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Intra-national Labor Market Adjustment in the Candidate Countries[1]

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Abstract

This paper analyzes the evolution of regional unemployment rates, wages, participation rates, migration and employment in seven candidate countries for accession to the European Union (EU) in the 1990's. We compare these countries to a core set of EU member states and find persistent regional disparities in both regions. However, persistence of unemployment rates is lower in the first-round candidate countries than in the member states. Furthermore, in both first-round and second-round candidate countries, persistence in participation rates is lower. Migration seems to be an ineffective labor market adjustment mechanism. Wages react more strongly to regional unemployment developments in first-round candidate countries than in member states but they are slightly less responsive to national unemployment.

JEL – Classification: E24, R11, P25

1. Introduction

Membership in the European Union (EU) places several challenges before the candidate countries. These countries will have to adopt the EU's *acquis communautaire*. In addition they will become eligible for support from the structural funds and will benefit from the freedom of movement of goods, services, labor and capital in the common market. Each of these changes will have regionally asymmetric implications. For example, transfers from the Common Agricultural Policy will benefit agricultural regions primarily and the effects of adopting competition and environmental policy are likely to impact more on regions in which non-competitive and sheltered industries or environmentally hazardous productions are located. Similarly, the freedom of movement of labor and services will affect border regions more significantly due to commuting possibilities and the limited transportability of many services.

This paper investigates the adjustment of regional labor markets of candidate countries to asymmetric shocks. Hence, we add to the literature on labor market adjustment in the United States (Blanchard and Katz, 1992) and the European Union (Decressin and Fatas, 1995, Fatas, 2000 and Jimeno and Bentolila, 1998) in two ways. First, we provide evidence on labor market adjustment and investigate to what extent candidate countries are already market economies. Second, by analyzing different forms of regional labor market adjustment, we provide an empirical background against which the effects of EU-enlargement on regional labor markets can be discussed in countries that have been characterized by different institutions than those in established market economies.

Analyzing labor market adjustments is particularly relevant with respect to the EMU membership of the candidate countries because joining a monetary union results in a country losing its autonomy over exchange rate policy. Hence, labor market mechanisms must be used to adjust to permanent shocks. To the extent that a loss in the real value of income denominated in foreign currency is socially or politically more desirable than increased unemployment, real wage losses denominated in national currency, migration or reductions in participation rates, there are risks of joining the EMU. Furthermore, to the extent that these forms of labor market adjustments differ amongst each other in their social or political desirability, the exact form of labor market adjustment will be relevant.

The motivation of our analysis is that any adverse region-specific that is not accommodated by regional transfers or borrowing from other regions must be absorbed by wages adjusting to new equilibrium levels, by increased unemployment or by reduced labor supply in the region. The last form of adjustment can be achieved either by emigration from the region or by lower participation of residents. After a short description of the data and the results of previous research in the next section, section three focuses on the short run dynamics of regional labor markets by analyzing the persistence of region-specific shocks and considering the reaction of inter-regional migration to disparities in unemployment rates and wages. Section four considers wage adjustments and section five concludes by drawing some policy conclusions.

2. The Data

We consider seven accession countries namely, Bulgaria, the Czech Republic, Estonia, Hungary, Poland, Romania and Slovenia. Data for the period from 1992 to 1998 are taken

from regional statistical yearbooks.[2] Similar data have been used in a number of studies on labor markets in accession candidate countries (Burda and Lubyova, 1995, Boeri and Scarpetta, 1996 and Traistru, Nijkamp and Resmini, 2002). From these countries we form two subgroups consisting of countries that have completed negotiations, i.e., the Czech Republic, Estonia, Hungary, Poland and Slovenia, and those that are still negotiating with the EU, i.e., Romania and Bulgaria. We refer to these two groups as first-round and second-round countries, respectively. As a benchmark we use five EU member states, namely, the Netherlands, Germany (excluding East Germany), Spain, Portugal and Italy. Our choice is guided by data availability and a concern to include both highly developed EU countries and poorer member states, in which the labor markets are less flexible. EU data for the years 1989 to 1995 are taken from the Eurostat Cronos database. As a wage indicator, the salaries paid to employees divided by the number of employees in a region is used.

{Table 1: Around here}

The regions of these countries differ in terms of size, wealth and labor market outcomes as Table 1 indicates. In general, regions in the candidate countries are substantially smaller than those in the member states, both in terms of population and area. Although unemployment rates in all candidate countries, except the Czech Republic and Estonia, were at the upper end of the distribution within the EU throughout the transition, they never exceeded the rates in Spain and approached the Italian rates by 1998. Similarly, participation rates measured as percentage of the population in Poland, Bulgaria and Romania exceeded

those found in most EU countries. Employment growth rates were very low in 1992 but they increased rapidly during transition. These findings are broadly consistent with recent contributions to the literature and suggest that the differences in labor market performance between candidate and EU countries may be exaggerated.[3] However, substantial heterogeneity exists among candidate countries. In particular, the Czech Republic is an outlier because of its low unemployment rates (Boeri and Burda, 1996) and Hungary has experienced substantial declines in participation rates (Köllö, 2001).

Our primary concern is with regional developments; large regional disparities emerged during the transition as has been stressed repeatedly in the literature (e.g. Boeri and Scarpetta, 1996, and Petrakos, 1995). Large cities have exhibited the lowest unemployment rates and highest wages throughout transition. In addition border regions in the Western parts of their countries have developed better than non-border regions and both mono-industrial and agricultural regions have faced considerable labor market problems (Gorzelak, 1996 and Smith 1998). Furthermore, regional disparities have increased in most candidate countries. Egger *et al* (2004) find divergence in wage levels in most candidate countries. In addition, Huber and Palme (2000) provide evidence that unemployment rates diverged in Poland and Hungary. As Table 1 indicates, unemployment rate disparities measured by standard deviations exceeded those in most EU countries except for Italy and disparities in participation rates were of comparable magnitude to those in the EU by 1998. The standard deviations of unemployment rates also increased in all candidate countries except for Poland and participation rate disparities increased in both Hungary and Poland.

{Table 2: Around here}

Profit (1999) points out that, despite rising regional disparities, the rank distribution of regions remained stable. Table 2 confirms this result by reporting correlation coefficients of unemployment rates, participation rates, employment growth and wages at the beginning of our observation period with their values at the end. Despite some heterogeneity among countries, coefficients of correlation are high and significant for all indicators except for employment growth. These correlations are slightly lower in the candidate countries, which suggests smaller persistence than in Western Europe. By contrast, correlation coefficients for employment growth are insignificant for both candidate countries and EU member states.

These features suggest that regional labor markets in both the EU and candidate countries do not adjust to shocks rapidly. Regional disparities are high and rising in most of the candidate countries and persistent in both regions. However, these characteristics do not indicate whether regional disparities are due to differences in long-run equilibrium levels or to the inability to absorb shocks specific to regions.[4] To disentangle these two effects region-specific developments must be identified.

3. Short-run Dynamics and Spatial Mobility

Various methods have been used in the literature to identify short run dynamics. Blanchard and Katz (1992) calculate differences between regional and national indicators, i.e., $\eta_{it} = Y_{it} - Y_{at}$ where Y_{it} is the value of the indicator in region i at time t and Y_{at} is the value of the same indicator at the national level. Decressin and Fatas (1995) run regressions of the following form:

$$Y_{it} = \gamma + \gamma_1 Y_{at} + \eta_{it}, \quad (1)$$

and interpret the residuals of these regressions (η_{it}) as region-specific shocks.[5]

The choice of methods depends on how closely regional developments follow national trends.[6] If regions follow national trends closely differences between the two methods will be minimal. We find substantial heterogeneity across candidate countries and follow Decressin and Fatas (1995) by using the residuals of equation (1) ($\bar{\eta}_{it}$) to estimate the following equation:

$$\bar{\eta}_{it} = \alpha_i + \delta_1 \bar{\eta}_{it-1} + \xi_{it}, \quad (2)$$

where α_i is a region-specific fixed effect, and δ_1 is a measure of the persistence of the indicator.[7] If this coefficient is smaller than one but larger than zero the series under consideration is stationary, but exhibits persistence. If δ_1 is negative but larger than -1 the series will also be stationary, but there will be cyclicality, i.e. the value of $\bar{\eta}_{it}$ will alternate between positive and negative values as a reaction to a one time shock. Persistence is higher the closer coefficient is to unity in absolute value, since this indicates that past shocks influence current developments more strongly.

