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Iulia Traistaru and Guntram B. Wolff

Regional Specialization and Employment Dynamics in Transition Countries

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Regional Specialization and Employment Dynamics in Transition Countries.

Iulia Traistaru* and Guntram B. Wolff**

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Abstract

Trade reorientation and transition to a market economy in Central and East European countries have resulted in structural change, i.e. industrial restructuring and labor reallocation across sectors and regions. In the 1990s, many transition countries have experienced considerable decline in output and employment.

In this paper we investigate and explain regional differentials in employment change in three transition countries: Bulgaria, Hungary and Romania. We apply a shift-share analysis using a three-factor decomposition and assess the role of industry mix (structural component), region-specific factors (differential component) and regional competitiveness (allocative component) in explaining regional differentials in employment growth. We find that the variance of regional employment growth is driven almost entirely by region-specific factors. Industry mix and regional competitiveness factors play only a minor role in explaining regional employment dynamics in the three countries included in our study.

JEL classification: J21, O41, R12, P23

Key words: Industry mix, regional growth, shift-share analysis, transition economies

*ZEI – Center for European Integration Studies, Walter-Flex Str. 3, D-53113 Bonn, Tel: +49/228/73 - 1886, e-mail: traistar@united.econ.uni-bonn.de

**ZEI – Center for European Integration Studies, Walter-Flex Str. 3, D-53113 Bonn, Tel: +49/228/73 - 1887, e-mail: gwolff@uni-bonn.de

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1 Introduction

Since 1990, trade reorientation and the transition to a market economy in Central and East European countries (CEECs) have resulted in major economic restructuring. Centrally planned economies had to adapt their regional and sectoral production structure to a market-based economic system. This led to large labor reallocation across sectors and regions. Regional employment changes can be driven by region-specific factors or by specialization in certain sectors, respectively industries of a region. The aim of this paper is to assess the importance of regional factors on the one hand and of industry specific factors on the other hand in explaining regional employment growth differentials in three selected transition countries, namely Bulgaria, Hungary and Romania.

This analysis is important and policy-relevant for a number of reasons. First, highly specialized regions are more vulnerable to asymmetric shocks, since industry demand shocks may become region-specific shocks. While in the long term regions may benefit from specialization via productivity growth, short run adjustment costs could be high in the case of relocation of firms. Second, region-specific shocks trigger different adjustment mechanisms. Third, the analysis of region-specific shocks should provide insights for the further development and co-ordination of regional policies within an integrated Europe.

Previous studies about the roles of national, industrial and regional factors in explaining regional employment change have established the following stylized facts. In a seminal paper, Blanchard and Katz (1992) show that in the US a large proportion of movements in employment growth is common to all states. In the case of Europe, Decressin and Fatas (1995) show that most of the dynamics in employment growth is region-specific which implies that region-specific shocks may be important in Europe. In the US, Gracia-Milà and McGuire (1993) find that the industrial mix plays an important role in explaining regional employment growth differentials. Esteban (2000) shows that region specific factors explain most of regional productivity differentials in Europe. In transition countries the existing evidence is less conclusive: while region specific factors explain regional employment growth differentials in Poland, the inherited, industry mix play the major role in countries such as Hungary and Slovakia (Boeri and Scarpetta 1996).

In this paper, we use sectoral employment data at regional level for the period 1990-1999 and investigate regional differentials in employment growth in Bulgaria, Hungary and Romania. We apply a shift-share analysis using a

three-factor decomposition suggested in Esteban (2000) and assess the role of industry mix (structural component), region-specific factors (differential component) and regional competitiveness (allocative component) in explaining regional differentials in employment growth. To our knowledge this is the first contribution bringing empirical evidence on the role of these three components in explaining regional employment growth differentials in transition countries. We find that in all the countries investigated the variance of regional employment growth is driven almost entirely by region-specific factors. Industry mix and regional competitiveness factors play only a minor role in explaining regional employment dynamics in the three countries included in our study.

The remainder of this paper is organized as follows. Section 2 discusses the three-factor decomposition methodology applied. Section 3 introduces the data and section 4 describes the summary statistics of regional employment growth and regional specialization in Bulgaria, Romania and Hungary. The results we obtain from our shift-share analysis are presented and discussed in section 5. Finally, in section 6 we formulate the main conclusions of our findings as well as their policy implications.

2 Methodological Framework

Regional employment growth differentials can be analyzed with the shift-share methodology. Despite reservations and criticisms, the shift-share approach is the most commonly used method to decompose the regional employment dynamics into regional and structural factors (e.g. Patterson (1991), Loveridge and Selting (1998), Fothergill and Gudgin (1982) and Esteban (2000)).[1] Initially it was used to decompose growth differentials between a region and the national average into two components: the growth differential due to a better/worse than national average performance of the region; the growth differential due to the specialization of the region in fast/slow growing sectors (Dunn 1960). Esteban (1972) extended the two-factor decomposition to a sum of three components which could be described as: structural, differential and allocative. The structural component indicates the growth share due to the

[1] One of the points of reservation raised is its lack of an underlying theory (Houston 1967). One additional major points of critique is that the method is deterministic. We believe that beside its deterministic nature, the method allows to give an accurate description of **actual** employment changes. Furthermore we do not seek to make statements about individual regions, for which a statistical significance test is necessary, but our analysis aims at looking at variance shares of the different components over the entire cross-section.

specialization (industry mix) of each region. The differential component, measures the part of growth due to region specific factors. Finally, the allocative component measures the covariance of the two factors and can be interpreted as regional growth deriving from its specialization in those activities where the region is most competitive.

In order to disentangle the role of industry mix and region specific factors in explaining the regional employment differentials we compare each region with a benchmark region having sectoral employment growth rates and industry mix equal to the national average. The differences between actual and the benchmark regions with respect to industry mix and sectoral employment growth capture the importance of these two factors in each region.

g	employment growth rate at national level
g_j	employment growth rate in region j
g_i	employment growth rate in industry i
E	employment at national level
E_j	employment in region j
E_i	employment in industry i
E_{ij}	employment in industry i in region j
$s_{ij} = E_{ij}/E_j$	share of employment in industry i in region j in total employment of region j
$s_i = E_i/E$	share of employment in industry i at national level
$g_{ij} = \frac{E_{ij,t+1} - E_{ij,t}}{E_{ij,t}}$	growth rate of employment in industry i in region j.

Table 1: Notations and definition of variables.

The difference between regional and national growth rate, as defined by equation (1) can be decomposed into three components.

$$g_j - g = \sum_i g_{ij} s_{ij} - \sum_i g_i s_i \tag{1}$$

The growth differential due to the specific sectoral composition/specialization of the region j, assuming that sectoral employment growth rates in each region are equal to the national average, is measured by μ_j (equation (2)).

$$\mu_j = \sum_i (s_{ij} - s_i) g_i \tag{2}$$

μ_j is positive if the region is specialized ($s_{ij} > s_i$) in sectors with high positive employment growth rates at the national level and de-specialized ($s_{ij} < s_i$) in sectors with low positive employment growth rates. μ_j is maximum in case the region j is specialized in the sector with the highest employment growth nation wide. μ_j is minimum if the region is specialized in the sector with the lowest employment change. Equation (2) can be rewritten as:

$$\sum_i s_{ij} g_i = g + \mu_j \tag{3}$$

The term on the left hand side (LHS) is the average employment growth in region j if regional and national employment growth rates coincide sector by sector.

The growth differential due to differences in employment growth of industry i in region j compared to the national growth of i, π_j, is given by equation (4).

$$\pi_j = \sum_i s_i(g_{ij} - g_i) \tag{4}$$

It can be rewritten as:

$$\sum_i s_i g_{ij} = g + \pi_j \tag{5}$$

The LHS describes the growth rate of the region, if it had the same sectoral structure. The variable π_j therefore describes the part of growth difference between the region and the national average, which can be attributed to region-specific factors.

The covariance between the two effects is given by equation (6).

$$\alpha_j = \sum_i (s_{ij} - s_i)(g_{ij} - g_i) \tag{6}$$

It captures high employment growth in those regions where a combination of certain industries and the region specific advantages lead to higher growth rates. With these equations it is easy to show that

$$g_j - g = \mu_j + \pi_j + \alpha_j = \sum_i s_{ij} g_{ij} - \sum_i s_i g_i \tag{7}$$

One way of measuring the role played by each of the shift-share components in explaining interregional differences in employment growth is to compute the relative weight of the variance of each component in overall observed variance. The variance of $g_j - g$ is

$$var(g_j - g) = var(\mu_j) + var(\pi_j) + var(\alpha_j) + 2[cov(\mu_j, \pi_j) + cov(\mu_j, \alpha_j) + cov(\pi_j, \alpha_j)] \tag{8}$$

Second, the importance of each factor can be assessed looking at the value of R^2 in regressions of total regional employment growth variation on each of the three factors separately.

$$g_j - g = a + b\mu_j + \epsilon_j \tag{9}$$

$$g_j - g = a + b\pi_j + \epsilon_j \tag{10}$$

$$g_j - g = a + b\alpha_j + \epsilon_j \tag{11}$$

We use the results of the regressions as a further check of the results of the relative variance comparison.

3 The Data

We use employment data at regional NUTS 3 level for Bulgaria, Hungary and Romania for the period 1990-1999[2]. Our data set[3] contains employment on sectors of economic activity and on manufacturing branches for 28 regions in Bulgaria, 20 regions in Hungary and 41 regions in Romania. The sectors of economic activity include agriculture, industry and services for Bulgaria and agriculture, industry, construction and services for Hungary and Romania. Regional manufacturing employment is disaggregated on 14 manufacturing branches for Bulgaria, 12 manufacturing branches for Romania and 8 manufacturing branches for Hungary. The data included in this data set has been collected from national statistical offices. Employment refers to persons employed in Bulgaria and Romania and employees only in Hungary. The GDP growth figures are taken from the EBRD Transition report, 2001 edition.

The average population size of NUTS 3 regions is similar in Hungary and Romania while in Bulgaria it is smaller. The average size of NUTS 3 regions has declined in the period 1990 to 1999 in all three countries. Regional size differentials are highest in Hungary and smallest in Romania. Regional size differentials have increased in Bulgaria and decreased in Hungary and Romania.

