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## Regional Unemployment and its Persistence in Transition Countries

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IZA DP No. 1074

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March 2004

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## **ABSTRACT**

### **Regional Unemployment and its Persistence in Transition Countries\***

We look at the differences in regional unemployment rates in six major transition countries and their persistence over time. We analyse the role various adjustment mechanisms play. While movement out of the labour force seems to be one consequence in many regions with high relative unemployment, there are also signs of emerging wage flexibility. Employment creation, by contrast, has not picked up in regions of high unemployment. Labour mobility also remains very limited in size although it appears to respond to basic economic incentives. Policies addressing housing market imperfections and information asymmetries are necessary to increase worker mobility and to integrate better national labour markets.

JEL Classification: J61, P2

Keywords: transition, regional unemployment, mobility

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## **1. Introduction**

In Poland, the unemployment rate for the city of Warsaw has remained at around 4-5 per cent throughout the 1990s. Yet, in the same period and only several hours away, in Olzstyn the unemployment rate has been stuck at over 20 per cent. Such disparities are widely replicated throughout the transition countries. While part of the reason for this disparity is that movement away from full employment necessarily revealed different underlying employment levels given structural shocks, the continuing absence of integration in national labour markets has also been a major contributory factor. In this paper, we begin to document and then explain such variation using regional labour market indicators from six major transition economies. We investigate the dynamics of relative region unemployment, employment, non-participation and wages. In addition, close attention is paid to the extent to which labour mobility plays a part in the adjustment to structural shocks. Research conducted in the first years of transition found that mobility was not only low across the European and Russian regions but that there was very limited evidence of other equilibrating mechanisms – such as wages – being at work to lower regional employment imbalances and hence their persistence <sup>1</sup>. Our findings suggest that exit from the labour force and hence high non participation rates are features common to regions with high unemployment. Wages, although responsive to regional disparities, only partially help to accommodate shocks. Lagged employment creation has as yet not helped equilibrate unemployment over regions, leaving depressed regions persistently lagging behind. Regional mobility, even though it seems to be driven by economic considerations, remains very low.

The paper is organised as follows. Section 2 reviews models of adjustment to shocks where the regional dimension is explicit. Section 3 describes the regional dimensions of unemployment and their evolution over time in the transition countries. Section 4 reports our findings from an analysis of labour market data from the six transition countries – Bulgaria, Czech Republic, Hungary, Poland Romania and Russia. Section 5 concludes.

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<sup>1</sup> See OECD (1995).

## 2. Models of Adjustment

Market economies exhibit large differences in the ways in which shocks not only get transmitted but also the adjustment mechanism. In some, factors of production tend to be more mobile, while in others mobility – particularly of labour – tends to be largely absent. A contrast between the USA and Europe is often made.<sup>2</sup> A key apparent difference is that in the USA the response at the level of a region or state to a negative shock to employment has been for wages and unemployment to move in opposite directions while workers in adversely affected regions start to move to other regions.<sup>3</sup> This very mobility of labour in turn affects the incentives for new employment to be created, so that net employment growth in a region will be a function of the speed at which workers leave and new jobs are created. Firms move into the depressed region, attracted by the low labour costs and the large pool of unemployed. After an adverse shock, employment in such a region tends to return eventually to its underlying rate of growth but at a lower level. If workers move out faster than firms move in, aggregate employment will not return to its original level in the region, and output in the depressed region will be permanently lower and higher elsewhere. In short, adverse shocks tend to have a permanent impact on the employment level. However, labour mobility reduces the extent to which unemployment persists in a region after an adverse shock. Hence, unlike employment, relative unemployment rates in the USA tend to return to their mean quite quickly following a shock. Decressin and Fatas (1995) find similar mean reverting properties for relative unemployment rates in Western Europe. However, a shift in region labour demand is mainly met through changes in participation rather than through mobility, as in the USA.

One common framework for such analysis has the following elements<sup>4</sup>. Denote  $\Delta e_{it}$  as the relative growth in employment in region  $i$  at time  $t$ . Then, by defining  $u_{it}$  as the relative unemployment rate in that region and  $np_{it}$  as the non participation rate the three variables can be written in a log linearised model of the following form:

$$\begin{aligned}\Delta e_{it} &= \alpha_{1i} + \beta_1(L) \Delta e_{it-1} + \gamma_1(L) u_{it-1} + \delta_1(L) np_{it-1} + \varepsilon_{it} \\ u_{it} &= \alpha_{2i} + \beta_2(L) \Delta e_{it-1} + \gamma_2(L) u_{it-1} + \delta_2(L) np_{it-1} + \varepsilon_{it} \\ np_{it} &= \alpha_{3i} + \beta_3(L) \Delta e_{it-1} + \gamma_3(L) u_{it-1} + \delta_3(L) np_{it-1} + \varepsilon_{it}\end{aligned}$$

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<sup>2</sup> Decressin and Fatas (1995).

<sup>3</sup> Blanchard and Katz (1992).

<sup>4</sup> See Blanchard and Katz (1992)

where (L) is an appropriate order of lags that captures the dynamics between the variables. Given parameter estimates and initial values, an innovation (or shock) to say, employment in the first equation, gives the response functions of all three variables to the new equilibrium.

However, the framework and its implementation is based on a number of assumptions. Not only is the time frame in which adjustments take place assumed to be over years, but also the economy is assumed to start off near equilibrium before shocks happen. Here lies a fundamental difference with the transition economies. The first decade of transition was marked by profound structural adjustments not directly comparable to the demand shocks lying behind the dynamics outlined above. This makes identification of equilibrium conditions a largely futile exercise.

