

# Shift-share analysis of employment growth – the case of the V4 countries

## *Shift-share analýza rastu zamestnanosti – prípad krajín V4*

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**Abstract:** The performance of labour market together with its consequences (changes in employment, wages and labour productivity) is regarded as one of the major economic problems of our times. Well functioning labour market is an important precondition for economic growth and competitiveness of the country (Musil 2007; Blanchard 2006). The aim of this paper is to examine the changes in employment with the help of the shift-share analysis. Shift-share analysis enables the decomposition of employment growth into sectoral-mix effect, competitive effect and residual effect. First part of the paper will present the literature background on the development of labour markets of the V4 countries. Later on, we try to identify the driving forces of employment growth in the Visegrad group countries during the period 1994–2006. In addition, the last part of the paper will summarise the results obtained in our analysis.

**Key words:** labour market, shift-share analysis, Visegrad countries

**Abstrakt:** Vývoj na trhu práce spolu s jeho dopadmi (zmeny v zamestnanosti, mzdách a produktivite práce) sú považované za najväčšie ekonomické problémy našej doby. Správne fungujúci trh práce je dôležitou podmienkou pre hospodársky rast a konkurencieschopnosť danej krajiny. Cieľom článku je skúmať zmeny zamestnanosti s pomocou metódy shift-share analýzy. Táto analýza umožňuje rozklad rastu zamestnanosti na základe miešaného sektorového efektu, konkurenčného efektu a reziduálneho efektu. V prvej časti prezentujeme literárny prehľad o vývoji na trhu práce krajín V4. Ďalej sa snažíme identifikovať hybné sily rastu zamestnanosti krajín Vyšegrádskeho zoskupenia v období 1994–2006. V poslednej časti sumarizujeme výsledky našej analýzy.

**Kľúčové slová:** trh práce, shift-share analýza, krajiny Vyšegrádskeho zoskupenia

Labour markets in the Visegrad group countries went through many changes since 1990. While before 1990 the economic growth in our countries was based mostly on extensive growth, the transformation of our economies led to a more intensive use of labour force. Many authors have been analysing the changes in labour markets and the productivity of labour force as a consequence of the structural changes in the economy (Klíma, Palát 2005; Buchta 2004; Blaas 2004; Blanchard 2006; Musil 2007a, b, c). The changes occurred also in the sectoral structure of employment, as a result of structural changes in the economy. Economic transition in the V4 countries has been associated with the reallocation of labour force across economic sectors. On the one side, there has been a shift of resources, including labour force,

from the public to the private sector, on the other, there has appeared the movement of labour across industries. This was important because of two main reasons. First, the newly created jobs in the expanding sectors usually required different skills and were located in different regions than the jobs that were destroyed in the declining sectors. This led to the changes in the educational structure of labour force and to the regional changes in employment. Both views, educational and regional, have had an important impact on the competitive potential of the country (Rutkowski 2006). In the case of economies of the V4 countries (as well as other countries in transition), economists expected a similar pattern of employment changes as within the EU-15: the decrease of agriculture employment, the increase of

employment growth in market services, the decrease of employment growth in non-market services and the further decrease of employment in processing industry (Karpiński et al. 1999; Batóg, Batóg 2001). The intensity of structural changes and the sectoral changes of employment was dependent mainly on the mobility of labour force, which is not given only by economic determinants but also by the demographic ones (Merkle, Zimmermann 1994).

In the paper, we analyse the dynamics of the total and sectoral employment in the V4 countries during the period 1994–2006. The partial aim of the paper is to identify the components of employment growth: the sectoral-mix effect, the competitive effect and the residual effect.

## DATA AND METHODS

To analyse the dynamics of the total and sectoral employment in the V4 countries during the period 1994–2006, we used the shift-share analysis. The data employed are obtained from the OECD database. The shift-share analysis enables to identify the driving forces of employment growth. Based on the methodology used by Batog Batog (2007), we calculated the sectoral-mix effect, the competitive effect and the residual effect explaining the variations in the employment of the V4 countries between the years 1994–2006.