	Bulgaria	Hungary	Romania
Population 1990 in 1000			
average	309.2	514	566
min	155.5	225.4	237.7
max	1202.9	1993.9	2394.3
stdev	216.2	378.6	337.9
coefficient of variation (in %)	69.9	73.7	59.7
Population 1999 in 1000			
average	292.5	505	547.8
min	138.8	217.8	239.5
max	1211.5	1838.7	2286.1
stdev	220.2	355	325.1
coefficient of variation (in %)	75.3	70.3	59.3

Table 2: The average size of NUTS 3 regions in Bulgaria, Hungary and Romania in 1990 and 1999.
Source: Data set REGSTAT, own calculations.

[2]In Hungary and Romania, data were only available from 1992-1999.

[3]The data set REGSTAT has been generated in the framework of the project P98-1117-R undertaken with financial support from European Communities PHARE ACE programme 1998.

4 Regional Specialization and Employment Change Differentials

This section aims at understanding the regional employment specialization and dynamics in the three transition countries. We first analyze the evolution of GDP and aggregate employment figures, so as to gain insights into the process of transition. The evolution of sectoral employment shares in the economy describes the process of economic restructuring in the transition countries. The tables, presenting the coefficient of variation of employment, employment growth and industry shares, allow us to asses the regional variation of these variables. We find considerable regional variation in employment change, which we then decompose in the next section using a shift-share analysis.

4.1 Bulgaria

Bulgaria has experienced large losses in GDP and employment since the beginning of transition (EBRD 2001). While GDP per capita was more than 1500 US$ in 1990, it declined to 1150 US$ in 1994 and to similar values again in 1996. Figure 1 shows the evolution of real GDP and employment growth in Bulgaria in the 1990s. GDP and employment growth moved together during most of the 1990s. Only in 1999, employment decreased although GDP increased.

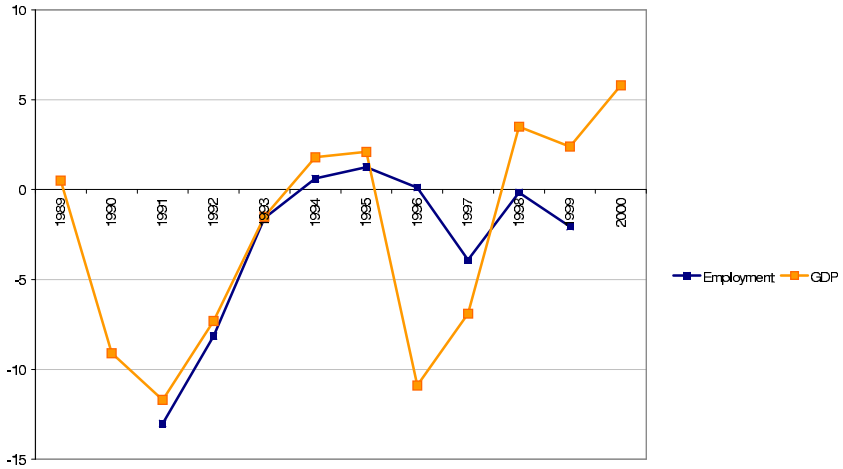

Figure 1: Real GDP and employment growth in Bulgaria.

The large losses in GDP were accompanied by significant restructuring across sectors. The share of the industrial sector in total employment decreased

dramatically during the 1990s, falling from over 45 percent to 28 percent in 1999. The share of industry in GDP also decreased from 33 percent to 25 percent (EBRD 2001). At the same time, the service sector share continuously increased during the 1990s and so did the agricultural sector's. In absolute

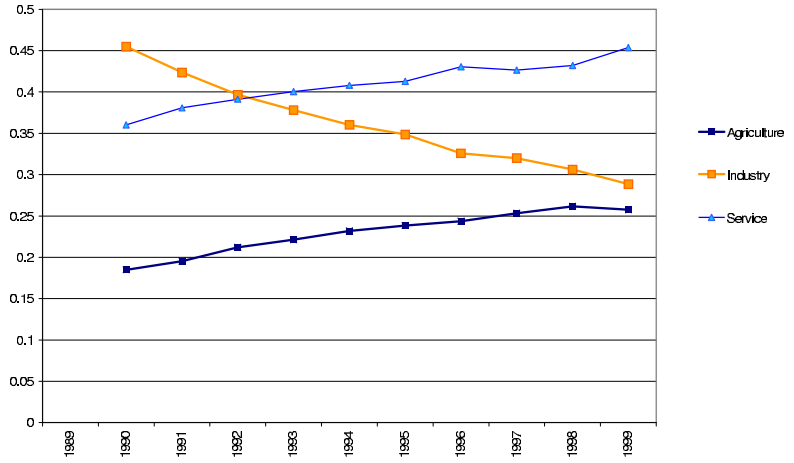

Figure 2: Sectoral shares in total employment in Bulgaria.

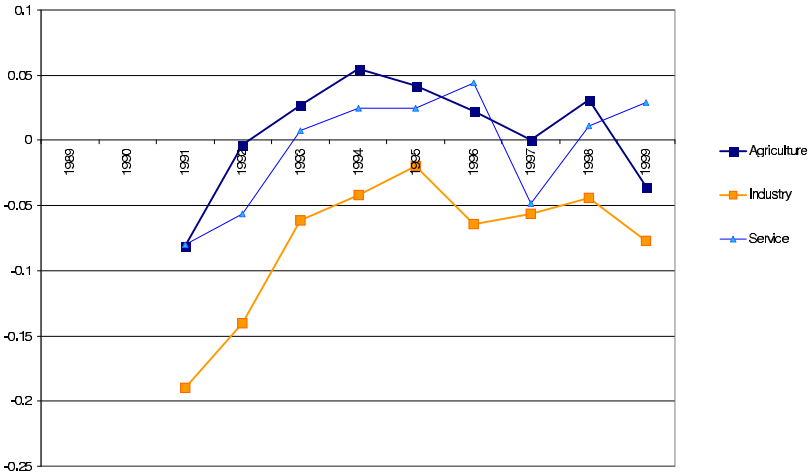

Figure 3: Sectoral employment growth in Bulgaria.

terms, the industry sector continuously lost employment during the 1990s. From 1990 to 1999, industrial employment decreased from 1.9 million to 0.9 million. The shrinkage of industrial employment was most dramatic in the initial phase of transition. Employment in the service sector decreased slightly from 1.47 million to 1.40 million, while employment in the agricultural sector increased from 0.75 to 0.79 million.

Variable	Obs	Mean	Std. Dev.	Min	Max	coeff. of variation
Total regional employment	280	119156.7	91630.29	41921	580041	76.9
Sectors						
Agriculture	280	27201.43	12226.58	2125	93867	44.9
Industry	280	43360.85	35239	9180	260037	81.3
Service	280	48594.38	57316.7	17758	382675	117.9
Regions	28					
Shares						
Agriculture	280	0.272	0.096	0.013	0.479	35.2
Industry	280	0.357	0.083	0.179	0.587	23.3
Service	280	0.371	0.067	0.277	0.731	17.9
Growth						
Total regional employment	252	0.003	0.503	-0.785	7.369	15489.7
Agriculture	252	0.075	0.788	-0.920	11.757	1052.6
Industry	252	-0.047	0.442	-0.839	6.173	-942.1
Service	252	0.047	0.865	-0.847	13.355	1858.1

Table 3: Summary statistics for regional employment in Bulgaria.

On the regional level, the summary statistics (see Table 3) reveal considerable variation in employment shares and growth. The map (Figure 16 in the appendix) shows the spatial variation of employment growth during the 1990s. Some regions have lost more than 20 percent of their initial employment in the course of the 1990s! For the whole period considered, the lowest share for agriculture, was 1.2 percent in 1992 in Blagoevgrad, while the highest share was 47.9 percent in Silistra in 1999. The coefficients of variation[4] range between 18 and 35 percent for the employment shares, for growth rates they are considerably higher in absolute values with up to 1000 percent. The coefficient of variation for total regional employment growth is high, indicating strong variation in regional employment growth rates during the 1990s in Bulgaria.

This pattern remains the same for an analysis of the data on a yearly basis (see Table 4). The coefficient of variation for total employment in levels increased over the entire period, with a maximum of 84.4 percent in 1996 when Bulgaria faced great economic difficulties and increased to 85.4 percent in 1999. Evidently, regional disparities in employment increased during the 1990s in Bulgaria.

The coefficient of variation for total regional employment growth shows a mixed pattern.[5] It is very high during the period 1994-1996, reaching a peak in 1997 with a value of over 2400 percent. This indicates that there is considerable variation in regional employment growth.

[4]The coefficient of variation is defined as the ratio of standard deviation over the mean, $(v = std.dev./mean * 100)$.

[5]A negative coefficient of variation indicates that the mean over all regions' employment growth in the respective year was negative, since standard deviation is positive.

Variable	1990	1991	1992	1993	1994	1995	1996	1997	1998	1999
Total reg. empl.	70.9	71.5	73.9	76.6	77.0	79.1	84.4	79.8	79.9	85.4
Sectors										
Agriculture	44.9	49.0	48.9	48.6	43.1	40.8	56.2	40.2	39.2	40.8
Industry	72.0	71.2	76.5	81.9	84.9	83.7	82.8	76.7	75.3	81.2
Service	105.0	107.3	109.7	111.9	111.1	118.7	127.2	130.1	131.9	137.8
Shares										
Agriculture	35.6	37.7	34.9	33.9	33.3	30.8	35.6	31.7	30.4	31.6
Industry	13.1	14.9	16.5	18.5	19.8	19.7	21.7	21.2	21.9	24.9
Service	15.6	16.3	15.7	15.3	14.8	16.4	18.3	20.1	20.6	19.8
Growth										
Total reg. empl.		-25.5	-31.0	-112.5	410.6	360.6	497.0	-2469.8	-386.1	-65.6
Agriculture		-79.7	2293.7	196.8	176.2	126.1	442.4	536.6	134.0	-115.2
Industry		-17.8	-23.2	-50.6	-67.1	-148.6	525.5	-202.4	-79.7	-65.8
Service		-43.4	-31.5	1745.7	148.1	1536.2	457.1	-180.5	825.7	145.9

Table 4: Evolution of the coefficient of variation of sectoral employment, sectoral employment shares and (sectoral) employment growth for Bulgaria.