The analysis is further hampered by the limited data availability. Regional data is only available on an annual basis and with merely a decade of transition, the time dimension remains short. In addition, in some countries (such as Poland and the Czech Republic) regional classification systems have changed in the mid 1990s and data from the early 1990s are difficult to obtain at the new aggregation levels. In this paper, wherever possible, we refer to Eurostat's NUTS <sup>5</sup> level 3 and draw on level 2 data where necessary. This sometimes limits the number of datapoints but does allow for better cross-country comparisons. Even so, there still remains considerable variation across these units in terms of population size and density, area and extent of urbanisation, among other indicators. For Russia, where these categories are not applicable, the measure used in this paper refers to *oblasts*.<sup>6</sup> A detailed description of the data used can be found in Annex 1.

### **3. Patterns of unemployment and its regional dimension**

Since the start of transition, average unemployment has risen in all transition countries. *Figure 1* shows the national unemployment rates in the last decade for the transition countries covered in this paper. While it could have been expected that aggregate unemployment would rise substantially shortly after the breakdown of communism, the persistence of unemployment at high levels has been somewhat surprising. In particular,

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<sup>5</sup> NUTS is the French acronym for Nomenclature of Territorial Units for Statistics.

<sup>6</sup> Throughout the analysis we exclude the following 3 regions from the Russian sample: the Republic of Dagestan, the Ingush Republic, and the Republic of North Ossetiya-Alaniya.

expectations of an inverted U-shape over time have not yet materialised and in some transition countries the situation has actually worsened in recent years.

[FIGURE 1 ABOUT HERE]

Large differences in regional unemployment rates have been common to all the transition countries and could have been expected given the importance of structural, as opposed to aggregate shocks. *Table 1* provides measures of regional unemployment for 1991 and 2001. Aside from providing the national unemployment rate at both points in time, it reports the standard deviation, the coefficient of variation and the minimum and maximum levels of unemployment across the regions for each country.

[TABLE 1 ABOUT HERE]

What is evident is that the dispersion in regional unemployment rates – as measured by the standard deviation and coefficient of variation – has not only been quite large but has also tended to grow over this period. For example, in Bulgaria, the standard deviation rose from 1.7 to 9.3 while the gap between the highest and lowest regional unemployment rates rose from 6.7 to 38.8 percentage points. Further east, in Russia not only did national unemployment more than double, but there was a very substantial increase in both measures of dispersion, while the gap between the region with the lowest and highest unemployment rates also increased very significantly. In short, *Table 1* suggests that there has very little, if any, reduction in regional disparities for unemployment. To put these numbers in context, comparable figures for a number of OECD countries are also included in *Table 1*. What is evident is that the coefficient of variation of unemployment for France and the USA is roughly half that for the Czech Republic and one third that for Hungary. In short, most transition countries reported here display a degree of variation generally higher than most Western European countries, let alone the USA. The Russian numbers also point to higher dispersion than can be found in most OECD countries.

We now turn to looking at *relative* unemployment rates.<sup>7</sup> The ranking of the regions at each point in time remains unchanged, but their relative distance to each other becomes comparable over time. *Figure 2* illustrates this separately for each country. The analysis reveals that relative unemployment rates are strongly correlated over time. Even as the distance between the points in time becomes larger, the correlation remains

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<sup>7</sup> The relative unemployment rates are defined as the regional unemployment rate minus the national average at each year divided by the standard deviation.



high. What is evident is that the relative position of most regions remained the same throughout the last decade, and correlations are both positive and strong. In Hungary, the correlation is particularly high at 0.9. Even in Bulgaria, where the correlation is the lowest at 0.2, most of the regions remained in their respective quadrant, indicating that their relative position remained little changed.

[FIGURE 2 ABOUT HERE]

The persistence of relative regional unemployment rates would be consistent not only with the emergence of long run unemployment,<sup>8</sup> but would also likely have been associated with changes in labour force participation, as workers become discouraged by long spells in unemployment and lack of local job opportunities. Indeed, *Table 2* shows that by 2000 non-participation rates were generally high in the transition countries. While, the dispersion of non-participation rates across regions in most countries was significantly lower than for unemployment, non-participation rates by region were highly correlated with the level of unemployment in that region in almost all the countries reported in *Table 2*. In Russia, where data are available for earlier in the transition, this correlation rose substantially between 1992 and 2000 from 0.39 to 0.66. In other words, high unemployment rates have been associated with declining labour forces. As an immediate result, high unemployment and the overall employment rate in a region have tended to move in opposite directions. While part of this may be explained by discrete changes in labour force participation rates – for example, by females wishing to work less than under socialism – this is unlikely to explain the persistence over time. The principal mechanism appears to be through high unemployment discouraging job search.

[TABLE 2 ABOUT HERE]

#### **4. Empirical results**

The setup in Blanchard and Katz (1992) translates directly into certain time series properties of the variables. For example, relative wages should follow a stationary process as should unemployment. Since employment accumulates past shocks, it should be non-stationary. The theoretical framework sketched above has been applied to data from various regions using the VAR methodology, which neatly models the interplay between the variables. However, such a procedure is unlikely to obtain reliable

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<sup>8</sup> A pattern repeated in the OECD countries, see OECD (2000).

estimates for short time series. Furthermore, the use of such estimates to compute impulse response functions, where the prediction horizon is longer than the sample time period does not seem appropriate<sup>9</sup>. Some simple correlations and regressions are more in order. As such, the time series tests reported below are conducted for indicative purposes only.