- *sectoral-mix effect in the country  $i$  ( $SE_i$ )*: measures the impact of differences between the initial sectoral structure of employment in the country  $i$  and the structure of the overall sample,
- *competitive effect*: measures the impact of differences between the sector specific growth rates in the country  $i$  and the sector specific rates average for all countries,
- *residual effect*: measures if the employment growth of the country  $i$  tends to be higher in relation to all countries, in the sectors in which the country  $i$  is specialised. (Batog, Batog 2007; Ray, Harvey 1995)

The first step of the shift-share analysis was to calculate the annualised employment growth ( $EG_i$ ) in the country  $i$ :

$$\overline{EG}_i = \left( \sum_{i=1}^n N_{ijt} - \sum_{i=1}^n N_{ij0} \right) / \sum_{i=1}^n N_{ij0}$$

where:

- $s$  = number of sectors
- $N_{ijt}$  = employment in country  $i$ , sector  $j$  and time  $t$
- $N_{ij0}$  = employment in country  $i$ , sector  $j$  and time 0
- $n$  = number of countries

The second part of the analysis focuses on the decomposition of the economic growth into:

- sectoral mix effect ( $SE_i$ ) in country  $i$ :

$$SE_i = CSG_i - \overline{EG} = \sum_{i=j}^s \overline{EG}_j \times w_{ij0} - \overline{EG}$$

where:

$CSG_i$  = employment growth in country  $i$  assuming common sectoral growth rates

$\overline{EG}$  = annualised employment growth in total sample

$\overline{EG}_j$  = annualised employment growth of sector  $j$  in total sample

$w_{ij0}$  = share of sector  $j$  in total employment at time 0

$$w_{ij0} = N_{ij0} / \sum_{j=1}^s N_{ij0}$$

- competitive effect ( $CE_i$ ) in country  $i$ :

$$CE_i = CID_i - \overline{EG} = \sum_{i=j}^s EG_{ij} \times \bar{w}_{j0} - \overline{EG}$$

where:

$CID_i$  = employment growth in country  $i$  assuming common initial distribution of sectors

$\overline{EG}$  = annualised employment growth in total sample

$\overline{EG}_j$  = annualised employment growth of sector  $j$  in total sample

$\bar{w}_{j0}$  = employment share of sector  $j$  in total sample at time 0

$$\bar{w}_{j0} = \sum_{j=1}^s N_{ij0} / \sum_{i=1}^n \sum_{j=1}^s N_{ij0}$$

- residual effect ( $RE_i$ ) in country  $i$ :

$$RE_i = REG_i - CE_i - SE_i, \quad REG_i = EG_i - \overline{EG}$$

where:

$REG_i$  = relative annualised employment growth in country  $i$

$\overline{EG}$  = annualised employment growth in total sample

$EG_i$  = the annualised employment growth in country  $i$

## EMPIRICAL RESULTS

### The development of employment growth in the V4 countries

The performance of labour market is considered to be one of the key determinants of the country competitiveness. Labour markets of the V4 countries went through a process of adaptation on new market conditions. As stated in Rutkowski (2006), labour

Table 1 Patterns of labour force adjustments

Labour force participation	Unemployment	
	high	low
High	Poland (late 1990s), Slovakia	Czech Republic
Low	Poland (early 2000s)	Hungary

Source: Rutkovski, 2006

force in the V4 countries followed different patterns of adjustment (Table 1).

The four basic patterns of adjustment are as follows.

- The 1<sup>st</sup> quadrant of the matrix shows limited job opportunities in the labour market, the labour force participation rate is high, but also the unemployment rates are high. This is because the unemployed workers still see some job opportunities and they still actively search for new jobs. There are only few of the workers who gave up the job search. This quadrant includes countries such as Slovakia. The case of Poland in this quadrant shows that this labour market state was transient. The Polish labour market evolved into a depressed one in early 2000s.
- For the countries in the 2<sup>nd</sup> quadrant, there was typical the scarcity of jobs, high unemployment rate and discouragement. This is a combination of high unemployment and low labour force participation rates, which signifies a depressed labour market with the resulting low employment level as it happened in Poland in the early 2000s. High unemployment in this case is according to Rutkovski, likely to reflect the fact that many jobless workers (e.g. primary earners, the poor) cannot afford to

be out of the labour and are compelled to actively search for work.