In summary, the industrial sector has lost employment in Bulgaria, while the agricultural sector and service sector retained more or less constant employment. There is considerable variation in regional employment growth and sectoral shares. During the 1990s regions have become more unequal in Bulgaria. Regional variation in employment growth was especially high during the period 1994-1998.

4.2 Romania

Over the period 1992-1999, Romania has continuously lost employment (see Figure 4). The loss was particularly high in 1993, a 3.8 percent decrease relative to 1992 and in 1995, a 5.2 percent respectively. Contrary to Bulgaria, the evolution of employment has not closely matched the real GDP growth. GDP declined sharply in the early 1990s, in the mid 1990s the economy recovered, entering in a new recession in 1997/1998. Since 2000, GDP is growing again. Especially in 1995, GDP growth was very high coinciding with negative employment growth. This points at productivity gains during the mid-1990s.

The employment share of the industry sector in Romania declined by 7 percentage points as shown in Figure 5. This loss was matched by an increase in the employment share of the agricultural sector, which has a share of over 40 percent in Romanian employment in 1999. The variation in total employment is mostly driven by the largest three sector, the agricultural, industry and service sectors, the construction sector playing only a minor role. While the agricultural sector remained at 3.4 million employed, the industrial sector lost more than 1 million workers, with the number of employed persons falling from

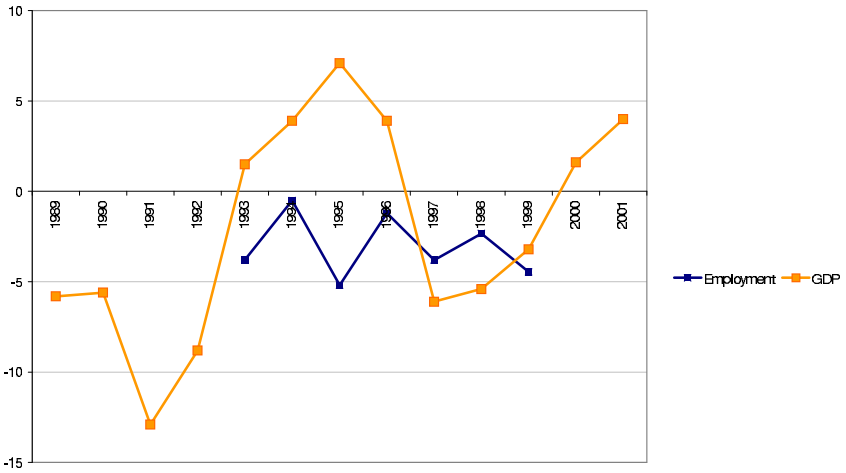

Figure 4: Real GDP and employment growth in Romania in percent.

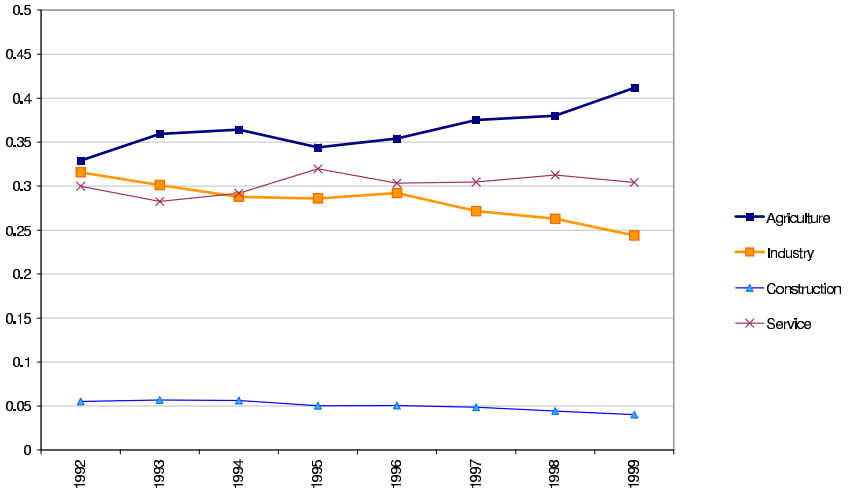

Figure 5: Sectoral shares in employment in Romania.

3.3 to 2 million during the 1990s. The service sector employment fell from 3.2 to 2.6 million. In 1994/95, employment in the service sector moved along with increasing GDP, while employment in the other sectors declined.

The summary statistics of regional data (see Table 5) again reveal considerable variation in employment shares and growth rates, with a coefficient of variation for total regional employment of 60 percent some 18 percentage points lower than in Bulgaria. In the appendix, the map (Figure 17) shows the spatial variation of employment change during the 1990s. The regional variation in the sectoral employment shares is also considerable, with a share of 4 percent for the agricultural sector in Bucharest and a maximal share of 65 percent in Giurgiu. Especially in the agricultural sector's growth rate there is enormous variation in the 1990s. The evolution of the coefficient of variation shown in Table 6 indicates a different pattern compared to Bulgaria. While

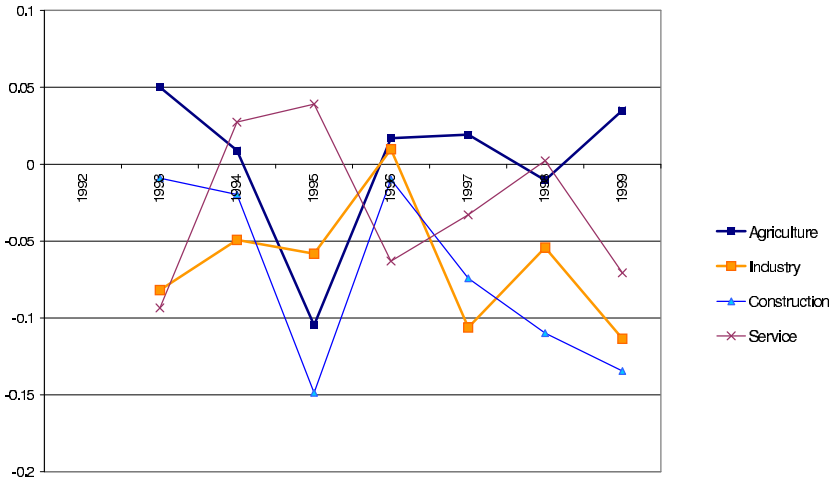

Figure 6: Sectoral employment growth in Romania.

in Bulgaria it increased from 71 to 85 percent, in Romania it decreased from 67 to 51 percent, implying that Romanian regions have become more similar in terms of total employment in the 1990s. Total regional employment growth had large variations in 1994 and 1996 with values up to 1000 percent, while in all other years the variation coefficient was around 100 percent. Considerable regional variation can be noted in 1996 in the growth rate of the construction sector and in 1998 in the service sector's growth. As in the case of Bulgaria, the strong regional variation in employment growth raises the question about the factors contributing to these disparities.

Summing up, like Bulgaria, Romania experienced a process of de-industrialization in the 1990s. In contrast to Bulgaria, however, there were considerable employment losses in the service sector. Regions in Romania have become more similar in terms of employment. Regional employment growth experienced great regional variation in 1994 and 1996, which is lower than the variation in Bulgaria in the years with highest variation.

4.3 Hungary

In Hungary, employment decreased over the period 1992 - 1997. In the initial phase of transition, GDP decreased strongly, but it resumed positive growth by 1994. With higher GDP growth rates since 1997 (almost 5 percent), employment increased again.

The evolution of the sectoral shares in Hungary has been different compared to the other two investigated countries (Figure 8. While in Bulgaria and Romania, the industry sector has lost importance and the agricultural

Variable	Obs	Mean	Std. Dev.	Min	Max	coeff. of variation
Total regional employment	328	230.7	139.9	88	1201	60.6
Sectors						
Agriculture	328	83.8	28.2	32.4	159.3	33.6
Industry	328	65.5	52.1	10.8	417.1	79.6
Construction	328	11.7	15.2	1.9	141.9	130.2
Service	328	69.6	73.9	21.9	597.8	106.1
Regions	41					
Shares						
Agriculture	328	0.4	0.1	0.0	0.7	29.9
Industry	328	0.3	0.1	0.1	0.5	30.2
Construction	328	0.0	0.0	0.0	0.1	41.2
Service	328	0.3	0.1	0.2	0.6	22.7
Growth						
Total regional employment	287	0.0	0.0	-0.2	0.1	-176.0
Agriculture	287	0.0	0.1	-0.3	0.3	2942.6
Industry	287	-0.1	0.1	-0.3	0.5	-172.5
Construction	287	0.0	0.3	-0.7	3.3	-1025.1
Service	287	0.0	0.1	-0.4	0.6	-619.8

Table 5: Summary statistics for regional employment, sectoral employment shares and (sectoral) employment growth in Romania.

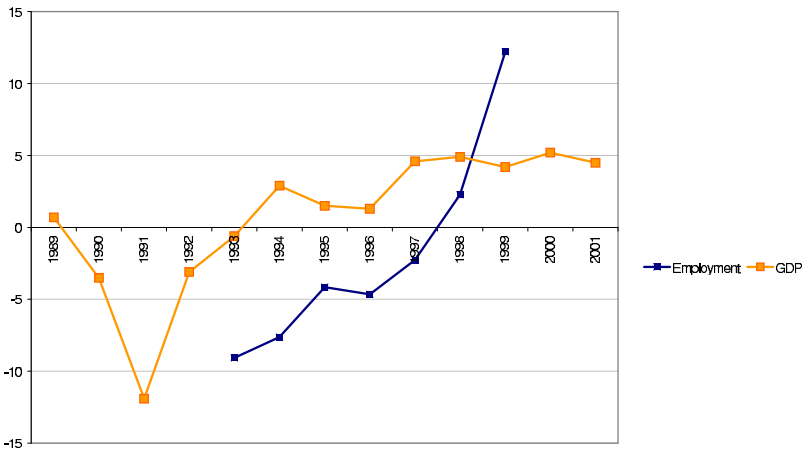

Figure 7: Real GDP and employment growth in Hungary.

sector increased to magnitudes of around 40 percent, in Hungary the service sector dominates the economy. Throughout the 1990s, its share increased from around 53 to 60 percent. The industry sector held a constant share of around 30 percent, while the agricultural sector slightly lost importance approaching a share close to West European values. Employment growth has been negative in all sectors until 1997. Since then employment increased considerably in the construction, industry, and service sectors. Thus after an initial phase of employment and GDP loss in Hungary, the economy now seems to recover.