We look at the mean reverting properties of relative unemployment rates, of log employment and log wages.<sup>10</sup> Since the lag structure cannot be estimated using the formal criterion of normally distributed residuals, the tests are reported for zero and for one lag. Table 3 summarizes the results.

[TABLE 3 ABOUT HERE]

The hypothesis that relative employment rates in Romania, Bulgaria, Poland and Russia are not mean reverting is rejected. Except for the Czech Republic and Hungary there are no signs of non-stationarity. Shocks to employment, in contrast, seem to be long lasting as a unit root in none of the series is rejected. Employment seems to follow a random walk. However, employment growth (results not reported here) is clearly mean reverting. The mean of each regional relative unemployment series is different from zero, pointing to region specific – and persistent – levels of unemployment. The results for wages are more ambiguous with three out of five series exhibiting non-stationary behaviour.

We now turn to looking at how relative unemployment rates and changes to those rates correlate with relative employment growth and relative wage growth in a region. Earlier evidence suggested that in Central Europe and Russia relative wages at the start of transition were only weakly responsive to unemployment<sup>11</sup>. Results reported in Table 4 report the basic patterns on a country by country basis. In the Czech Republic

[TABLE 4 ABOUT HERE]

and in Hungary, we find that relative unemployment rates are negatively correlated with both actual and lagged employment and wage growth. In other countries, the situation is

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<sup>9</sup> As, for example, in Huber (2003)

<sup>10</sup> Panel Unit Root tests may seem appropriate at first sight as they exploit the cross sectional dimension. However, the small sample corrections for tests such as the Levin, Lin and Chu (2002) or the Im, Pesaran and Shin (1997) test do not cover the time periods at hand. Since the magnitude of the adjustment terms decreases exponentially a severe bias in the estimation results is likely for very short panels. This is especially the case if other disturbances such as contemporaneous cross correlations can be expected. Hence we refrain from using Panel Unit Root tests here.

<sup>11</sup> Commander and Yemtsov (1995) and Boeri and Scarpetta (1995)

less clear. While in Bulgaria employment growth and unemployment rates are correlated, there is no evidence (at the 5% level) of any correlation with wage growth. In Romania, only contemporaneous correlations are significant. Both in Poland and in Russia no significant correlations can be found. In short, we find that differences in relative unemployment rates are not robustly correlated with employment or wage growth.

We next compare average changes in wages and mean unemployment over a longer period of time. Allowing for longer adjustment periods gives less ambiguous results. As depicted in *Figure 3*, there is a strong and negative association between a region's relative unemployment rate and the average rate at which that region's wage increased in relative terms in all countries, except Russia. This indicates that regions that have experienced larger adverse shocks have been characterised by lower relative rates of wage increase. However, it should be emphasised that in Russia this relationship has remained very weak over the 1990s. There has been a very low correlation between the change in relative real wages and unemployment.

[FIGURE 3 ABOUT HERE]

While changes to relative wages will be an important part of any adjustment, differences in rates of job creation should also play a role. *Table 5* gives the average change in employment for a country, alongside the standard deviation across regions, as well as the correlation between changes in employment and the unemployment rate over the period, 1990-2001. What is evident is that there is a clear negative association

[TABLE 5 ABOUT HERE]

between a region's unemployment rate and the change in employment. As such, regions that have experienced relatively large unemployment over this period have *not* experienced relatively greater increases in employment. Indeed, the correlation between the change in the employment and unemployment rate is significantly negative in all cases but Poland. Relating employment changes to lagged unemployment also found no evidence of a positive association.

In order to address the issues econometrically a simple Philips curve was estimated for five of the countries. *Table 6* summarizes the results.

[TABLE 6 ABOUT HERE]

As expected, an increase in unemployment rates is, in general, associated with lower wage growth. However, this relationship is only statistically significant in the Czech Republic and in Hungary. For the other countries the relationship remains insignificant. The inverse relationship between unemployment rates and lagged employment growth is more robust, only in Romania is it insignificant. Even if qualitative results are similar across countries, common coefficient restrictions are rejected.

So far we have found that wages adjust but not enough to equilibrate employment, and unemployment rates persist. An additional factor of adjustment is labour mobility. In the context of this substantial rise in unemployment and differential shocks to regions, a growing mobility of labour within national boundaries might have been expected as workers move to where jobs can be found. Yet, a closer look at internal migration data suggests that labour mobility has indeed been a small part of the overall picture and that the movement of labour across regions in response to economic signals has been very restricted.

*Table 7* provides migration rates for a number of transition countries, as well as some OECD comparator countries for the early 1990s and 2000. What is immediately obvious is that, even in the advanced reformers of Central Europe, gross migration rates have remained very low.<sup>12</sup> To put this in perspective, the highest gross rate can be found in Hungary. Yet, this was significantly smaller than the equivalent French number and far lower than for North America. Gross migration rates in the Czech Republic, Poland, Romania have remained yet smaller, with the Czech and Polish rates roughly comparable to either Spain or Italy. Furthermore, in most of the transition countries reported in *Table 7*, gross migration rates have either declined or remained stable through the 1990s. Turning to the ratio between net and gross migration, which gives the impact on the actual distribution of regional populations, in the Czech Republic and Poland a relative high share of inter-regional migration results in actual population change. These ratios are comparable to many Western European countries, including France and Spain, but clearly lower than in North America. While Russia appears to have had a substantial gross migration rate in the early 1990s, this rate has subsequently come down to European levels. The ratio of net to gross flows has also fallen considerably to levels below Western European comparators.