- The 3<sup>rd</sup> quadrant is characteristic by high employment, high labour force participation rate and low unemployment rate. This is the most desirable type of the labour market state.
- The last quadrant shows limited job opportunities and discouragement. Hungary is an example of a country where the limited job opportunities forced a number of jobless workers to withdraw from the labour force. This is the reason why unemployment in these countries is low, but so is the labour force participation rate. The employment effect is similar to that in the countries where both the labour force participation and unemployment are higher (the previous group).

The annualised total employment growth in the V4 countries is presented in Figure 1. The greatest employment growth in the searched period was observed in Slovakia. The unemployment rate remained relatively high in Slovakia during the whole searched period. This proved that the labour market performance in Slovakia presented an important barrier for economic growth and competitiveness of economy. Moreover, this high unemployment rate seemed to be natural for the Slovak labour market. Since 2004, the unemployment rate is steadily decreasing, which might be a result of economic reforms in Slovakia. The last quarter of 2007 shows the unemployment rate lower than 10% which is the lowest rate in the whole searched period. Czech labour market has been the most efficient among the V4 countries during the whole analysed period. It showed a stable position and the changes in employment were relatively small. In 2004 and 2006, the Czech Republic together with Slovakia became the fastest growing economies. The performance of labour market in Hungary shows a positive development especially during the last years when unemployment in Hungary ranged from 6 to 8%. The most complicated situation was observed in the labour market of Poland, where the employment rate has had a decreasing tendency since 1998 until 2004 and the values of unemployment rate were counted in two-digit numbers. However, the development after 2002 is positive, as the unemployment rate is steadily decreasing and moving toward the natural rate of unemployment, which might be a result of economic reforms in Poland. The common feature of all the labour markets was the increasing rate of employment at the end of the searched period.

Beside the changes in the total employment rate, there appeared also the changes in the structure of employment in the labour markets of the V4 countries. The structure of employment before the transition

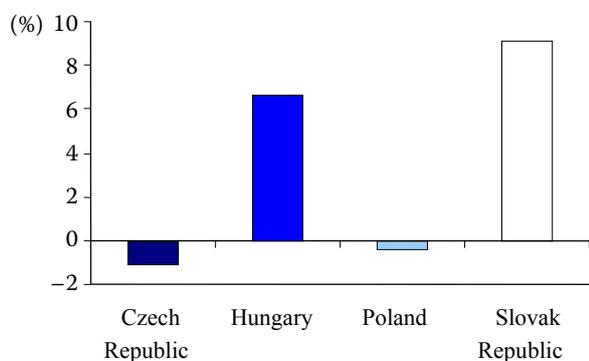


Figure 1. Annualised total employment growth during 1994–2006 for V4 countries (in percentage points)

Source: own calculation based on OECD data

was not based on efficient principles and a reallocation of the labour sources was needed in all the V4 countries. Under the central planning, industry in some countries was overdeveloped while the service sector was underdeveloped. Figures 2, 3, 4 show

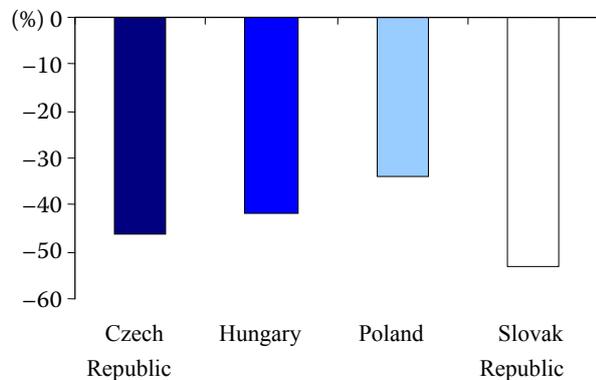


Figure 2. Employment growth in agriculture in V4 countries in 1994–2006 (in percentage points)