As Table 7 shows, there are substantial regional disparities in employment in Hungary. While the smallest region has only 29 thousand employed people, the largest region has more than 950 thousand employed people. This ex-

Variable	1992	1993	1994	1995	1996	1997	1998	1999
Total regional employment	67.4	64.3	64.2	60.2	57.1	56.5	58.7	51.1
Sectors								
Agriculture	33.1	33.0	32.7	33.3	33.8	34.2	34.9	35.0
Industry	81.2	80.4	83.4	76.3	75.6	76.4	77.3	69.1
Construction	144.5	154.3	131.5	113.9	109.1	105.1	117.4	97.9
Service	115.9	114.0	114.6	103.1	98.5	100.3	106.0	96.2
Shares								
Agriculture	30.8	30.8	30.3	30.1	30.0	29.5	29.3	27.7
Industry	27.1	29.9	30.9	29.3	29.9	29.7	30.3	30.1
Construction	37.4	46.5	39.2	40.4	38.9	40.0	40.7	38.0
Service	20.7	22.8	23.4	21.4	21.7	24.4	21.7	24.3
Growth								
Total regional employment		-90.5	-1018.4	-98.7	-731.7	-145.6	-181.7	-166.6
Agriculture		76.9	487.3	-47.4	237.4	148.0	-172.6	51.7
Industry		-79.5	-172.5	-258.0	483.6	-80.7	-158.3	-180.0
Construction		5285.8	315.4	-182.7	699.6	-238.8	-136.8	-160.5
Service		-60.8	422.0	154.4	-159.8	-282.4	1183.8	-107.6

Table 6: Evolution of the coefficient of variation for Romania.

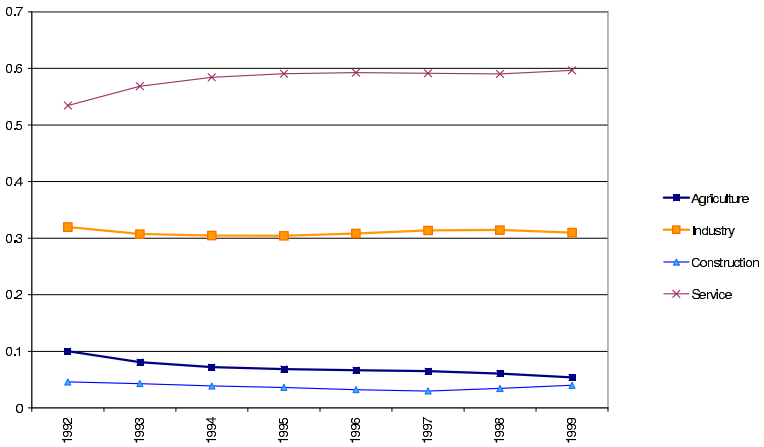

Figure 8: Sectoral shares in employment in Hungary.

plains the almost twice as high coefficient of variation compared to Romania. The sectoral shares in employment also have substantial regional differences. The coefficient of variation in shares increased during the 1990s for all sectors except the construction sector, which dropped in 1999 after having reached a maximum in 1996 (Table 8). The regions have become more different in 1998 in their total regional employment size. In the course of higher economic growth in Hungary, some regions appear to have increased much faster than others, which explains the jump in the coefficient of variation for total employment levels in 1998. Regional disparities in employment growth rates (In the appendix, the map (Figure 18) shows the spatial variation of employment change during the 1990s.) were especially high in 1996, mostly due to high regional growth variation in the industry sector. But also in 1998, there were still substantial variations in the growth rate. While Budapest had a strong

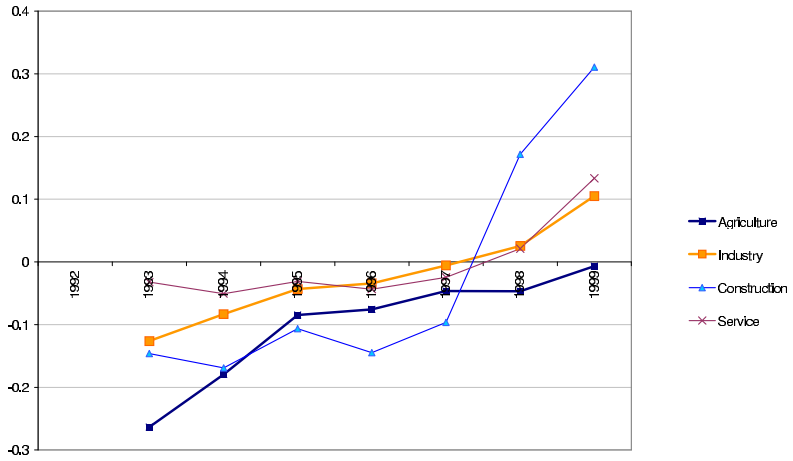

Figure 9: Sectoral employment growth in Hungary.

Variable	Obs	Mean	Std. Dev.	Min	Max	coeff. of variation
Total regional employment	160	130.29	155.93	29.26	952.22	119.68
Sector						
Agriculture	160	9.38	4.29	2.03	25.23	45.79
Industry	160	40.45	28.89	10.54	195.27	71.41
Construction	160	4.95	6.39	0.69	45.77	129.00
Service	160	75.51	123.16	14.93	734.18	163.10
Regions	20					
Share						
Agriculture	160	0.10	0.04	0.00	0.21	40.57
Industry	160	0.35	0.07	0.17	0.51	18.70
Construction	160	0.04	0.01	0.02	0.06	25.16
Service	160	0.51	0.08	0.37	0.79	15.21
Growth						
Total regional employment	140	-0.03	0.10	-0.36	0.40	-331.90
Agriculture	140	-0.10	0.11	-0.40	0.25	-109.17
Industry	140	-0.02	0.12	-0.43	0.52	-540.66
Construction	140	-0.01	0.23	-0.35	1.01	-1627.67
Service	140	-0.02	0.11	-0.35	0.46	-566.18

Table 7: Summary statistics for regional employment, sectoral employment shares and (sectoral) employment growth in Hungary.

increase in employment in 1998 (33 percent), other regions like Borsod-Abauj-Zemplen and Zala lost 14 and 17 percent of their employment respectively. In 1999 all regions experienced positive employment growth. Bacs-Kiskun and Pest had strong increases in employment of around 20 percent and 30 percent respectively, while employment in Tolna increased by 6 percent. The standard deviation of growth rates was thus much smaller, while the mean was higher, explaining the drop in the coefficient of variation to 42. The strong regional variability in the agricultural sector in 1999 was of little relevance for the entire economy due to its small share. Thus in 1999 the country as a whole had a good growth performance.

Summing up there are similarities and differences in the three countries

Variable	1992	1993	1994	1995	1996	1997	1998	1999
Total regional employment	111.2	114.7	113.2	113.9	111.2	109.9	148.9	145.6
Sector								
Agriculture	38.9	31.4	31.4	32.4	32.8	33.5	36.6	36.7
Industry	74.8	72.0	66.2	64.5	59.6	55.6	85.8	84.9
Construction	130.5	129.2	121.8	120.7	120.7	123.1	130.6	125.7
Service	155.6	155.5	153.8	155.6	153.5	153.9	201.7	194.0
Share								
Agriculture	37.8	36.6	37.1	37.8	37.2	38.3	39.7	39.6
Industry	17.2	17.3	17.3	18.5	19.0	20.2	20.6	19.7
Construction	19.1	21.4	20.8	23.2	27.2	25.4	23.8	16.3
Service	14.1	13.4	13.7	14.6	15.0	16.0	17.8	16.0
Growth								
Total regional employment		-25.5	-23.3	-167.5	-757.1	-120.0	-138.3	42.0
Agriculture		-55.5	-30.5	-61.9	-56.6	-161.5	-158.8	-2611.7
Industry		-27.4	-62.0	-231.4	2866.7	1102.1	-616.8	64.1
Construction		-49.6	-53.3	-99.3	-100.3	-71.5	132.9	57.3
Service		-92.5	-30.6	-184.6	-1159.6	-76.2	-83.9	38.7

Table 8: Evolution of the coefficient of variation for Hungary.

with respect to employment, sectoral shares and (sectoral) employment growth. The average employment size of a region in the three countries is different. While in Bulgaria and Hungary, the average regional employment is around 120 and 130 thousand people employed, in Romania 230 thousand people work in every region on average. Hungary has a very different sectoral structure from Romania and Bulgaria. While Bulgaria and especially Romania have a very large agrarian sector, Hungary's economy is dominated by the service sector. Regions differ largely in terms of employment size in Hungary, where the coefficient of variation increased during the 1990s. In Romania, the coefficient of variation for regional employment size is only half the size of Hungary and decreasing. Regions have thus become more similar. In Bulgaria, regional variation was somewhat higher than in Romania and increased during the 1990s. In Hungary, regional employment size variation increased in the course of the 1990s. For the sectoral employment shares there is less regional variation in Hungary compared to Romania and Bulgaria except for the agricultural share. Regional variation in employment growth rates is highest in Bulgaria, especially in the mid 1990s. In Hungary this variation is relatively low in the late 1990s but was quite high in 1996, especially in the industrial sector. Overall one can conclude that the three investigated countries differ substantially in terms of sectoral composition of their economies. Also the evolution of the variation in regional employment sizes shows a different pattern. Regional employment differentials have increased in Hungary and Bulgaria and decreased in Romania. Regions differ in terms of their sectoral shares, while this variation is lowest in Hungary. Regional employment growth variation is substantial in all three countries, especially in the early phase of transition.

5 Determinants of Regional Employment Change

This section presents the results of the regional employment growth decomposition into three components as described in section 2. Our aim is to assess the importance of the industry mix, regional factors and allocative factors in explaining regional growth differentials. We do so by calculating the variance shares of the respective components.