{Table 3: Around here}

Corroborating the results of Fatas, (2000) and Decressin and Fatas (1995), we find insignificant persistence of wage growth rates in the overall EU, but high levels of persistence for both unemployment and participation rates in Table 3. For candidate countries there is

substantial heterogeneity between country groups. In the first-round candidate countries unemployment rate shocks are substantially less persistent than in the EU. In the second-round candidate countries, unemployment rates are similar in persistence as in the EU. Finally, in both first-round and second-round candidate countries, participation rates are less persistent and there is evidence of region-specific wage growth and employment growth rates oscillating around the country mean as in EU member states.

Taking the results for individual countries, we also find substantial variation within country groups. Unemployment rate persistence is high in Hungary but low in the Czech Republic and Bulgaria. In Poland participation rate developments are more persistent than in other candidate countries, and wage and employment growth rates oscillate more strongly in Poland than in many other candidate countries. Moreover, heterogeneity among candidate countries seems of similar magnitude as among member states. In particular we find significant coefficients for wage growth in Italy, Spain and Portugal but insignificant unemployment persistence in Italy, Spain and the Netherlands. However, country results should be interpreted cautiously, because some countries have only a few observations.

Hence, unemployment and in particular participation rates in the regions of the candidate countries return to their long-run levels more quickly than they do in EU member states. In theory, this low persistence in participation rates could be due to higher migration or to the labor supply behavior of residents. However, limited evidence on regional mobility in candidate countries indicates that internal mobility is unlikely to be an effective labor market adjustment mechanism. Fidrmuc (2004) finds lower mobility in the candidate countries than in the EU. In addition, spatial mismatch has remained high throughout the transition period

due to low migration and high transport costs, which impinge on the possibility of commuting (Boeri and Scarpetta, 1996).[8]

Migration rates have also fallen despite increasing regional disparities throughout the last decade. Fidrmuc and Huber (2003) report that, in the Czech Republic, the dispersion of wage levels measured by the coefficient of variation increased from 1992 to 1998 but migration dropped by 15% in the same time period. Similar results are reported for Poland and Slovakia by Huber (2004). Migration rates increased slightly with increasing regional wage disparities only in Slovenia. Huber (2004) also shows that migration rates in the candidate countries are correlated over time, with coefficients of correlation for migration rates 6 years apart ranging at around 0.9. This author also reports that about 90% of total migration flows consist of people moving in and out of the same region. Hence, migration reflects structural, rather than aggregate, differences between regions[9] and is associated either with a very protracted adjustment to permanent shocks or differences in the steady-state growth rates rather than reflecting short run adjustment. Finally, Fidrmuc (2004) relates net migration to wage and unemployment differentials between regions and finds that migration is ineffective in reducing regional disparities in the candidate countries. Most coefficients are small and some are insignificant.

These results can be extended by estimating place to place models of migration. Following Fields (1979) and Lundborg (1991) we hypothesize that the number of migrants from sending region j to receiving region i at time t (m_{ijt}) can be written as:

$$m_{ijt} = \alpha_0 \ln(w_{it} / w_{jt}) + \alpha_1 \ln(u_{it} / u_{jt}) + \alpha_2 \ln(p_{it}) + \alpha_3 \ln(p_{tj}) + \sum_{k=1}^{T} y_k + \sum_j \sum_i \gamma_{ij} a_{ij} + \varepsilon_{ijt}. \qquad (3)$$

In equation (3), w_{it} and w_{jt} refer to wages, while u_{it} and u_{jt} are measures of labor market tightness. Finally, p_{it} and p_{jt} indicate the population in the receiving and sending region, respectively, and are included to control for differences in region size. Since migration should occur from low-wage to high-wage regions and from high-unemployment to low-unemployment regions, α_0 should be positive and α_1 should be negative when unemployment rates are used as proxies for labor market tightness. Furthermore, α_2 and α_3 should both be positive. The a_{ij} are dummy variables for each sending – receiving region pair; they are included to control for all aspects of moving costs between two regions, e.g., the distance to be covered, contingency effects, differences in relationships between urban and suburban regions, and potential cultural differences within regions of countries that may increase psychological moving costs. Finally, the y_k are dummy variables to indicate the year of observation and are used as a proxy for macroeconomic influences on migration behavior, e.g., changes in the social welfare system or changes in the level of unemployment rates (Decressin, 1994).

For some countries, in particular Slovenia, migratory moves between regions are small in absolute number. Thus, estimating equation (3) using ordinary least squares would result in biased and inefficient results. Hence, we adopt standard methods used for analyzing count data by estimating equation (3) using maximum likelihood under the assumption of a negative binomial distribution (Cameron and Trivedi, 1986). Several authors suggest different measures of labor market tightness in specification (3). Jackman and Savouri (1992) use vacancy rates in addition to unemployment rates, Juarez (2000) uses employment growth or employment rates, and Fields (1979) favors unemployment rates. We experimented with

alternative measures of labor market tightness, by employing both unemployment rates and employment rates, which correspond to employment as a share of resident population.

{Table 4: Around here}

Migration is slightly less responsive to regional wage, unemployment and employment disparities in the candidate countries than in the EU, as Table 4 indicates.[10] Employment rate differences increase regional migration significantly in all EU countries, although employment rates are only marginally significant in Italy; however, employment rate disparities are insignificant throughout for the candidate countries. The only significant result for the candidate countries are unemployment rates in the Czech Republic, but these marginal effects are small too. Finally, wage differentials between sending and receiving regions tend to be significant for member states only; in Slovenia, wage differentials are insignificant and, when marginally significant in the Czech Republic, they have the wrong sign.

Analyzing migration and time series properties indicates that, migration rates are lower in both the first-round and second-round candidate countries and that the first-round candidate countries differ from current EU member states lower persistence in region-specific unemployment and participation rates shocks. Regions in second-round candidate countries also have less persistent region-specific participation rate shocks than do regions in the EU countries. The reasons for these differences must depend on factors other than high migration. One possible explanation is that wages react more strongly to regional labor market conditions in first-round candidate countries. We explore this reason in the next section.

4. Regional Wage Flexibility

The evidence concerning the relationship between wages and regional unemployment in candidate countries is mixed. Boeri and Scarpetta (1996) find the expected negative sign but insignificant coefficients from estimating equations relating regional wage growth to unemployment rate changes or levels. Commader and McHale (1995) report ambiguous results for the Visegrad countries. In contrast, Kertesi and Köllö (1995) find a significant negative impact of unemployment rate levels on regional wage levels using smaller regional units for Hungary. They also present evidence that the elasticity has increased during the transition. Kallai and Traistaru (2001) report a significant impact of unemployment rates on wage levels for a wide variety of specifications in Romania.[11] Comparing wage setting institutions in the candidate countries to those in the EU, Vaugham - Whitehead (1998) and Boeri and Terrell (2002) conclude that the bargaining structure is somewhat less centralized in the candidate countries; hence, we would expect more regional differentiation in wage levels in these countries.