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<sup>12</sup> This gives the share of the population that moved across region in a given year.

[TABLE 7 ABOUT HERE]

While internal migration rates have remained low, the obvious question is whether such flows have been driven by labour market signals and, in particular, whether regions with relatively low unemployment rates and/or regions with relatively high income levels have experienced higher net inflows. In this regard, the evidence suggests that in Central and Eastern Europe net migration has indeed been greater in regions with lower unemployment and higher per capita incomes. *Figure 4* relates net migration rates at the level of the region to the region unemployment rate for two points in time. There is a clear downward sloping line in all countries for both data points suggesting that regions with lower unemployment experience higher net migration rates. However, the relationship is not particularly strong, even by 2000. In the case of Russia, there is some weak evidence that migration flows in Russia have increased over the 1990s, albeit from very low levels. Such flows have been partly in response to differences in regional income levels and other economic incentives, including labour market conditions in both sending and receiving regions. Yet the link remains weak. Further, it appears that for a significant number of regions very low income levels have been associated with liquidity traps that impede mobility and effectively lock workers into long run poverty and lack of access to resources. As much as a third of the Russian population may be so affected.<sup>13</sup>

[FIGURE 4 ABOUT HERE]

In short, internal migration has remained quite limited in the transition countries. Those that migrate tend to move from relatively poor or high unemployment areas to ones with relatively low unemployment and higher incomes. However, the scale of movement has not been large nor is the relationship between movement and economic conditions very robust. Although the numbers reported here do not factor in commuting – something that appears to have become more prevalent over time – this would not significantly modify the overall picture of limited internal labour mobility in the transition countries.

There are a number of factors behind these low rates of migration. In Russia and the CIS, there was little history of voluntary migration throughout the Soviet period and as a consequence, little or no institutional support for those wishing to move. As

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<sup>13</sup> Andrienko and Guriev (2003).

compensation was skewed towards non-monetary benefits, such as housing and childcare, the factors attaching workers to particular firms remained quite important, even if the actual value of those benefits has tended to decline.<sup>14</sup> Relocation costs, poor information about job opportunities in other regions and the importance of local cultural and social ties have also been factors limiting migration. In much of Central and Eastern Europe, the fact that owner-occupied housing was always dominant may also have been a factor in limiting migration.<sup>15</sup> Even where owner-occupation has been less prevalent – as in Russia - lack of clarity over property rights and mechanisms for handling common expenditures for multiple occupancy housing, coupled with the low average quality of the housing stock, have combined to make relocation difficult. There has also been an absence of long term housing finance; by 2000 the volume of outstanding housing loans did not exceed 5 per cent of GDP in any transition country.<sup>16</sup> By comparison in the UK, Germany and USA such loans exceeded 50 per cent of GDP.

## **5 Conclusion**

This paper has examined in detail the evolution of unemployment, employment, participation, wages and migration in six transition countries. What emerges from the analysis is rather sobering. Not only has aggregate unemployment risen substantially in the transition countries but it has also been quite persistent. Very significant differences in regional unemployment also emerged early in the transition process. These differences have also proven to be highly persistent over time. One consequence has been non-participation has increased as workers have become discouraged. Further, there has been no lagged rebound in job creation and employment in regions relatively hard hit by structural shocks. While there is evidence of an emerging inverse relationship between wage changes and unemployment levels, adjustment through wages has been insufficient to accommodate completely the shocks. Further, cross-region labour mobility has remained low and has played a minimal role in equilibrating regional disparities. Workers in depressed regions appear often to be caught in a poverty-cum-liquidity trap with incomplete information about job opportunities

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<sup>14</sup> Commander and Schankerman (1997).

<sup>15</sup> In Hungary, Poland, Romania and Slovenia, owner occupancy in 1999 ranged between 70-90 per cent of the housing stock, see OECD (2002).

<sup>16</sup> OECD (2002).

elsewhere that make moving yet more difficult. A poorly functioning housing and rentals market compounds these problems. An affordable rental market for housing is likely to be indispensable if mobility is to be raised, while benefits that discourage mobility – of relevance mainly in Central Europe – need to be reduced.

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## Annex 1: Data description and sources

### Unemployment rates

Bulgaria	nominal wages, provided by Mariella Nenova, Employment Agency at the Ministry of Labour and Social Aid
Czech Republic	Accesslab (2003)
Hungary	The Hungarian Labour Market, econ.core.hu/publications
Poland	Polish Statistical Office
Romania	provided by Ella Kallai
Russia	LFS survey, Goskomstat, "Regions of Russia"

### Wages

Bulgaria	nominal wages, provided by Mariella Nenova, Employment Agency at the Ministry of Labour and Social Aid
Czech Republic	nominal wages, Accesslab (2003)
Hungary	nominal wages, The Hungarian Labour Market, econ.core.hu/publications
Poland	Na
Romania	nominal wages, provided by Ella Kallai
Russia	own computations based on LFS data, data provided by Adrienko and Guriev (2003), Goskomstat, "Regions of Russia"

### Employment

Bulgaria	provided by Mariella Nenova, Employment Agency at the Ministry of Labour and Social Aid
Czech Republic	Czech Statistical office
Hungary	The Hungarian Labour Market, econ.core.hu/publications
Poland	Polish Statistical Office
Romania	National Agency for Employment
Russia	Goskomstat, "Regions of Russia"