5.1 Bulgaria

In Bulgaria, region specific factors play the predominant role in explaining regional growth variation. π has the largest share of variance in all years, as shown in table 9. The sectoral/industry mix factor, μ, explains only little or nothing, while α, the allocative component, has a variance share between 5 and 56 percent. For some years, the covariance term is negative.

	1991	1992	1993	1994	1995	1996	1997	1998	1999
$var(\mu)/var(g_j)$	0.04	0.13	0.06	0.03	0.04	0.00	0.00	0.25	0.10
$var(\pi)/var(g_j)$	0.80	0.63	1.35	1.10	0.86	0.54	0.61	1.11	0.74
$var(\alpha)/var(g_j)$	0.05	0.19	0.11	0.56	0.07	0.08	0.05	0.35	0.30
$2 * Covariance/var(g_j)$	0.11	0.05	-0.52	-0.69	0.03	0.38	0.35	-0.70	-0.13

Table 9: Evolution of the variance shares for Bulgaria.

Figure 10 illustrates, that region specific factors played the major role in explaining employment growth differentials, whereas the different composition

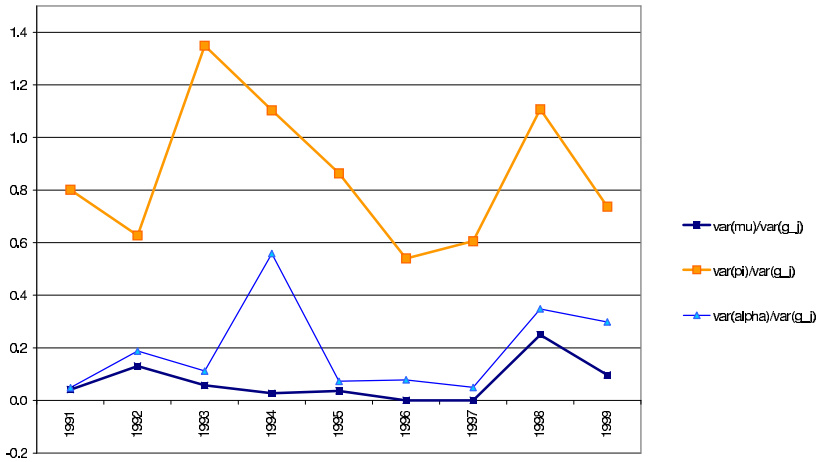

Figure 10: The evolution of variance shares over time in Bulgaria.

of industries in the regions explained only little of the overall variance.

The fact that regional factors are the predominant source of regional growth variation is quite astonishing in view of the fact that the three sectors included in the analysis are expected to have very different growth potentials and different responsiveness to shocks. In the previous section we showed that there is considerable variation in the regional shares of sectors in total regional employment. Regional employment growth differences, however, are driven by factors specific to a region, not by differences in the shares. The importance of regional factors declined from 1993 to 1996 and had a second (lower) maximum in 1998. It is interesting to note that the regional component attains its two maxima in times when GDP growth was positive. Thus especially in times of booms, which coincide with times of expanding employment in Bulgaria, some regions grow faster than others. Growth of the economy thus appears to be unevenly distributed spatially. This result is in line with Petrakos and Saratsis (2000), who show for Greece that regional inequalities are pro-cyclical, increasing in times of economic booms and decreasing in times of recessions.

To further assess the importance of each of the three factors individually, we regressed the gap between regional and national average employment growth $g_j - g$ on each of the three factors separately, as in regressions (9) to (11).[6] Clearly, variation of π has the highest explanatory power in the regressions for all years, with an R^2 between 0.44 to 0.99. The sectoral composition factor, μ, has explanatory power only in 1991, indicating that in the initial phase of transition the sectoral composition of employment had a significant impact on employment losses. Later on R^2 values are lower than 6 percent. The combination of region-specific factors and sectoral composition of the region, α, in some years contributes only little to the explanation of $g_j - g$. In other years its R^2 reaches values of 0.99. The regression results therefore confirm the insights gained. The sectoral composition has little explanatory power, while factors specific to a region drive regional employment growth differences.

5.2 Romania

Over the period 1993-1999 in Romania, regional factors have the largest share in overall regional employment growth variance (Table 10). Their variance share increased in the beginning of the sample and declined again in 1999 (see also Figure 11). The variance shares of the sectoral composition and the competitiveness factor remained stable at around 3 to 11 percent. Again this result is astonishing since we consider 4 sectors, which are unevenly distributed across

[6] The regression results are presented in Table 12 in the appendix.

	1993	1994	1995	1996	1997	1998	1999
$var(\mu)/var(g_j)$	0.09	0.01	0.03	0.03	0.06	0.01	0.10
$var(\pi)/var(g_j)$	0.62	1.27	1.03	0.99	0.91	1.13	0.71
$var(\alpha)/var(g_j)$	0.18	0.11	0.08	0.04	0.06	0.07	0.07
$2 * Covariance/var(g_j)$	0.11	-0.39	-0.14	-0.06	-0.03	-0.21	0.11

Table 10: Evolution of the variance shares for Romania.

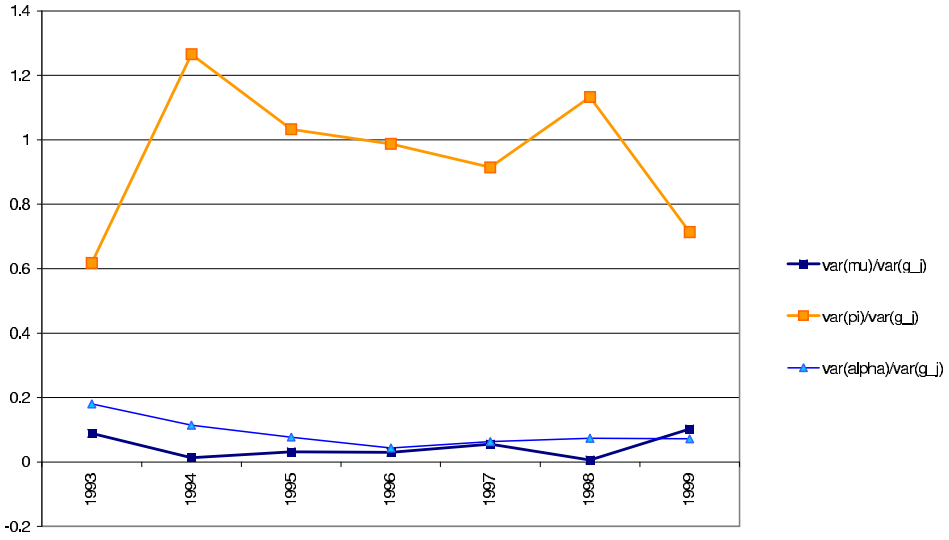

Figure 11: The evolution of variance shares over time in Romania.

regions. All 4 sectors may be subject to different shocks, regional growth differences should then be determined by the industry structure of the region. But the main driving force behind regional growth difference are regional factors, not structural ones.

As in the case of Bulgaria, for Romania the regression results indicate the highest explanatory power for the variable π with R^2 values between 0.69 and 0.94. Thus region specific factors appear to explain regional growth performances fairly well. The sectoral composition of the economy has some explanatory power only in 1996 and 1999, in all other years it is around zero percent. The competitiveness factor α has slightly higher R^2 values than μ but is also negligible.

5.3 Hungary

Region specific factors constitute the largest share of regional employment growth variance in Hungary, as shown in Table 11. π's variance share is around 100 percent with a drop in 1997, where the covariance between the three factors gained some importance. Over the entire period the importance of π has decreased by 10 percentage points. Again we believe that the result is

	1993	1994	1995	1996	1997	1998	1999
$var(\mu)/var(g_j)$	0.20	0.09	0.00	0.00	0.00	0.00	0.01
$var(\pi)/var(g_j)$	1.07	1.26	1.04	1.00	0.77	0.93	0.96
$var(\alpha)/var(g_j)$	0.11	0.04	0.00	0.00	0.05	0.03	0.02
$2 * Covariance/var(g_j)$	-0.38	-0.39	-0.04	0.00	0.17	0.03	0.01

Table 11: Evolution of the variance shares for Hungary.

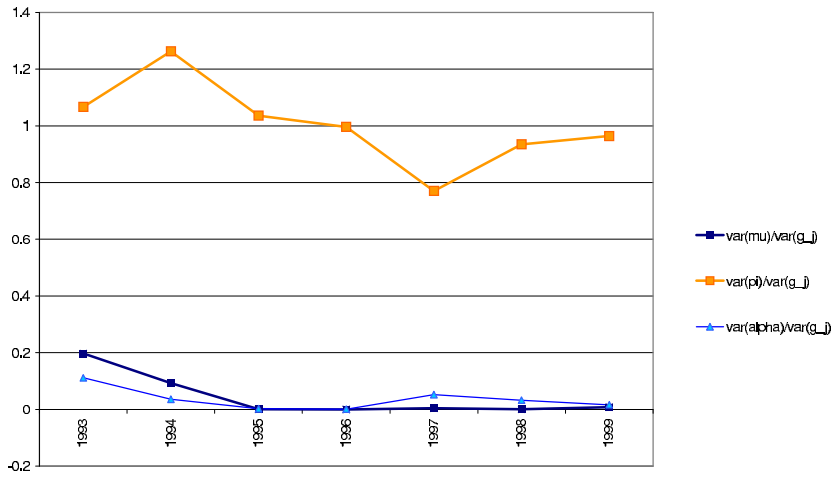

Figure 12: The evolution of variance shares over time in Hungary.

remarkable since the 4 considered sectors have indeed very different shares in each region, though the coefficient of variation for the shares is in all but the agricultural sector lower than in Bulgaria and Romania. Although the sectors may be subject to very different shocks and thus cause regions to grow at different speed, regional differences in growth performance are almost entirely driven by region specific factors.

In Hungary, the same results as in Romania and Bulgaria are obtained in the regression analysis (Table 14 in the appendix). For every year the regression of $g_j - g$ on π yields the highest R^2 with values between 0.89 and 0.99. The R^2 in the regressions on α and μ respectively are much lower with values between 0 and 30.