We explore the relationship between regional wages and unemployment by estimating equations in which wage changes are related to regional unemployment rate changes. Following Büttner (1999), we specify:

$$\Delta w_{i,t} = \eta_i + \phi_1 u_{i,t} + \phi_2 u_{i,t-1} + \phi_3 X_{i,t} + \varsigma_{i,t}, \qquad (4)$$

where $w_{i,t}$ is the wage rate of region i at time t, η_i is a region-specific fixed effect to control for region-specific factors such as productivity shocks and $u_{i,t}$ is the unemployment rate in region i at time t. Additional variables, namely the log of the share of agricultural and manufacturing employment, denoted $X_{i,t}$, are included to control for differences in regional

structure. As Büttner (1999) points out, this specification nests both the standard Phillips-curve relationship and the wage-curve specification. If $\phi_2=0$, the equation specifies a relationship between wage growth and the unemployment rate which resembles the Phillips-curve as an adjustment process. If $\phi_1=-\phi_2$, it provides a relationship between the growth rate of wages and the change in unemployment rates, which is indicated by the standard wage-curve serving as an equilibrium relationship between wages and unemployment.

{Table 5: Around here}

However, the specification in Equation (4) ignores possible interactions among regional labor markets due to migration and capital movements in some countries and that wages are negotiated on a national, rather than regional, level in many European countries. Both factors may cause national unemployment rates to be more important for wage growth than regional unemployment rates. Thus, following Jimeno and Bentolila (1998), we include the national unemployment rate as an additional explanatory variable and correct for the bias in t-statistics that results from using data from different regional levels of aggregation (Blien, 1996). Our results in Table 5 indicate that regional real wage growth is more responsive to regional unemployment rates in first-round candidate countries than in the EU, although this result is not obtained for second-round candidate countries. In first-round candidate countries, a one percentage point increase in the regional unemployment rate reduces regional wage growth by around 0.4% in the first year and by a total of 0.3% in the long-run.[12] However, in the second-round candidate countries and in EU member states, there is no significant

correlation between regional wage growth and regional unemployment. National unemployment rates are determinants of wage growth in EU member states, but not in either group of candidate countries. For EU member states, a one percentage point increase in the national unemployment rate reduces wage growth by 2.6%[13]

Our results also favor weakly the wage-curve interpretation for the first-round candidate countries, because the hypothesis $\phi_1=-\phi_2$ cannot be rejected in any of the candidate countries with the exception of Romania but the hypothesis that the coefficient on the lagged unemployment rate (ϕ_2) is zero can be rejected at least at the 10% level for the first-round candidate countries and most individual countries. By contrast, the results for the EU and second-round candidate countries do not support either hypothesis, because neither $\phi_2=0$ nor $\phi_1=-\phi_2$ can be rejected.

Regional wages thus react more strongly to regional labor market conditions in first-round candidate countries than in the current EU member states, but national unemployment rates are more important for wage developments in the current EU member states than in candidate countries. This finding is consistent with the findings on less centralized wage bargaining institutions in many candidate countries than in EU member states. Furthermore, it indicates a higher capability of candidate countries to adjust to asymmetric regional shocks through the wage mechanism than in current member states.

5. Conclusions

In this paper we analyze the evolution of regional unemployment rates, wages, participation rates, migration and employment in seven candidate countries for EU accession during the period from 1992 to 1998. We compare the results concerning regional labor

market adjustment with those in EU member states. The evidence indicates that, in both candidate countries and EU member states, persistent regional disparities in unemployment rates, employment rates, participation rates and wages exist. However, despite variations among countries, persistence of unemployment rate disparities is lower in the first-round candidate countries than in the current EU member states. Furthermore, in both first-round and second-round candidate countries, the persistence in participation is lower than in EU member states. In addition, migration rates in candidate countries are low and highly persistent, a substantial portion of this migration consists of churning flows and correlations of migration flows with regional disparities are small. Hence, we conclude that migration is not an effective adjustment mechanism in candidate countries. Finally, we find some evidence that wages react more strongly to regional unemployment developments, but are slightly less responsive to national unemployment rates, in candidate countries than in EU member states.

Our results pertain to the experiences of the candidate countries in the 1990s; however, integration into the EU may change the institutions and thus adjustment mechanisms of these countries. Despite this and the low levels of internal migration, which require further research to explain their basis, we find little empirical support for the argument that regional labor markets are substantially less flexible in adjusting to regional asymmetric shocks in the candidate countries than they are in current EU member states. Furthermore, the evidence indicates that the candidate countries adjust to regionally asymmetric shocks mainly through higher regional wage flexibility, which in turn leads to lower persistence in unemployment and participation rates than in the EU.

Interpreting these results from the perspective of EMU integration, the candidate countries may be deemed equally suited for monetary union as current EMU member states with respect to labor market adjustment mechanisms. In particular, the higher responsiveness of wages to regional labor market conditions suggests that candidate countries may find it easier to adjust to asymmetric shocks. However, this conclusion, depends on the assumptions that shocks in the candidate countries are equally asymmetric and equally persistent as are shocks in the member states and that labor market adjustment mechanisms are not endogenous to integration into the EMU.

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Appendix: Data Description & Sources

Data Definitions

Data for the Czech Republic, Slovenia, Hungary and Poland are taken from regional and national statistical yearbooks. Data for Bulgaria, Romania and Estonia are taken from the Regspec database; see Iara and Traistaru (2002) for a description. Despite their substantial use in regional labor market analysis of candidate countries, data are not always comparable due to differences in national statistical systems. The following indicators are used:

Unemployment Rates: Registered unemployment rates are measured at the end of the year for the Czech Republic, Poland, Hungary and Slovakia. In Bulgaria and Romania they are annual averages. In Estonia only Labor Force Survey (LFS) data are available.

Population: This variable is the average population for all countries

Participation Rates: These rates are measured as a percent of total population and are calculated from employment figures and unemployment rates in all countries.

Wages: This variable is average monthly wages. In the Czech Republic, Slovakia, Poland, Hungary and Romania we use gross wages. In Slovenia and Bulgaria we use net earnings. All wage data are deflated using consumer price indices.

Employment: These data refer to employees in Slovenia, the Czech Republic, Hungary and Poland and to employed persons elsewhere. In the Czech Republic these data are registered at the end of the year; in Slovenia they are registered on September 30. For all other countries, annual averages are reported.

Place to Place Migration Data: The data for the Czech Republic were provided by Jan Fidrmuc; see Fidrmuc and Huber (2003) for a description. The Slovenian data are taken from national statistical yearbooks. Data are from the registry of residents and correspond to population moves except in Slovenia where only moves of nationals are reported.

National Indicators: We used the consumer price index (all items) as reported in the OECD Main Economic Indicators database to deflate wages.

Dealing with data Problems

In some cases, changes in reporting system and regional aggregation occurred: In the Czech Republic, the minimal size of enterprises in the private sector required to report employment changed three times from 1992 to 1998. These changes could have affected the adjustment of employment growth even after removing the national developments using equation (1). We estimated equation (2) for employment growth excluding the Czech Republic. This did not change results. Thus we did not omit the Czech employment data in the text.

Furthermore, in the Czech Republic in 1996, the district of Jesenik was formed from the territories of Sumperk and Bruntal. Thus, the districts of Sumperk, Jesenik and Bruntal were excluded to provide a comparable level of regional disaggregation for the complete period from 1992 to 1998. In Hungary up to 1997, regional employment statistics were collected at the enterprise level; after this time, establishment level statistics are provided. Due to these changes, 1998 data were omitted. In Slovenia, data at the level of statistical regions were reported only from 1997 onwards. Before this time, the data are reported at the level of 192 communities. These data can be aggregated exactly to the level of statistical regions using the bridge provided in the national statistical yearbooks. Hence, we have comparable data on employment and wages for the period from 1992 to 1998. For Romania, gross wages were calculated as the mean of average monthly gross earnings of the counties that constitute each region for the complete time period.