### Migration

Bulgaria	Na
Czech Republic	Newcronos Database, Eurostat
Hungary	Newcronos Database, Eurostat
Poland	Polish Statistical Office, Newcronos Database, Eurostat
Romania	Net migration rates by Ella Kallai (NUTS3 level), Newcronos Database, Eurostat
Russia	Goskomstat: "Regions of Russia"



**Table 1**  
**Regional unemployment**

Country	Regions (NUTS) <sup>1</sup>	Year	Average	Standard deviation <sup>2</sup>	Coefficient of variation <sup>3</sup>	Minimum	Maximum
Bulgaria	28 (III)	1991	7.4	1.7	23.0	4.9	11.6
		2001	19.9	9.3	46.9	4.2	43.0
Czech Republic	14 (III)	1991	4.3	0.2	35.1	1.2	6.2
		2001	8.0	1.5	44.0	3.0	14.6
Hungary	20 (III)	1991	4.1	2.6	63.2	1.2	10.7
		2001	8.5	5.1	60.4	2.6	19.0
Poland	16 (II)	1995	12.3	2.8	23.1	8.9	20.7
		2001	18.4	3.4	18.5	12.8	24.1
Romania	42 (III)	1991	3.0	1.4	44.5	1.2	6.2
		2001	8.8	2.9	33.1	3.1	15.3
Russia	74 (oblasts)	1992	4.8	1.0	20.8	2.6	9.1
		2000	12.5	3.8	30.5	4.3	24.4
<b>Memorandum :</b>							
France	22 (II)	1997	12.0	2.5	20.5	7.8	18.1
Spain	17 (II)	1997	21.1	5.6	26.5	10.0	31.9
USA	51 (states)	1997	5.5	1.1	19.5	3.0	8.6

Sources: Accesslab (2003), OECD (2000), NewCronos Database and Goskomstat.

1 NUTS is the French acronym for Nomenclature of Territorial Units for Statistics.

2 Standard deviation weighted by employment or population.

3 Computed as the standard deviation divided by the mean multiplied by 100.

**Table  
2  
Non participation rates**

Country	Regions (NUTS)	Year	Average	Standard deviation	Coefficient of variation	Minimum	Maximum	Correlation with unemployment rates
Bulgaria	28 (III)	2000	39.6	4.7	11.9	31.9	40.9	0.59
Czech Republic	14 (III)	2000	28.4	2.3	8.1	23.7	31.9	0.72
Hungary	20 (III)	1999	40.9	4.5	11.0	33.3	46.7	0.87
Poland	16 (II)	2000	34.8	9.2	26.5	21.0	52.8	0.47
Romania	42 (III)	2000	37.2	5.5	14.7	24.4	38.9	-0.04
Russia	74 (oblasts)	1992	11.4	6.7	58.4	2.5	34.3	0.39
		2001	18.1	3.8	20.8	10.2	32.9	0.66

Sources: Accesslab (2003), OECD (2000), NewCronos Database and Goskomstat.

**Table 3**  
**Unit Root tests**

$$\Delta y_{it} = \alpha_i + \beta y_{it-1} + \gamma \Delta y_{it-k} + \varepsilon_{it}$$

$y_{it}$	country	tstat beta (k=0)	tstat beta (k=1)	result
relative regional Urates	BG	-2.92	-2.71	I(0)
	CZ	-1.94	-1.53	I(1)
	HU	-1.43	-1.04	I(1)
	RO	-4.92	-4.46	I(0)
	PL	-2.82	-2.34	I(0)
	RU	-8.62	-5.93	I(0)
relative regional log employment	BG	-0.69	-0.54	I(1)
	CZ	-0.45	-0.45	I(1)
	HU	-0.43	-0.5	I(1)
	RO	-1.26	-1.09	I(1)
	PL	-0.59	-0.43	I(1)
	RU	-0.38	-0.25	I(1)
relative regional log wage	BG	-6.19	-2.95	I(0)
	CZ	-1.15	-1.03	I(1)
	HU	-1.02	-0.73	I(1)
	RO	-3.17	-2.54	I(0)
	PL	na	na	
	RU	-1.87	-1.67	I(1)

Note: MacKinnon critical values: -2.57, -2.86, -3.43

**Table 4**  
**Correlations**

Bulgaria			Czech Republic			Hungary		
	$u_{it}$	$\Delta u_{it}$		$u_{it}$	$\Delta u_{it}$		$u_{it}$	$\Delta u_{it}$
$w_{it}$	<b>0</b>	<b>0</b>	$w_{it}$	-	-	$w_{it}$	-	<b>0</b>
$e_{it}$	-	-	$e_{it}$	-	0	$e_{it}$	-	<b>0</b>
$w_{it-1}$	<b>0</b>	<b>0</b>	$w_{it-1}$	-	0	$w_{it-1}$	-	<b>0</b>
$e_{it-1}$	-	<b>0</b>	$e_{it-1}$	-	0	$e_{it-1}$	-	<b>0</b>
Poland			Romania			Russia		
	$u_{it}$	$\Delta u_{it}$		$u_{it}$	$\Delta u_{it}$		$u_{it}$	$\Delta u_{it}$
$w_{it}$	<b>na</b>	<b>na</b>	$w_{it}$	-	<b>0</b>	$w_{it}$	<b>0</b>	<b>0</b>
$e_{it}$	<b>0</b>	-	$e_{it}$	-	-	$e_{it}$	<b>0</b>	-
$w_{it-1}$	<b>na</b>	<b>na</b>	$w_{it-1}$	<b>0</b>	<b>0</b>	$w_{it-1}$	<b>0</b>	<b>0</b>
$e_{it-1}$	<b>0</b>	<b>0</b>	$e_{it-1}$	<b>0</b>	<b>0</b>	$e_{it-1}$	<b>0</b>	-