Source: own calculations based on OECD data

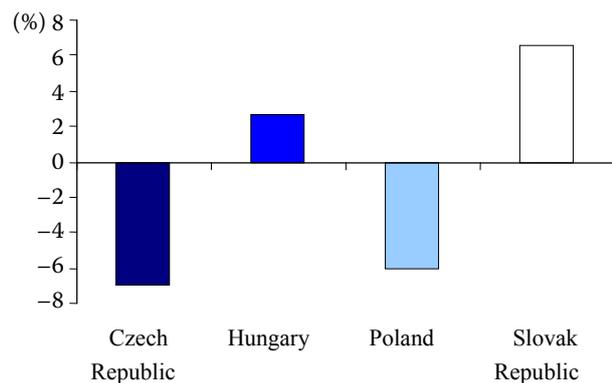


Figure 3. Employment growth in industry in V4 countries in 1994–2006 (in percentage points)

Source: own calculations based on OECD data

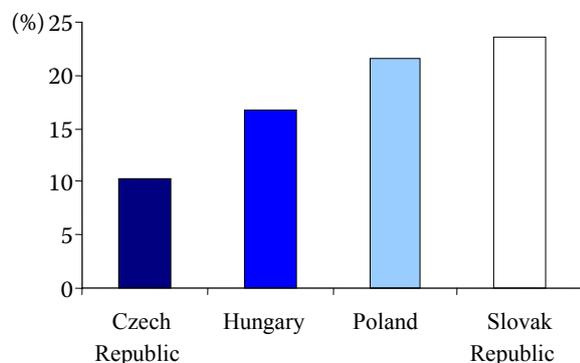


Figure 4. Employment growth in services in V4 countries in 1994–2006 (in percentage points)

Source: own calculations based on OECD data

Table 2. Shift-share analysis of employment growth in V4 countries (in percentage points)

	$CE_i$	$SE_i$	$RE_i$
Czech Republic	-6.519	23.582	-18.126
Hungary	-12.055	17.388	1.327
Poland	-3.847	-10.536	13.927
Slovak Republic	-15.413	7.811	16.662

Source: own calculation

the changes in employment growth in three sectors – agriculture, industry and services.

The agricultural employment decreased in all countries. The highest decrease was observed in Slovakia. While in 1960 agriculture in Slovakia employed 337% of the active labour force, in 1980 it was only 14.5%, and the present values are drawing near 4%. The common feature of all labour markets was the expansion of services at the expense of the agricultural sector and to a somewhat lesser extent at the expense of industry. The share of services was abnormally small before the transition, so that it is considered to be a measure of an efficient labour reallocation.

### Decomposition of employment growth in the V4 countries

Table 2 shows the shift-share decomposition of the relative employment growth into 3 sectors. The competitive effect explains the large part of the cross-country variation in employment growth, (correlation coefficients between the annualised employment growth and this effect are equal to 0.9693). It means that the impact of differences between the sector specific growth rates in a concrete country and the sector specific rates average for all countries have had strong influence on the employment growth of the country. There is no statistically significant correlation between the sectoral-mix effect and employment growth (0.1346), which means that the initial structure of employment in the V4 countries has had a very small influence on the relative growth rates of the overall employment. The influence of the residual effect was relatively high (except for Hungary).

Batog et al. (2007) made an analysis of the employment growth decomposition within the EU countries and obtained similar results. The largest part of variation in the relative employment growth in his study was explained by the competitive effect. As he noticed, almost all countries of the EU composed practically one cluster and this is even more true when we are talking about the countries of the Visegrad group.

## CONCLUSION

Labour markets in the Visegrad group countries went through many changes during the last 15 years. While before 1990 the economic growth in our countries was based mostly on extensive growth, the transformation of our economies led to a more intensive use of labour force. Later on, in 2001–2006, labour productivity growth in the V4 countries was faster than the average of the EU-15. All of our economies passed the period of high unemployment rate. However, the last years show the increase of employment rate. The cross-country comparisons of the employment growth revealed that the common feature of all V4 countries was the decrease in the agricultural employment together with the sustained increase of the service employment. A large part of the employment growth was explained by the competitive effect, there is no statistically significant correlation between the sectoral-mix effect and employment growth. It means that the initial structure of employment in the V4 countries has had a very small influence on the relative growth rates of the overall employment.

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