5.4 Robustness Check and Interpretation

In the preceding exercise we assessed the role of sectoral employment composition in explaining regional employment growth differentials in three transition countries. We find that the sectoral mix does not play a major role in accounting for regional employment dynamics in Bulgaria, Hungary and Romania. Highly aggregated data may bias our results. Therefore, as a robustness check, the above analysis was applied to Hungarian data with a 1-digit industrial classification with 12 sectors. The results stayed qualitatively the same,

indicating that our high level of aggregation with 4 sectors does not drive our results. Furthermore for all three countries, we implemented the shift-share analysis for a 2-digit classification of the manufacturing sector[7] (see Figures 13, 14 and 15 in the appendix.). The results are qualitatively identical to those presented above.

The analysis shows that in the three transition countries, the sector-composition of employment in a region does not explain regional growth patterns. The results of the shift-share analysis rather indicate that by far the largest part of regional employment growth differentials can be ascribed to the fact that the industries in a region grow slower or faster than the national average. This is surprising given the regional differentials of sectoral shares. These broadly defined sectors are possibly subject to quite different shocks leading on a regional level to diverging growth performances.[8]

Our analysis, however, implies that in Bulgaria, Romania and Hungary the sectoral composition of the region does not play a major role. There are at least two explanations for this. First, the sectors may be strongly interrelated. This implies that if one sector is affected by a shock, all the other sectors in the respective region will benefit or suffer, meaning that strong interindustry spill-over effects are present. Second, there may be very few idiosyncratic shocks affecting only one specific sector, whereas many region specific shocks affect regions as a whole. Both views justify the analysis of regions on an aggregate level, neglecting the sectoral composition of industries.

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[7]In Bulgaria, national statistics published distinguish between 14 different manufacturing sectors, in Romania 12 and in Hungary 8. The analysis of the data showed that indeed regions have quite different compositions of sectors. All three capital regions, e.g. have a very low share in agriculture and very high shares in the service sector, whereas the opposite is true for the country side. Also, the coefficient of variation of sectoral shares is high in all cases.

[8]Consider the following thought experiment: The occurrence of a particularly long and strong winter should impact on the production of the agricultural sector, which should lead to significant lay-offs in employment. Regions with a high agricultural sector should be affected much more by this winter than regions with virtually no agricultural sector.

6 Conclusions and Policy Implications

In this paper we used employment data at regional level for the period 1990-1999 and applied a shift-share analysis to explain regional employment growth differentials at sectoral level in three transition countries, namely Bulgaria, Romania and Hungary. The sectors included in our analysis are agriculture, industry, construction and services. Our research results suggest the following conclusions and policy implications:

1. We find both commonalities and particularities in the patterns of regional employment growth in the three above mentioned transition countries. In the period 1990-1999 the industrial sector has declined everywhere, most strongly in Bulgaria and Romania, while the service sector has grown in Bulgaria and especially in Hungary. Bulgaria and Romania have experienced a growing share of employment in agriculture. Regional disparities in employment have been increasing in Bulgaria and Hungary and decreasing in Romania.

2. Despite different patterns of regional disparities we find that in all three countries regional variance in employment growth is explained mostly by region-specific factors. A complementary regression analysis performed for each component supports these results. Employment growth differentials are uniform across sectors and vary across regions. Our results indicate that over the period 1990-1999 the share of the variance due to region-specific factors is decreasing in Bulgaria and Hungary while it is increasing in Romania. Regional industry mix does not play an important role in explaining regional growth differentials.

Several hypotheses can be put forward to explain these results. First, the four sectors analyzed in this paper are interrelated at regional level. This implies that if one sector is affected the other sectors in the region will be affected as well. Second, the nature of shocks seems to be region-wide rather than industry -specific.

3. Our findings suggest that there is no scope for an industrial policy to foster a specific industrial mix in promoting regional growth in the three transition countries analyzed here. Regions lagging behind seem to suffer from an uniform employment growth gap across sectors. This suggest the need for (regional) policy measures to increase employment opportunities and attractiveness in these regions such as upgrading of infrastructure and human capital.

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A Appendix

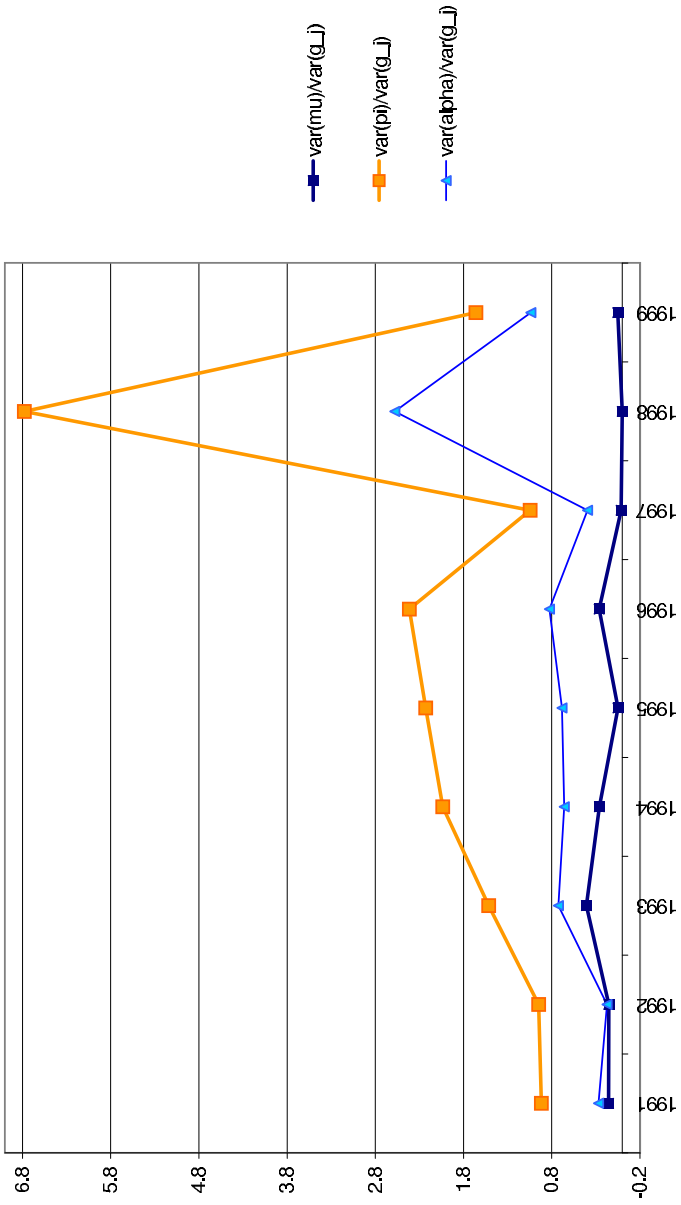

Figure 13: The evolution of variance shares over time in Bulgaria for the manufacturing sector.

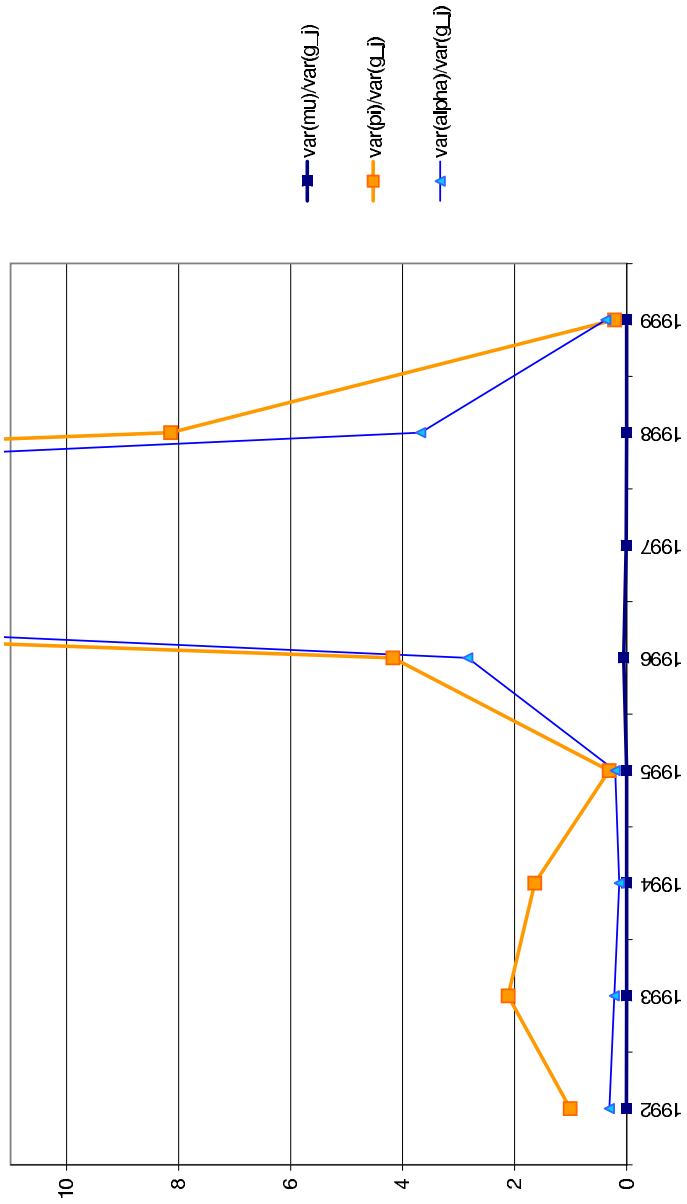

Figure 14: The evolution of variance shares over time in Romania for the manufacturing sector.