Note: "-" and "+" denote negative and positive correlation at the 5 per cent level, "0" denotes insignificant correlation

**Table 5**  
**Changes in employment**

Country	Region (NUTS)	Average yearly employment growth (per cent)	Standard deviation	Correlation of employment growth and unemployment rate
Bulgaria	28 (III)	-3.6	1.4	-0.62
Czech Republic	14 (III)	-7.1	1.2	-0.61
Hungary	20 (III)	-3.1	4.4	-0.67
Poland	16 (II)	-0.6	1.4	0.10
Romania	42 (III)	-2.1	0.7	-0.16
Russia	74 (oblasts)	-1.6	1.0	-0.22

Sources: Accesslab (2003), NewCronos Database and Goskomstat

**Table 6**  
**Philips curve regressions**

$$u_{it} = \alpha_i + \beta w_{it-1} + \gamma e_{it-1} + \varepsilon_{it}$$

	Bulgaria	Czech Republic	Hungary	Romania	Russia
<b>wage growth</b>	-0.10 (-1.68)	-0.44 (-4.85)	-0.26 (-2.96)	-0.09 (-1.58)	-0.05 (-1.03)
<b>employment growth</b>	-0.29 (-5.10)	-0.19 (-2.15)	-0.21 (-2.34)	-0.08 (-1.31)	-0.14 (-3.20)
<b>R-sq</b>	0.10	0.26	0.13	0.02	0.02
<b>observations</b>	280	98	120	287	513

Note: t-statistics in parenthesis

**Table 7**  
**Migration rates in selected countries**

Country	Gross migration rate (per cent)		Net to gross migration	
	1990	2000	1990	2000
Czech Republic	0.6 <sup>a</sup>	0.5	5.3 <sup>a</sup>	13.1
Hungary	1.9	1.36	7.4	3.6
Poland	0.4	0.26	14.5	14.4
Romania	-	0.28	-	7.2
Russia <sup>f</sup>	2.4 <sup>d</sup>	1.76	12.8 <sup>d</sup>	8.2
<b>Memorandum :</b>				
France	1.4	1.6 <sup>e</sup>	-	
Spain	0.7	-	11.7 (1996)	
USA	3.3	2.2 <sup>e</sup>	15.4 (1990)	

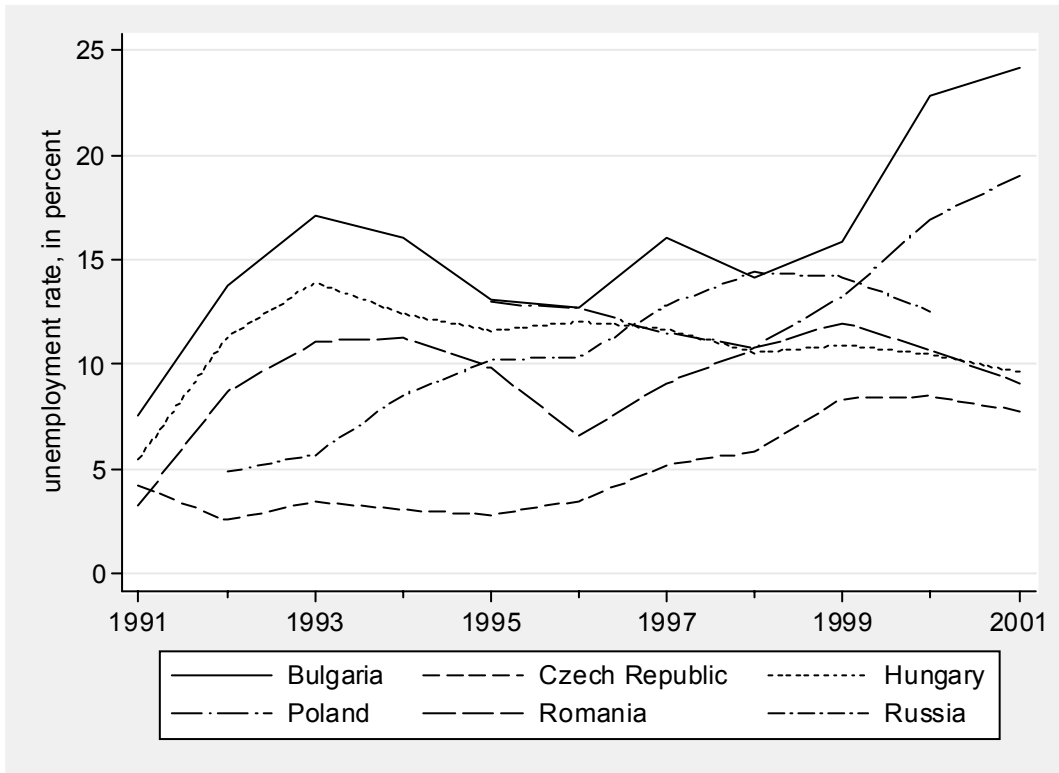
Sources: Accesslab (2003), OECD (2000), NewCronos Database and Goskomstat.

Notes: a: 1993, b: 1999, c: 1991, d: 1992, e: 1998,

The Gross migration rate is defined as the fraction of internal departures (or arrivals) to the population of the country.