Data Sources

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Poland: Glowny Urzad Statystyczny (Polish Statistical Office), Rocznik Statystyczny Wojewodztw, various issues, 1992 -1999.

Slovenia: Slovene Statistical Office, Statistcal Yearbook, various issues, 1992 – 1998.

Hungary: Központi Statisztikai Hivatal, Területi Statiisztikai Evkönyv – Regional Statistical Yearbook, various issues , 1992-1998.

Bulgaria, Estonia, and Romania: Respec databases (REGSTAT) Iara and Traisturu (2002) provide descriptions.

National CPI Data: OECD Main economic indicators (all items).

Table 1: Summary Statistics of Regional Data in Candidate and EU Countries

	Population		Area	Unemployment Rate		Participation Rate		Employment Growth		Wage Growth	
	1992	1998		1992	1998	1992	1998	1993	1998	1993	1998
Czech Republic	135.7 (133.6)	133.7 (135.8)	1,051 (578)	2.9 (1.4)	7.5 (3.0)	32.9 (6.4)	34.8 (5-0)	-18.7 (6.5)	-3.2 (4.0)	-3.3 (1.8)	-4.0 (1.5)
Poland	783.0 (604.0)	789.1 (590.5)	6,381 (3630)	13.6 (4.4)	10.4 (4.1)	45.9 (3.7)	45.5 (4.6)	-5.9 (5.5)	-0.1 (2.6)	-6.3 (3.1)	3.4 (1.9)
Slovenia	165.8 (138.5)	165.2 (139.0)	1,689 (749)	-	14.3 (4.1)	-	34.1 (2.9)	-4.2 (1.4)	-0.4 (1.7)	10.5 (4.8)	1.4 (0.7)
Hungary	516.9 (393.2)	506.8 (367.3)	4,651 (1790)	13.3 (3.6)	9.1 (3.8)	32.6 (4.3)	25.7 (6.65)	-9.8 (2.4)	-2.0 (2.2)	-4.8 (2.0)	2.3 (1.4)
Bulgaria	303.0 (215.5)	293.9 (217.6)	3961 (1496)	14.7 (4.1)	13.8 (4.5)	43.8 (2.4)	43.0 (2.3)	-1.7 (2.1)	-0.2 (1.0)	-	-
Estonia	305.3 (160.1)	289.1 (143.9)	8740 (4591)	-	4.7 (1.2)	-	46.4 (3.2)	-7.5 (1.8)	-0.1 (1.4)	20.4 (2.2)	6.7 (1.8)
Romania	555.8 (330.8)	548.8 (325.7)	5814 (1495)	3.0 (1.3)	9.0 (2.9)	47.2 (2.8)	42.7 (2.7)	-3.8 (3.0)	-2.7 (2.7)	-10.8 (1.2)	-3.1 (8.7)
	1989	1995		1989	1995	1989	1995	1989	1995	1989	1995
Germany	5978.7 (5251.4)	6192.3 (5129.2)	8,925 (5,661)	6.7 (2.3)	7.6 (1.9)	43.8 (5.8)	41.7 (6.5)	3.1 (0.1)	-1.2 (0.1)	2.6 (9.5)	5.4 (0.6)
Italy	2837.9 (2276.8)	2865.0 (2245.1)	15,066 (7,226)	10.0 (6.27)	11.9 (6.8)	30.7 (3.2)	30.0 (3.5)	0.9 (1.9)	-0.7 (1.7)	3.5 (1.0)	-5.7 (0.9)
Netherlands	1260.6 (964.5)	1288.3 (939.2)	2,824 (1,139)	8.5 (1.5)	7.0 (1.0)	32.8 (4.0)	33.1 (4.2)	3.0 (1.6)	2.0 (0.5)	0.4 (0.3)	5.6 (0.4)
Portugal	1408.6 (1444.3)	1883.7 (1339.1)	13.123 (10,249)	4.8 (3.1)	7.3 (2.1)	29.3 (4.2)	31.6 (4.1)	2.4 (9.5)	-8.9 (5.1)	0.7 (5.3)	6.0 (7.0)
Spain	2169.8 (2014.8)	2178.3 (1992.2)	28,044 (29,521)	17.4 (6.0)	23.1 (5.4)	27.8 (3.5)	25.1 (3.8)	-4.8 (1.7)	2.9 (2.5)	12.5 (2.5)	-1.2 (3.7)

Notes:

i) Table reports unweighted averages and standard deviations in parentheses.

ii) Population is measured in thousand inhabitants and area is measured in square kilometers. All other variables are in percent.

iii) The German data for employment growth, wage growth and participation rates ends in 1994. 1994 data are reported in the second column for each indicator.

iv) The Hungarian data for 1998 were excluded from the analysis due to changes in methodology. 1997 values are reported in the table.

v) The data for Portugal exclude overseas territories, i.e., Acores and Madeira.

Table 2: Intertemporal Correlations of Selected Labor Market Indicators

	Unemployment Rate	Participation Rate	Wages	Employment growth
	1992 –98	1992 –98	1992 -98	1992 –98
Poland	0.90***	0.85***	0.95***	0.18
Czech Republic	0.65***	0.79***	0.84***	0.08
Slovenia	-	-	0.92**	0.05
Hungary	0.90***	0.86***	0.91***	0.20
Bulgaria	0.40**	0.72***	1.00***	-0.16
Estonia	-	-	0.99***	0.14
Romania	0.46**	0.55**	0.78***	-0.17
	1989 –95	1989 –95	1989–95	1989 – 95
Germany	0.99***	0.99***	0.99***	-0.24
Italy	0.96***	0.98***	0.99***	0.06
Netherlands	0.72**	0.99***	0.96***	0.07
Portugal	0.78**	0.88**	0.88**	0.02
Spain	0.78**	0.82***	0.86***	0.25

Notes:

i) The table reports correlations of the indicator between the years indicated.

ii) The German data for employment growth, wage growth and participation rates ends in 1994. Correlations are between 1989 and 1994

iii) The Hungarian data for 1998 were excluded from the analysis due to changes in methodology. Correlations are between 1992 and 1997.

iv) The data for Portugal exclude overseas territories, i.e., Acores and Madeira.

v) The symbols ***, ** and * indicate that the coefficients are significantly different from zero at the 1% , 5% and 10% level, respectively.