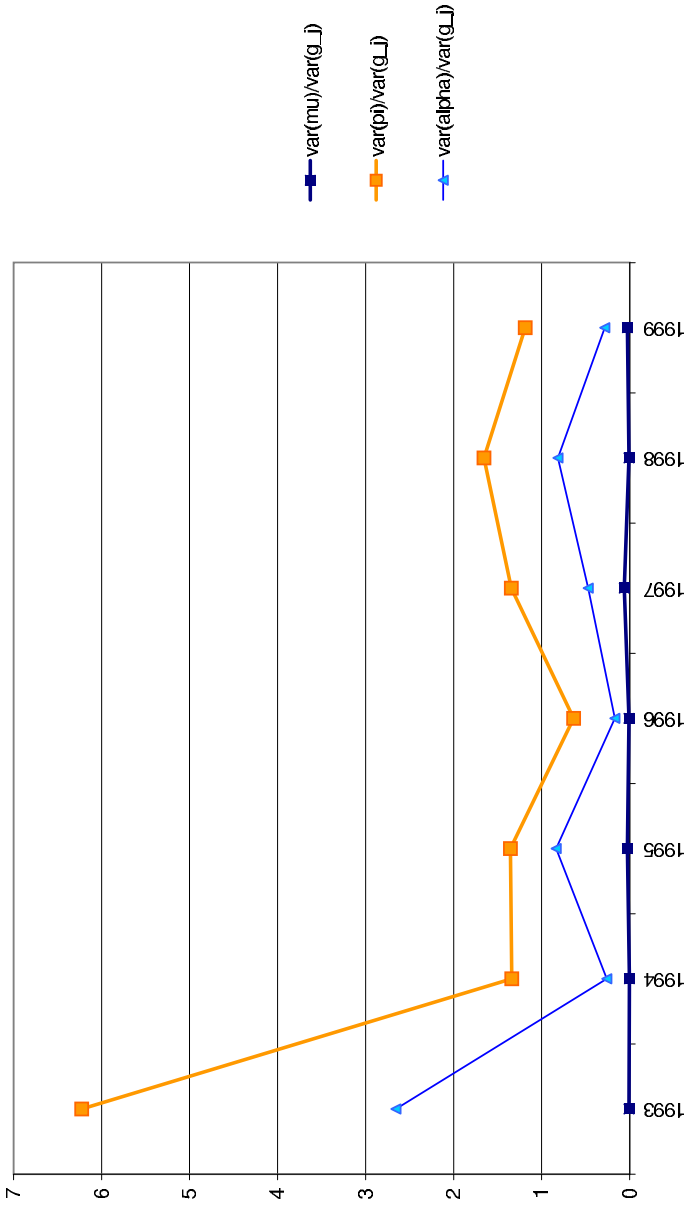

Figure 15: The evolution of variance shares over time in Hungary for the manufacturing sector.

1991	const.	variable	R^2
mue	-0.001	3.541	0.520
	(-0.23)	(5.31)	
pi	0.004	1.061	0.902
	(1.85)	(15.47)	
alpha	-0.001	0.066	0.0002
	(-0.15)	(0.07)	

1992	const.	variable	R^2
mue	-0.0001	-0.247	0.008
	(-0.04)	(-0.46)	
pi	0.004	1.090	0.746
	(1.62)	(8,73)	
alpha	-0.004	1.854	0.646
	(-1.29)	(6.88)	

1993	const.	variable	R^2
mue	-0.005	-0.569	0.019
	(-0.91)	(-0.70)	
pi	-0.0001	-0.802	0.869
	(-0.05)	(13.11)	
alpha	-0.005	-0.444	0.022
	(-1.05)	(-0.77)	

1994	const.	variable	R^2
mue	0.006	0.427	0.005
	(0.73)	(0.36)	
pi	0.003	0.634	0.444
	(0.44)	(4.56)	
alpha	0.008	0.516	0.149
	(1.04)	(2.13)	

1995	const.	variable	R^2
mue	-0.003	-1.128	0.046
	(-0.79)	(-1.12)	
pi	0.002	1.040	0.934
	(1.43)	(19.15)	
alpha	-0.005	1.961	0.281
	(-1.45)	(3.19)	

1996	const.	variable	R^2
mue	0.579	81.502	0.061
	(1.47)	(1.30)	
pi	0.020	1.353	0.989
	(0.46)	(48.14)	
alpha	-0.001	3.440	0.924
	(-0.01)	(17.74)	

1997	const.	variable	R^2
mue	0.123	10.866	0.005
	(0.71)	(0.35)	
pi	0.008	1.285	0.9997
	(3.17)	(307.05)	
alpha	-0.017	4.503	0.998
	(-2.21)	(102.21)	

1998	const.	variable	R^2
mue	-0.001	0.426	0.045
	(-0.28)	(1.11)	
pi	0.001	0.793	0.695
	(0.92)	(7.70)	
alpha	-0.0001	0.047	0.001
	(-0.06)	(0.14)	

1999	const.	variable	R^2
mue	-0.006	1.608	0.250
	(-1.53)	(2.94)	
pi	-0.001	0.783	0.451
	(-0.19)	(4.62)	
alpha	-0.017	0.899	0.241
	(-4.37)	(2.87)	

Table 12: Regression results of g_j on the respective variable, t-values in parenthesis: Bulgaria.

1993	const.	variable	R^2
mue	0.014	0.182	0.003
	(1.50)	(0.34)	
pi	0.016	1.060	0.694
	(3.33)	(9.40)	
alpha	-0.002	1.825	0.600
	(-0.40)	(7.65)	

1994	const.	variable	R^2
mue	0.012	-0.674	0.006
	(1.88)	(-0.49)	
pi	0.005	0.838	0.890
	(2.23)	(17.72)	
alpha	0.013	-0.452	0.023
	(2.02)	(-0.97)	

1995	const.	variable	R^2
mue	0.019	0.433	0.006
	(2.09)	(0.49)	
pi	-0.003	0.933	0.899
	(-1.10)	(18.64)	
alpha	0.018	0.290	0.007
	(2.08)	(0.51)	

1996	const.	variable	R^2
mue	0.005	2.507	0.188
	(1.18)	(3.01)	
pi	0.003	0.981	0.949
	(2.80)	(26.95)	
alpha	0.011	-0.986	0.042
	(2.35)	(-1.31)	

1997	const.	variable	R^2
mue	0.005	0.634	0.022
	(0.61)	(0.95)	
pi	0.006	0.985	0.887
	(2.35)	(17.46)	
alpha	0.004	1.004	0.065
	(0.49)	(1.64)	

1998	const.	variable	R^2
mue	0.003	-0.423	0.001
	(0.34)	(-0.21)	
pi	0.003	0.903	0.924
	(1.55)	(21.78)	
alpha	0.003	-0.279	0.006
	(0.39)	(-0.47)	

1999	const.	variable	R^2
mue	0.012	1.315	0.178
	(1.54)	(2.91)	
pi	0.002	1.102	0.866
	(0.59)	(15.86)	
alpha	0.019	1.094	0.086
	(2.42)	(1.92)	

Table 13: Regression results of g_j on the respective variable, t-values in parenthesis: Romania.

1993	const.	variable	R^2
mue	-0.001	0.476	0.045
	(-0.15)	(-0.92)	
pi	-0.009	0.932	0.927
	(-6.42)	(-15.10)	
alpha	-0.006	-0.787	0.069
	(-1.12)	(-1.16)	

1994	const.	variable	R^2
mue	0.001	-1.131	0.119
	(-0.11)	(-1.56)	
pi	-0.002	0.841	0.894
	(-1.36)	(-12.32)	
alpha	0.004	1.203	0.052
	(-1.05)	(-0.99)	

1995	const.	variable	R^2
mue	0.003	9.576	0.053
	(-0.11)	(-1.00)	
pi	0.002	0.981	0.997
	(-1.54)	(80.43)	
alpha	0.018	-8.369	0.184
	(0.72)	(-2.01)	

1996	const.	variable	R^2
mue	0.034	4.668	0.003
	(1.17)	(0.23)	
pi	0.001	1.001	0.998
	(1.17)	(103.74)	
alpha	0.030	1.784	0.004
	(0.97)	(0.27)	

1997	const.	variable	R^2
mue	0.002	5.556	0.138
	(0.31)	(1.70)	
pi	0.004	1.101	0.934
	(2.60)	(15.97)	
alpha	-0.003	2.419	0.306
	(-0.61)	(2.82)	

1998	const.	variable	R^2
mue	-0.059	19.271	0.179
	(-2.18)	(1.98)	
pi	0.017	1.017	0.967
	(2.63)	(22.90)	
alpha	-0.110	1.222	0.049
	(-3.42)	(0.96)	

1999	const.	variable	R^2
mue	0.012	0.954	0.007
	(0.66)	(0.37)	
pi	-0.010	1.007	0.977
	(-5.20)	(27.63)	
alpha	0.013	1.317	0.029
	(0.90)	(0.73)	

Table 14: Regression results of g_j on the respective variable, t-values in parenthesis: Hungary.