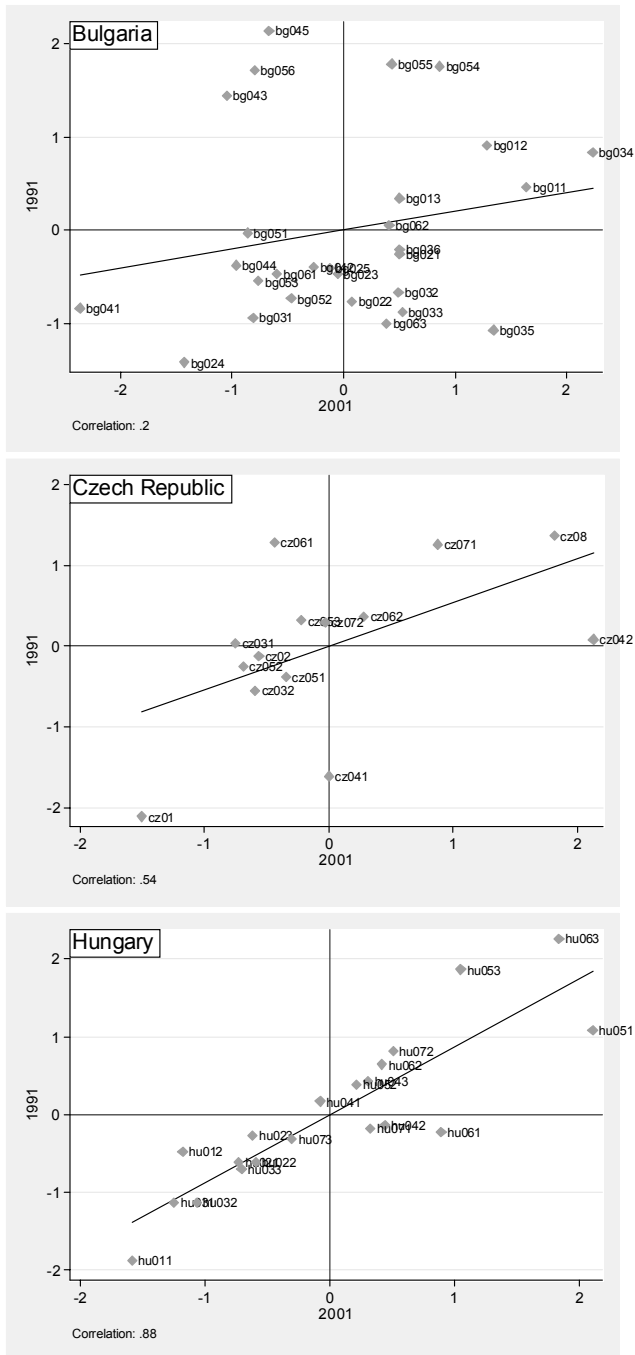
Net to gross migration is computed as the ratio of the sum of the absolute values of regional net migration times ½ to the gross migration, multiplied by 100. Regional levels are NUTS (II) for all countries except for Russia.

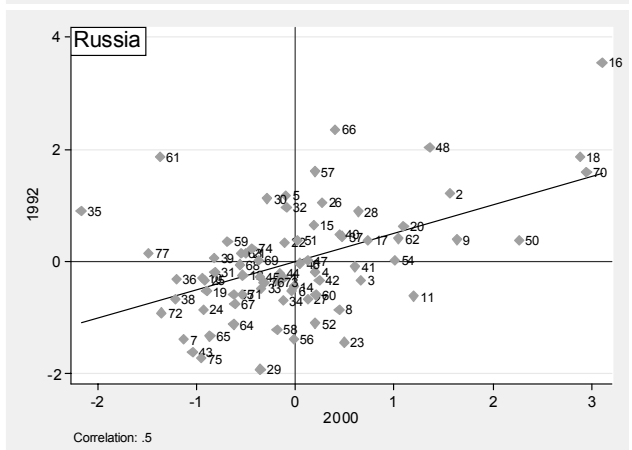
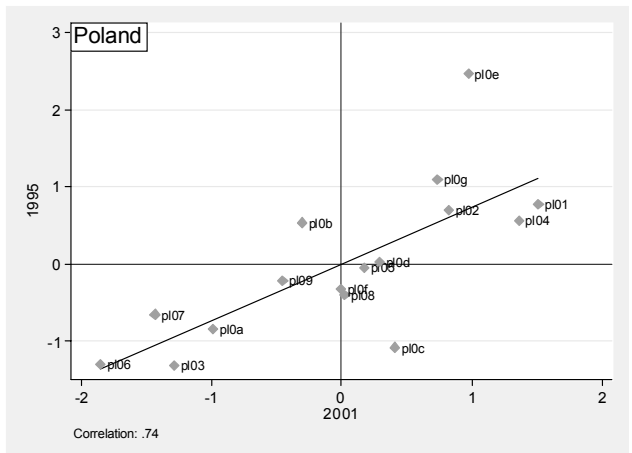
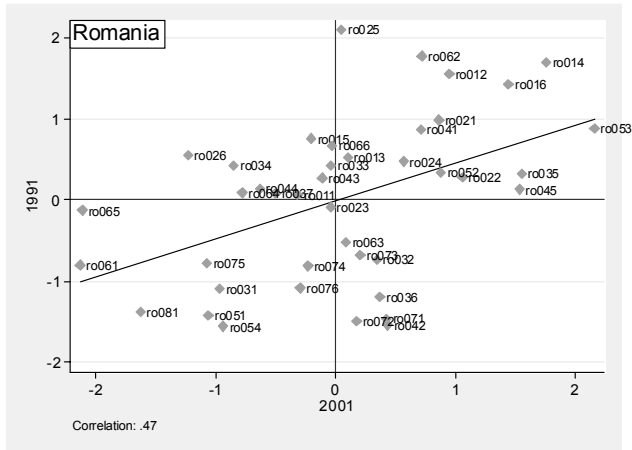
**Figure 1: Unemployment in Transition Countries**



Note: See Appendix 1 for data description.