Table 3: Persistence of Region-Specific Shocks

	participation rate		unemployment rate		wage growth		employment growth	
Candidate Countries 1992-1998	0.214*** (0.019)	T=7 N=212	0.320*** (0.054)	T=7[a)] N=212	-0.090 (0.070)	T=6 N=201	-0.127*** (0.024)	T=6 N=229
First-Round 1992-1998	0.231*** (0.023)	T=7 [a)] N=143	0.168** (0.070)	T=7 N=143	-0.169*** (0.066)	T=6 N=160	-0.149*** (0.024)	T=6 [a)] N=155
Second-Round 1992-1998	0.084** (0.039)	T=7 N=69	0.420** (0.071)	T=7 N=69	-0.091 (0.114)	T=6 N=41	-0.053 (0.063)	T=6 [a)] N=74
Czech Republic 1992-1998	0.169*** (0.024)	T=7 N=74	0.231*** (0.079)	T=7 [a)] N=74	-0.402*** (0.081)	T=6 N=74	-0.194** (0.065)	T=6 [a)] N=74
Poland 1992-1998	0.283*** (0.044)	T=7 [a)] N=49	0.026 (0.060)	T=7 N=49	-0.617*** (0.015)	T=6 N=49	-0.304** (0.048)	T=6 [a)] N=49
Slovenia 1992-1998					-0.457*** (0.073)	T=6 N=12	0.028 (0.151)	T=6 N=12
Hungary 1992-1997	0.007 (0.244)	T=6 [a)] N=20	0.667*** (0.074)	T=6 N=20	-0.159** (0.061)	T=5 N=20	0.353*** (0.116)	T=5 N=20
Bulgaria 1992-1998	0.001 (0.051)	T=7 [a)] N=28	0.268*** (0.054)	T=7 N=28			-0.323** (0.044)	T=6 N=28
Estonia 1992-1998					-0.079 (0.058)	T=6 N=5	-0.261** (0.119)	T=6 N=5
Romania 1992-1998	0.015 (0.072)	T=7 N=41	0.412*** (0.122)	T=7 N=41	-0.136 (0.149)	T=6 N=41	-0.101 (0.078)	T=6 N=41
EU 1992-1998	0.402*** (0.109)	T=5 N=67	0.390*** (0.107)	T=5[a)] N=67	-0.164 (0.134)	T=4 N=67	-0.392** (0.155)	T=4 N=67
Germany	0.290*** (0.006)	T=5 N=11	0.573*** (0.009)	T=5 N=11	-0.028 (0.022)	T=5 N=11	-0.653*** (0.090)	T=5 N=11
Italy	0.153** (0.073)	T=5 N=21	0.111 (0.146)	T=5 N=21	-0.424*** (0.123)	T=5 N=21	-0.373*** (0.101)	T=5 N=21
Netherlands	0.802*** (0.058)	T=5 N=12	0.186 (0.117)	T=5 N=12	-0.089 (0.126)	T=5 N=12	-0.340*** (0.095)	T=5 N=12
Portugal	0.315 (0.211)	T=5 N=5	0.209*** (0.096)	T=5 N=5	-0.313** (0.119)	T=5 N=5	-0.319** (0.114)	T=5 N=5
Spain	0.408*** (0.065)	T=5 N=18	0.189 (0.155)	T=5 N=18	-0.448*** (0.111)	T=5 N=18	-0.607*** (0.115)	T=5 N=18

Notes:

i) The values in parentheses are the standard errors of the estimate.

ii) The superscript a) indicates that the null of second order auto-correlation cannot be rejected at the 5% level.

iii) The symbols ***, ** and * indicate that the coefficients are significantly different from zero at the 1%, 5% and 10% level, respectively.

iv) For the candidate countries the results for participation and unemployment rates exclude Slovenia and Estonia and the results for wage growth exclude Bulgaria. Hungarian data are for the period 1992 to 1997.

v) For the EU, German data for employment growth, wage growth and participation rates are for the period 1989 to 1994 and Portuguese data exclude overseas territories, i.e., Acores and Madeira.

vi) T is the maximum number of time periods and N is the number of cross sectional units.

Table 4: Determinants of Gross Migration Flows

	Czech Republic 1992 – 1998 (74)		Slovenia 1996-1998 (12)		Netherlands 1989-1995 (12)		Italy 1989-1995 (21)		Spain 1983-1985 (18)	
Ln Population in sending region	0.68** (0.03)	0.71** (0.03)	1.01** (0.49)	0.33* (0.84)	0.78** (0.14)	0.72** (0.13)	0.09 (0.04)	-0.09*** (0.03)	0.25*** (0.03)	0.03** (0.01)
Ln Population in receiving region	0.69** (0.03)	0.67** (0.03)	0.83 (0.50)	0.53** (0.74)	0.95** (0.16)	1.02** (0.15)	2.96** (1.33)	0.04 (0.03)	-0.09*** (0.03)	-0.17*** (0.03)
Ln wage differentials	-0.10* (0.06)	-0.08 (0.05)	0.02 (1.30)	-1.29 (3.36)	0.46 (0.61)	0.06 (0.59)	0.95 (0.06)	0.15*** (0.07)	0.26*** (0.05)	0.42*** (0.06)
Ln employment rate differentials	0.02 (0.04)		0.05 (0.85)		0.56** (0.26)		0.53* (0.31)		0.27*** (0.02)	
Ln unemployment differentials		-0.05*** (0.01)		0.51 (0.34)		-0.03 (0.04)		-0.20*** (0.03)		-0.01 (0.03)
Number of Observations	37793	37793	375	244	396	396	4902	5200	3695	3666
Log Likelihood	-89138	-80120	-698	-337	-2108	-2110	-35672	-24713	-19749	-18898
Log Likelihood fixed effects only	-131572	-131572	-700	-349	-2140	-2140	-25024	-25024	-19827	-19827

Notes:

i) The dependent variable is the number of migrants and the coefficients are derived from maximum likelihood estimation under the assumption of a negative binomial distribution.

ii) All specifications include fixed effects for each sending - receiving region pair as well as period fixed effects for each year.

iii) The values in parentheses are heteroscedasticity robust standard errors of the estimates.

iv) The symbols ***, ** and * indicate that coefficients are significantly different from zero at the 1%, 5% and 10% level, respectively.

Table 5: Results of Wage Regressions including National Unemployment Rates

	National unemployment rate	Unemployment rate	Lagged unemployment rate	Ln(Agriculture share)	Ln(Industrial employment share)	R2 (Number of Observations)	Test $\phi 1=-\phi 2$ P-Value
CEE[a)] 1992-1998	0.0031 (0.018)	-0.0037 (0.0047)	0.0080 (0.0110)	-0.10 (0.10)	-0.01 (0.07)	0.18 (1257)	0.45
First-Round 1992-1998	-0.0098 (0.0058)	-0.0042** (0.0011)	0.0012* (0.0006)	0.05 (0.06)	-0.08 (0.04)	0.43 (927)	0.39
Second-Round 1992-1998	0.0604 (0.297)	-0.0026 (0.0116)	0.0108 (0.0401)	-0.08 (0.26)	-0.07 (0.11)	0.34 (330)	0.24
EU 1989-1995	-0.0262*** (0.0031)	0.0006 (0.0010)	0.0062 (0.0043)	1.08 (0.52)	0.60 (0.45)	0.68 (388)	0.21
Czech Republic 1992-1998	-0.0189*** (0.0017)	-0.0028* (0.0016)	0.0011 (0.0014)	-0.01 (0.03)	-0.01 (0.02)	0.71 (518)	0.28
Poland 1992-1998	-0.0084*** (0.0022)	-0.0011 (0.0022)	0.0017* (0.0011)	-0.57*** (0.08)	-0.57*** (0.10)	0.40 (294)	0.73
Hungary [c)] 1992-1997	-0.0342*** (0.0094)	-0.0022 (0.0030)	0.0002 (0.0028)	0.53 (0.35)	0.22 (0.10)	0.90 (100)	0.53
Bulgaria 1995-1998	0.0857*** (0.0297)	-0.0538** (0.0216)	0.1300*** (0.0131)	2.23 (1.70)	-1.85 (1.96)	0.81 (84)	0.00
Estonia 1995-1998	-0.1384*** (0.0834)	0.0951 (0.0341)	-0.0981** (0.0341)	-0.06 (1.24)	2.27 (2.19)	0.68 (15)	0.95
Romania 1992-1998	0.0792*** (0.0037)	0.0039 (0.0025)	-0.0109*** (0.0017)	-0.21 (0.02)	-0.14 (0.04)	0.79 (246)	0.01

Notes:

i) The values in parenthesis are standard errors corrected for the downward bias due to clustering.

ii) The symbols ***, ** and * indicate that coefficients are significantly different from zero at the 1%, 5% and 10% level, respectively.

iii) The EU includes German data for employment growth wage growth and participation rates, for the period 1989 to 1994 and excludes Portuguese overseas territories, i.e., Acores and Madeira.

iv) For the candidate countries Hungarian data for 1998 were excluded from the analysis due to changes in methodology .

v) The number in parentheses in the R^2 column gives the number of observations and the number in the last column reports probability values of a test for the equality of the parameter of contemporary and lagged unemployment rates.