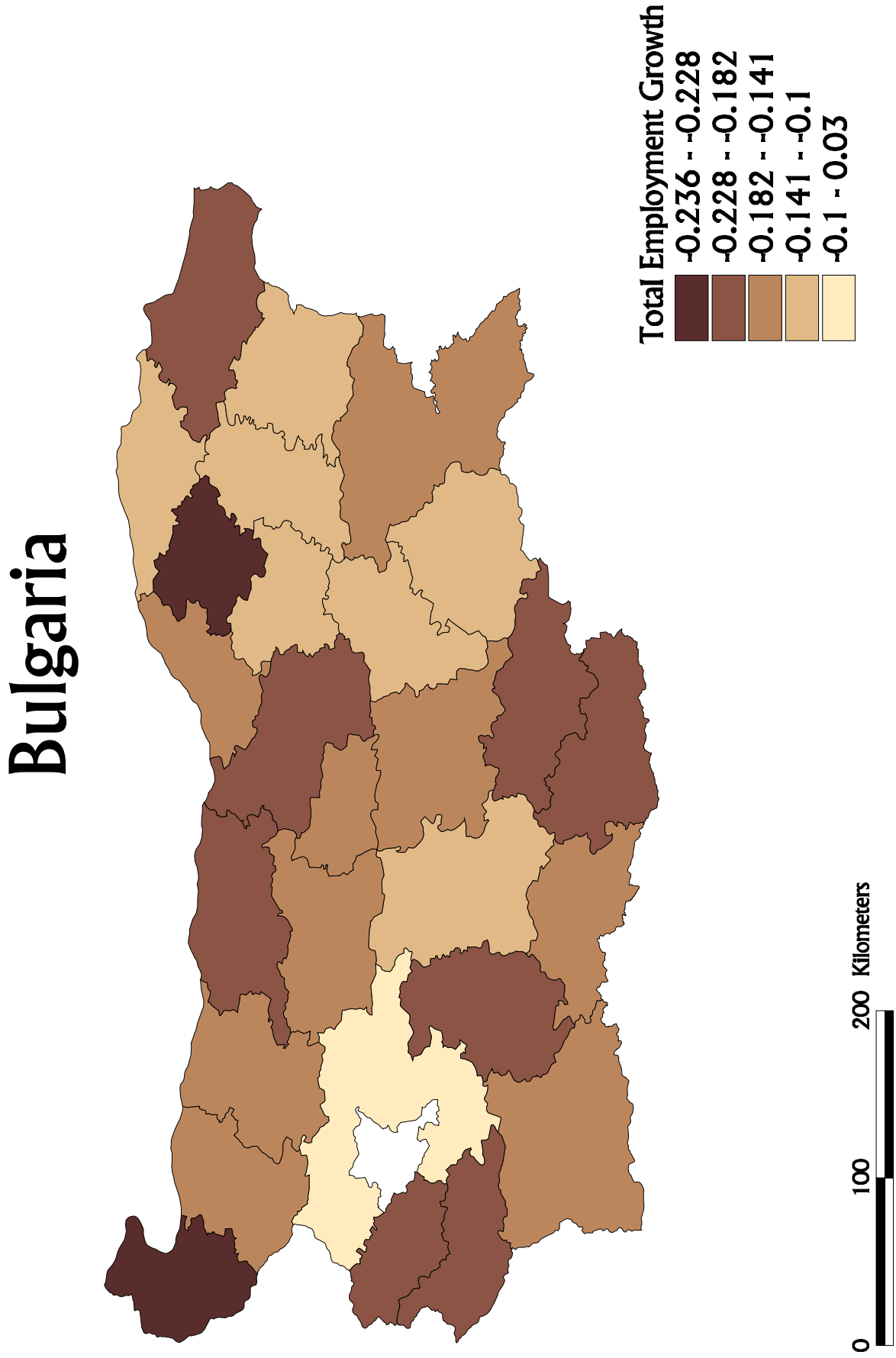

Figure 16: Regional employment growth over the entire period investigated, 1990-1999. Negative values indicate employment losses.

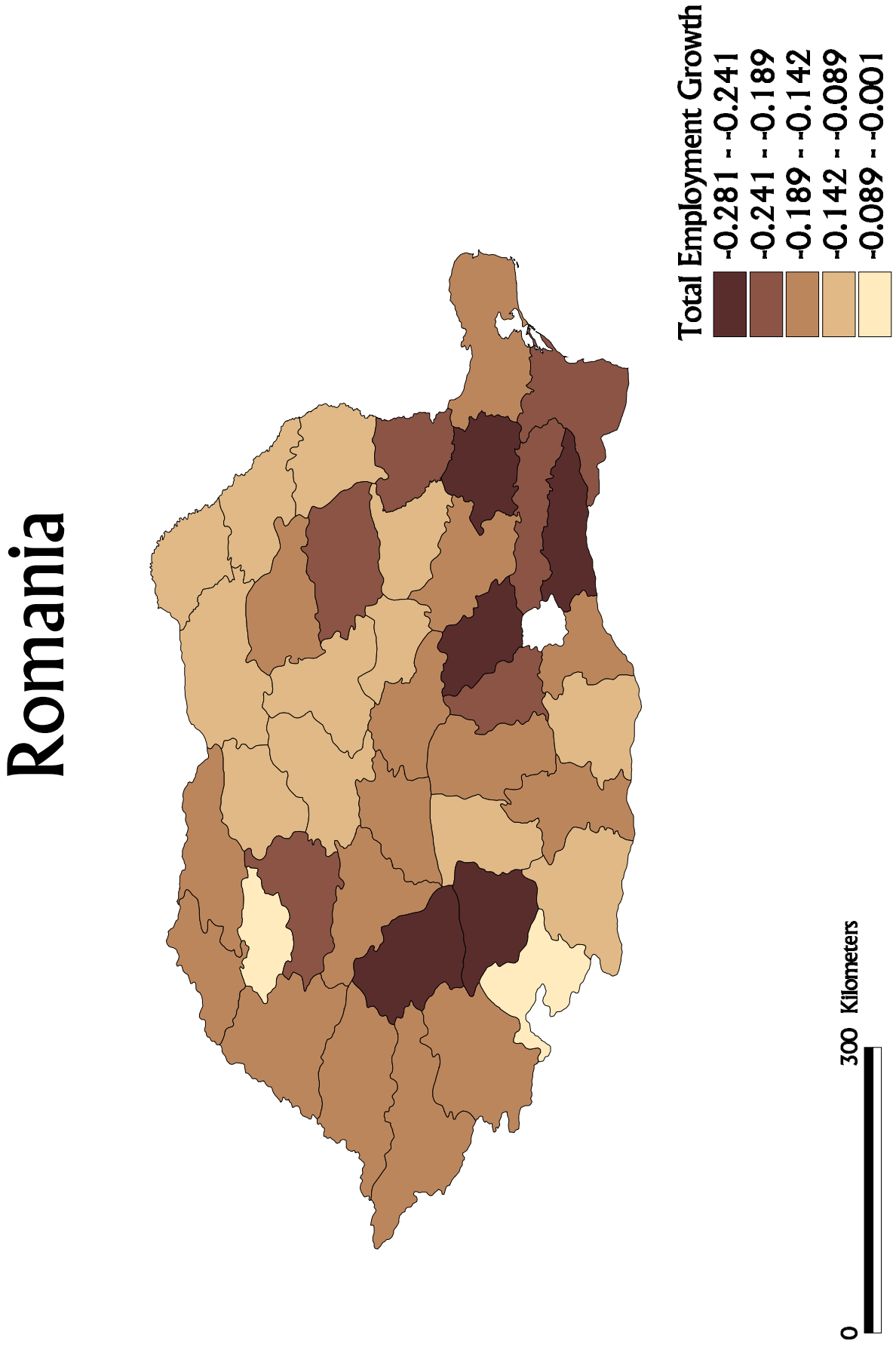

Figure 17: Regional employment growth over the entire period investigated, 1992-1999. Negative values indicate employment losses.

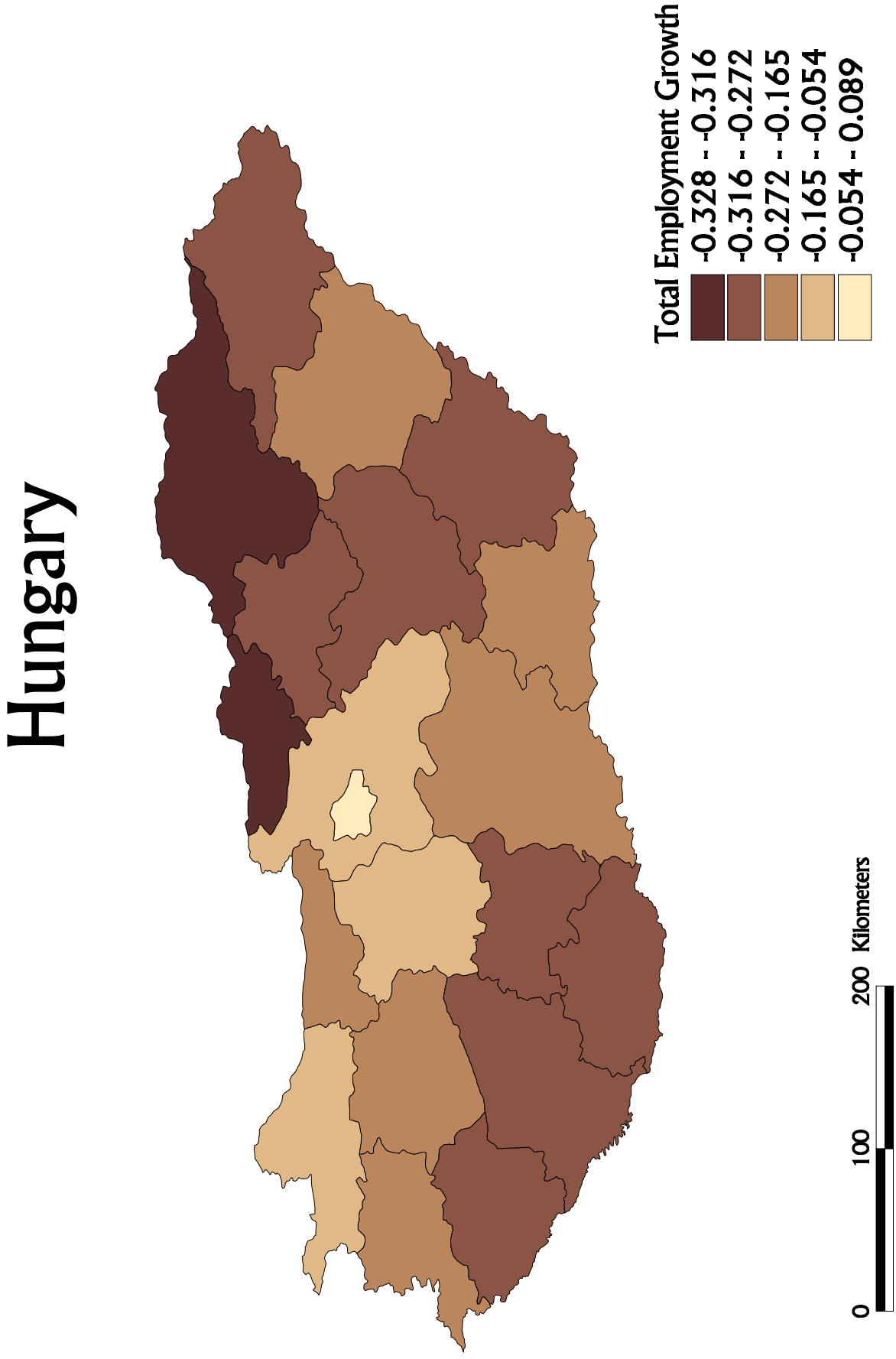

Figure 18: Regional employment growth over the entire period investigated, 1992-1999. Negative values indicate employment losses.

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Zentrum für Europäische Integrationsforschung
Center for European Integration Studies
Rheinische Friedrich-Wilhelms-Universität Bonn

Walter-Flex-Strasse 3
D-53113 Bonn
Germany

Tel.: +49-228-73-1732
Fax: +49-228-73-1809
www.zei.de