**Figure 2: Relative unemployment rates, beginning and end of sample**

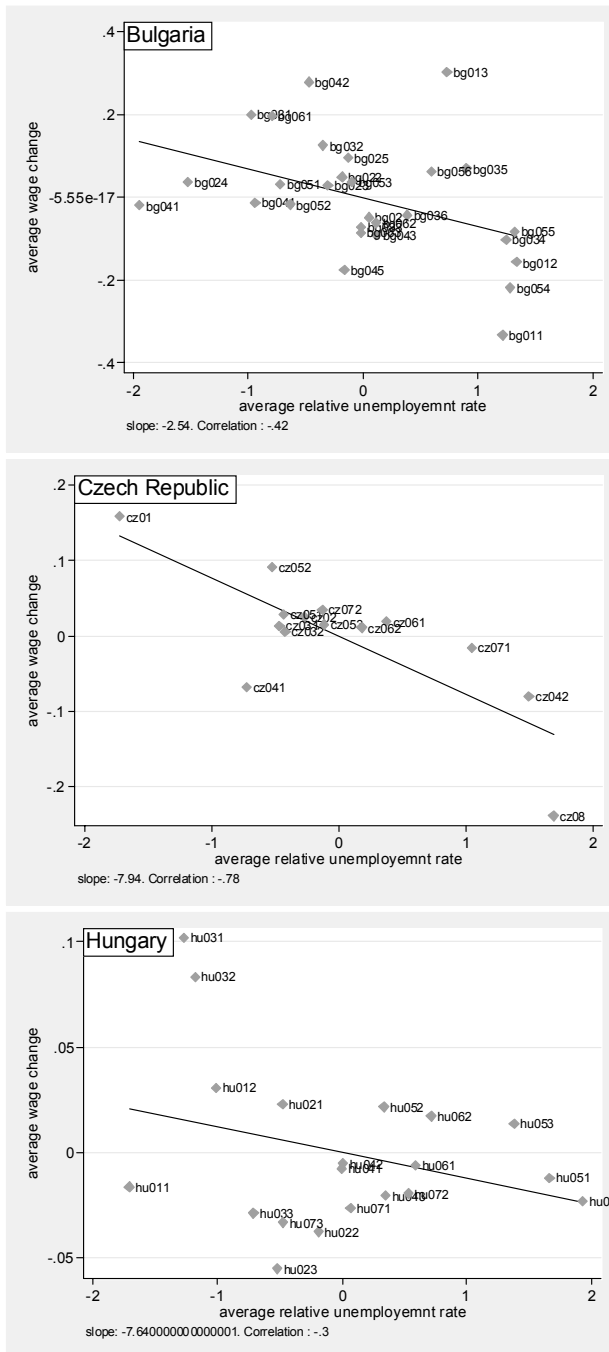


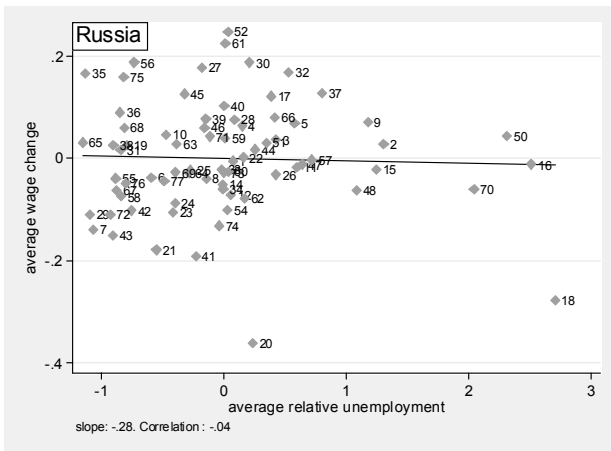
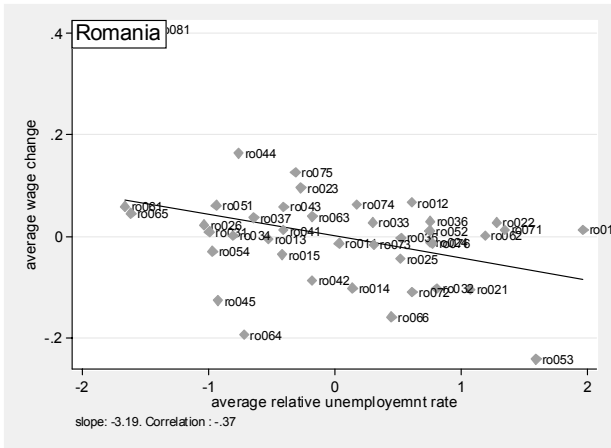


Note: Abbreviations in panels 1 to 5 correspond to official NUTS classification. For Russia, numbers refer to regions. For further information on the data, see Annex 1



**Figure 3: Average relative unemployment rates and average relative wage change**





**Figure 4: Relative Unemployment rates and net migration**