Appendices : Robustness of Results

Appendix 2: Results of Unit Root Tests

Table A2.1: Unit Root Tests for Untransformed Series (Levels)

	Im Pearsaran Shin Test (P-values)			
	Participation Rate	Unemployment Rate	employment growth	wage growth
Czech Republic	0.00	0.00	0.00	0.00
Germany	0.39	0.05	-	-
Italy	0.17	0.23	0.00	0.00
Netherlands	0.34	0.00	0.00	0.02
Poland	0.00	0.00	0.00	-
Portugal	0.13	0.39	0.00	0.44
Slovenia	-	-	0.00	0.00
Spain	0.00	0.21	0.01	0.00
Hungary	0.40	0.08	0.00	0.00
Bulgaria	0.00	0.01	0.00	-
Estonia	-	-	0.06	0.00
Romania	0.03	0.40	0.00	0.00
	Levin Lin tests (P-values)			
	Participation Rate	Unemployment Rate	employment growth	wage growth
Czech Republic	0.00	0.00	0.00	0.00
Germany	0.32	0.00	-	-
Italy	0.11	0.19	0.00	0.00
Netherlands	0.29	0.00	0.00	0.01
Poland	0.00	0.00	0.00	0.00
Portugal	0.08	0.05	0.00	0.31
Slovenia	-	-	0.00	0.00
Spain	0.00	0.31	0.00	0.00
Hungary	0.38	0.00	0.00	0.00
Bulgaria	0.00	0.00	0.00	-
Estonia	-	-	0.00	0.00
Romania	0.01	0.33	0.00	0.00

I performed Levin and Lin (1993, 1992) and Im, Persaran and Shin (1997) panel unit root tests on both the original indicators as well as the residuals of equation (1). Starting from a specification such as

(A1) $\Delta y_{it} = \alpha_i + \delta_i t + \theta_t + \rho_i y_{it-1} + \xi_{it}$

with t a time trend and y_i the indicator under consideration. These two tests, test slightly different hypotheses. The Levin and Lin test restricts the ρ_i to be equal across all i and thus tests the null hypothesis that $\rho_i = \rho = 0$ for all i against the alternative $\rho_i = \rho < 0$ for all i while Im, Persaran and Shin test restricts θ_i and δ_i to zero and tests the null hypothesis that $\rho_i = 0$ for all i against the alternative that a subset of the series in the panel are not

integrated i.e. $\rho_i < 0$ for all i=1..N_1 , $\rho_i = 0$ for all i=N_1+1, ..., N. The tests also have different minimum data requirements and differ in their small sample properties (see Banerjee, 1999, Maddala and Wu, 1999 for comparisons of panel unit root tests). I perform tests for all series where this is possible. Results Reported in Tables A2.1 and A2.2 suggest that:

1. For most indicators in some countries the null of a unit root cannot be rejected. this is the case more often for member states than for candidate countries (see: Table A2.1)
2. for transformed series the null (of a unit root) can be rejected for all series but for unemployment rates in Romania. (see Table A2.2)

Table A2.2: Unit Root Tests for Transformed Series (Residuals of regression 1)

	Im Pearsaran Shin Test (P-values)			
	Participation Rate	Unemployment Rate	employment growth	wage growth
Czech Republic	0.00	0.00	0.00	0.00
Germany	-	0.00	-	-
Italy	0.00	0.00	0.00	0.00
Netherlands	0.00	0.00	0.00	0.00
Poland	0.00	0.00	0.00	0.00
Portugal	0.00	0.00	0.00	0.00
Slovenia			0.00	0.00
Spain	0.00	0.00	0.00	0.00
Hungary	0.00	0.00	0.00	0.00
Bulgaria	0.00	0.00	0.00	
Estonia	-	-	0.00	0.00
Romania	0.02	0.32	0.00	0.00
	Levin Lin tests (P-values)			
	Participation Rate	Unemployment Rate	employment growth	wage growth
Czech Republic	0.00	0.00	0.00	0.00
Germany	-	0.00	-	-
Italy	0.00	0.00	0.00	0.00
Netherlands	0.00	0.00	0.00	0.00
Poland	0.00	0.00	0.00	0.00
Portugal	0.00	0.00	0.00	0.00
Slovenia			0.00	0.00
Spain	0.00	0.00	0.00	0.00
Hungary	0.00	0.00	0.00	0.00
Bulgaria	0.00	0.00	0.00	
Estonia	-	-	0.00	0.00
Romania	0.02	0.32	0.00	0.00

Appendix 3: Additional Results Concerning Univariate Processes

I performed a number of tests of robustness on estimates of equation (2). First, an important assumption for consistency of the GMM estimator proposed by Arellano and Bond (1991) is that the residuals of equation (3) do not exhibit second order auto-correlation. I thus tested the null that second order auto-correlation in the residuals is zero.[1] This null cannot be rejected for only few results in Table 4 (see table in main text)

Table A3.1: Persistence of regional indicators (Residuals – 2Lags - GMM)

	participation rate			unemployment rate			wage growth			employment growth		
CEE	0.213** (0.019)	0.021 (0.036)	T=7 N=212	0.325** (0.051)	0.164** (0.047)	T= 7 N=212	-0.072 (0.074)	0.041 (0.042)	T=6 N=201	-0.102** (0.024)	0.128** (0.067)	T=6 N=229
First Round	0.225** (0.023)	0.091 (0.248)	T=7 N=143	0.065 (0.071)	-0.032 (0.041)	T=7 N=143	-0.178 (0.069)	-0.041 (0.040)	T=6 N=160	-0.100** (0.027)	0.182** (0.060)	T=6 N=155
Second Round	0.092 (0.051)	-0.310** (0.037)	T=7 N=69	0.418** (0.065)	0.231** (0.064)	T=7 N=69	-0.142 (0.151)	0.172 (0.02)	T=6 N=41	-0.132 (0.089)	-0.449** (0.105)	T=6 N=74
Czech Republic	0.162 (0.021)	0.116 (0.016)	T=7 N=74	0.338 (0.121)	-0.329 (0.070)	T=7 N=74	-0.599 (0.044)	-0.166 (0.054)	T=6 N=74	-0.134 (0.034)	0.212 (0.056)	T=6 N=74
Poland	0.292 (0.042)	-0.110 (0.052)	T=7 N=49	-0.305 (0.072)	-0.170 (0.041)	T=7 N=49	-0.455 (0.118)	-0.231 (0.070)	T=6 N=49	-0.388 (0.049)	-0.254 (0.063)	T=6 N=49
Slovenia							-0.332 (0.157)	-0.229 (0.180)	T=6 N=12	0.034 (0.232)	-0.447 (0.124)	T=6 N=12
Hungary	-0.012 (0.202)	0.224 (0.166)	T=7 N=20	0.689 (0.085)	-0.175 (0.128)	T=7 N=20	-0.325 (0.146)	-0.075 (0.107)	T=7 N=20	0.329 (0.106)	0.122 (0.052)	T=6 N=20
Bulgaria	-0.007 (0.062)	-0.238 (0.053)	T=7 N=28	0.249 (0.081)	0.184 (0.099)	T=7 N=28				-0.436 (0.072)	-0.270 (0.111)	T=6 N=28
Estonia							-0.329 (0.039)	-0.757 (0.077)	T=6 N=5	-0.323 (0.146)	-0.581 (0.146)	T=6 N=5
Romania	0.029 (0.093)	-0.364 (0.052)	T=7 N=41	0.406 (0.117)	0.084 (0.066)	T=7 N=41	-0.142 (0.151)	0.172 (0.092)	T=6 N=41	-0.118 (0.104)	-0.798 (0.117)	T=6 N=41
EU	0.754 (0.118)	-0.419 (0.205)	T=5 N=68	0.313 (0.186)	-0.454 (0.122)	T=5 N=68	-0.361 (0.215)	-0.313 (0.194)	T=4 N=68	-0.550 (0.243)	-0.345 (0.152)	T=4 N=68

Note: Results report the coefficient of regression (2), values in brackets are standard errors of the estimate, *** (**) (*) coefficients are significantly different from zero at the 1% (***), 5% (**) and 10% (*) level. Candidate countries: results for participation and unemployment rates excluding Slovenia and Estonia, results for wage growth and employment growth excluding Bulgaria. EU: German wages and employment growth and participation rate 1989 – 1994, excluding Portuguese overseas territories (Acores and Madeira.. T= maximum number of time period, N= number of cross sectional units.

Second, I was concerned that either the choice of detrending method or the choice of the number of lags may have implications on the results reported. For this reason I re-estimated equation (3) under a number of alternative specifications: In particular I:

1) experimented with increasing the lag length (see: results reported in Table A3.1) to two lags. These results confirm the results in the main text. The second lags are, however, insignificant for a number of estimates.

[1] This test is provided by the m_2 statistic in Arellano and Bond (1991)

Thus out of concern for efficiency of my estimates in already short series, I gave preference to results using only one lag.

2) used LSDV estimates rather than GMM estimation (results in table A3.2). Results are broadly consistent with my findings in the main text. Participation rates are less persistent in candidate countries than in the EU, unemployment rates are less persistent in the first round countries only and employment growth is more persistent in candidate countries. However, these results also suggest a slightly lower persistence in unemployment rates in second round candidate countries. LSDV estimates are, however biased.

Table A3.2: Persistence of regional indicators (Residuals – 1Lags - LSDV))

	participation rate		unemployment rate		wage growth		employment growth	
CEE	0.127*** (0.030)	T=7 N=212	0.165*** (0.031)	T=7 N=212	-0.246*** (0.039)	T=6 N=201	-0.207*** (0.032)	T=6 N=229
First Round	0.161*** (0.036)	T=7 N=143	-0.017 (0.036)	T=7 N=143	-0.234*** (0.041)	T=6 N=160	-0.211*** (0.035)	T=6 N=155
Second Round	0.023 (0.051)	T=7 N=69	0.249*** (0.055)	T=7 N=69	-0.278*** (0.092)	T=6 N=41	-0.231*** (0.056)	T=6 N=74
Czech Republic	0.132** (0.049)	T=7 N=74	0.254*** (0.047)	T=7 N=74	-0.399*** (0.045)	T=6 N=74	-0.227*** (0.049)	T=6 N=74
Poland	0.223*** (0.062)	T=7 N=49	-0.263*** (0.058)	T=7 N=49	-0.112 (0.089)	T=6 N=49	-0.336*** (0.058)	T=6 N=49
Slovenia					-0.454*** (0.118)	T=6 N=12	-0.069 (0.156)	T=6 N=12
Hungary	0.468*** (0.107)	T=7 N=20	0.482*** (0.109)	T=7 N=20	-0.169 (0.115)	T=7 N=20	0.511*** (0.104)	T=6 N=20
Bulgaria	0.003 (0.079)	T=7 N=28	0.214*** (0.083)	T=7 N=28			-0.333*** (0.075)	T=6 N=28
Estonia					-0.012 (0.208)	T=6 N=5	-0.276** (0.202)	T=6 N=5
Romania	0.032 (0.069)	T=7 N=41	0.286*** (0.074)	T=7 N=41	-0.347*** (0.102)	T=6 N=41	-0.171** (0.086)	T=6 N=41
EU	0.137** (0.059)	T=5 N=68	0.533*** (0.055)	T=5 N=68	-0.167 (0.148)	T=4 N=68	-0.535*** (0.056)	T=4 N=68

Note: Results report the coefficient of regression (2), values in brackets are standard errors of the estimate *** (**) (*) coefficients are significantly different from zero at the 1% (***), 5% (**) and 10% (*) level. Candidate countries: results for participation and unemployment rates excluding Slovenia and Estonia, results for wage growth and employment growth excluding Bulgaria. EU: German wages and employment growth and participation rate 1989 – 1994, excluding Portuguese overseas territories (Acores and Madeira).. T= maximum number of time period, N= number of cross sectional units.

3) used differences between regional and national indicators (as proposed by Blanchard and Katz, 1992) rather than residuals from equation (2) (results reported in Table A3.3) although series may be integrated and the heterogeneity in parameter estimates of (1) suggest that this procedure may not be optimal. Results are, qualitatively equivalent to my findings in the main text. Participation rates are less persistent in candidate

countries than in the EU, unemployment rates are less persistent in the first round countries only but and employment growth is more persistent in candidate countries.

Table A3.3: Persistence of regional indicators (Differences – 1Lags - GMM)

	participation rate		unemployment rate		wage growth		employment growth	
CEE	0.224*** (0.078)	T=7 N=212	0.462 (0.121)	T=7 N=212	0.371 (0.039)	T=6 N=201	-0.107 (0.023)	T=6 N=201
First Round	0.174 (0.076)	T=7 N=143	-0.075 (0.099)	T=7 N=143	0.377 (0.022)	T=6 N=160	-0.117 (0.031)	T=6 N=160
Second Round	0.475 (0.088)	T=7 [a)] N=69	0.759 (0.099)	T=7 [a)] N=69	0.249 (0.006)	T=6 N=41	-0.098 (0.036)	T=6 N=41
Czech Republic	0.173 (0.094)	T=7 N=74	0.945 (0.141)	T=7 N=74	0.206 (0.079)	T=6 N=74	-0.109 (0.028)	T=6 N=74
Poland	0.335 (0.077)	T=7 N=49	0.169 (0.087)	T=7 N=49	0.044 (0.001)	T=6 N=49	-0.179 (0.064)	T=6 N=49
Slovenia					0.455 (0.010)	T=6 N=12	0.531 (0.273)	T=6 N=12
Hungary	0.215 (0.273)	T=7 N=20	-0.072 (0.139)	T=7 N=20	-0.026 (0.072)	T=7 N=20	-0.043 (0.127)	T=7 N=20
Bulgaria	0.350 (0.094)	T=7 [a)] N=28	0.752 (0.065)	T=7 [a)] N=28			-0.241 (0.078)	
Estonia					0.629 (0.045)	T=6 N=5	-0.268 (0.139)	T=6 N=5
Romania	0.475 (0.095)	T=7 N=41	0.616 (0.104)	T=7 N=41	0.249 (0.006)	T=6 N=41	-0.078 (0.079)	T=6 N=41
EU	0.451 (0.159)	T=5 N=68	0.541 (0.129)	T=5 N=68	0.686 (0.050)	T=4 N=68	-0.160 (0.067)	T=4 N=68

Note: Results report the coefficient of regression (2), values in brackets are standard errors of the estimate *** (**) (*) coefficients are significantly different from zero at the 1% (***), 5% (**) and 10% (*) level. Candidate countries: results for participation and unemployment rates excluding Slovenia and Estonia, results for wage growth and employment growth excluding Bulgaria. EU: German wages and employment growth and participation rate 1989 – 1994, excluding Portuguese overseas territories (Acores and Madeira).. T= maximum number of time period, N= number of cross sectional units.

4. Finally, due to the changes in reporting of employment in the Czech Republic, this country was excluded from the sample. This, however, changes the results only marginally (see Table 4.4). thus we decided to leave the Czech Republic in our sample.

Table A4.4: Persistence of regional indicators (Residual – 1Lag - GMM) Excluding the Czech Republic

	CEE				First Round			
	participation rate		employment growth		participation rate		employment growth	
	0. 227*** (0.030)	T=7 N=138	-0.075** (0.041)	T=6 N=138	-0.280*** (0.047)	T=7 N=69	-0.162*** (0.051)	T=6 N=69

Note: Results report the coefficient of regression (2), values in brackets are standard errors of the estimate *** (**) (*) coefficients are significantly different from zero at the 1% (***), 5% (**) and 10% (*) level. Candidate countries: results for participation and unemployment rates excluding Slovenia and Estonia, results for wage growth and employment growth excluding Bulgaria. T= maximum number of time period, N= number of cross sectional units.

Appendix 4: Additional Results Concerning Migration

Table A3.1: Regression Results for the Czech Republic, Slovenia and Member States

	Population in sending region	Population in receiving region	wage differentials	Distance	Unemployment rate differences	employment rate differences	Number of Obs. (log likelihood)
	Czech Republic (different Region sizes)						
Czech Republic (NUTS II - 14) 1992 –1998	-0.04 (0.084)	0.15 (0.089)	0.31** (0.096)			0.13** (0.05)	1274
Czech Republic (NUTS II - 14) 1992 –1998	0.03 (0.08)	0.08 (0.09)	0.33** (0.10)		-0.02* (0.01)		1274
	bilateral fixed effects						
Czech Republic	1.37*** (0.08)	-1.30** (0.56)	0.04 (0.11)	-1.56** (0.01)	-0.03* (0.01)		
Slovenia	-31.35 (41.40)	-13.92 (43.97)	-4.39 (9.77)	-1.37*** (0.07)	1.00 (0.90)		244 (-959.95)
Netherlands	0.47 (1.189)	-0.76 (1.17)	0.32 (3.087)	-1.45*** (0.03)	0.05 (0.17)		528 (-3750.50)
Spain	-0.03 (0.02)	5.88*** (0.73)	0.22** (0.11)	-1.25*** (0.02)	0.09* (0.05)		3501 (-22285.11)
Italy	0.75 (0.85)	3.38 (0.85)	0.41 (0.43)	-0.63** (0.02)	-0.20 (0.03)		4902 32469.20
Czech Republic	1.46 (0.09)	-1.25 (0.56)	0.06 (0.11)	-1.56 (0.01)		0.03 (0.06)	37807 –107974.81
Slovenia 1996 – 1998	-10.51 (13.88)	-11.11 (13.76)	-2.55 (3.64)	-1.41*** (0.07)		-1.33 (2.40)	380 (-775,75)
Netherlands 1989 – 1995	0.48 (1.22)	-0.77 (1.21)	0.27 (3.29)	-1.45** (0.03)		-0.23 (1.76)	528 (-3753.5)
Spain 1983-1995	0.80** (0.24)	4.36*** (0.79)	0.04 (0.11)	-1.22** (0.02)		-0.83** (0.24)	3671 (-23160.95)
Italy 1983 – 1995	0.40 (0.84)	3.98 (0.85)	0.75 (0.048)	-0.63 (0.02)		-0.44** (0.18)	4940 (-32658.20)
	Excluding Regions						
Netherlands 1989 – 1995 excluding Flevoland	0.988 (0.181)	1.209 (0.185)	0.166 (0.590)	-0.028 (0.041)		440	
Spain 1983-1995 (excluding overseas terr.)	0.467 (0.037)	0.029 (0.014)	0.785 (0.069)	0.035 (0.031)		2531	
Italy 1983 – 1995 excluding overseas terr	0.129 (0.031)	0.092 (0.031)	0.181 (0.128)	-0.187 (0.013)		3944	

Note: LSDV estimates. a) All specifications include fixed effects for sending and receiving regions as well as period fixed effects for each year. b) All specifications include fixed effects for each sending - receiving region pair as well as period fixed effects for each year. Values in brackets are heteroscedasticity robust standard errors of the estimate for LSDV estimates.

I also estimated migration flows using sending and receiving region fixed effects and distance rather than bilateral fixed effects (see Table A4.1). These results, however, suffer from low explicative power of the regressions for member states and candidate countries. The only variable, which is robustly significant in all of the analysed countries, is distance between the sending and receiving region. In general I find that the elasticity of migration rises with the size of the regions analysed. In the Czech Republic and Slovenia increasing distance between two regions by 1% will reduce bilateral migration by between 1.2% to 1.6%. This coefficient compares

in magnitude to those found in both the Netherlands and in Spain but is somewhat higher than in Italy. Thus distance seems to deter migration equally in both candidate countries and member states

Furthermore, I was concerned that different sizes of EU and candidate countries regions may be important because migration across regional borders should be higher for countries with smaller regions. To check for this possibility I aggregated Czech Data to NUTS II level and re-estimated the model. Regional wage, employment rate and unemployment rate disparities become significant determinants of bilateral migration in this specification. But marginal effects for unemployment and employment rates are smaller than in any of the member states. Only wage disparities seem to have a comparable impact on migration as in the EU. Overall thus these results reconfirm the result that migration is less responsive to regional disparities in candidate countries than in the EU.

Furthermore I experimented with including the employment growth rate as well as excluding individual regions from the regressions (see Table A3.1).

Appendix 5: Additional Results concerning Wages

To test for the robustness of wage regressions I excluded national unemployment rates and included population to correct for potential biases which may result from the different sizes of regions. This reconfirms the result of higher responsiveness of wage growth to regional unemployment rates in the first round candidate countries. Marginal effects on regional unemployment rates are substantially higher in first round candidate countries when excluding national unemployment rates and are unchanged when including population.

Table A5.1: Results when deflating by national rather than regional price level in the Czech Republic (1993-1994)

	Unemployment rate	Lagged unemployment rate	National unemployment rate	Ln(Aggriculture share)	Ln(Industrial employment share)	R2 (NOBS)
Deflated with national prices	-0-005 (0.008)	0.002 (0.005)		-0.337 (0.624)	-0.277 (0.376)	0.96 (148)
Deflated with regional prices	-0.012 (0.009)	-0.007 (0.007)		-0.210 (0.767)	-0.443 (0.465)	0.81 (148)

Table A5.2: Additional Results Concerning Wage Regressions

	Unemployment rate	Lagged unemployment rate	National unemployment rate	Ln(Aggriculture share)	Ln(Industrial employment share)	ln(pop)	R2 (NOBS)	Test a1=-a2
CEE	-0.074 (0.058)	0.023 (0.025)		0.639 (0.756)	0.353 (0.621)		0.47 (1220)	0.23
First Round	-0.163** (0.052)	-0.081** (0.031)		-0.191 (0.733)	-0.200 (0.236)		0.59 (875)	0.00
Second Round	0.008 (0.008)	0.029 (0.019)		0.324 (0.127)	0.237 (0.057)		0.70 (345)	0.10
EU	-0.008* (0.003)	-0.007** (0.002)		1.226 (0.789)	0.178 (0.188)		0.66 (388)	0.04
Czech Republic	-0.003* (0.002)	0.003 (0.002)		-0.089*** (0.037)	0.001 (0.018)		0.71 (518)	0.76
Poland	0.002 (0.002)	-0.005*** (0.002)		0.135 (0.125)	0.116 (0.129)		0.99 245	0.06
Hungary [c)]	- 0.002 (0.003)	0.0001 (0.003)		0.533 (0.350)	0.218** (0.098)		0.90 100	0.53
Bulgaria	-0.003 (0.008)	0.004 (0.008)		-0.117 (0.631)	0.198 (0.719)		0.96 84	0.91
Romania	0.001 (0.002)	-0.004** (0.002)		0.546 (0.131)	0.310 (0.082)		0.94 246	0.11
CEE[a)]	-0.004 (0.005)	0.009 (0.011)	0.023 (0.018)	-0.086 (0.117)	0.006 (0.048)	-1.723 (3.464)	0.20 (1220)	0.54
First Round	-0.004** (0.001)	0.002 (0.001)	-0.010 (0.005)	0.036 (0.075)	-0.068 (0.029)	-0.691 (0.677)	0.44 (927)	0.01
Second Round	-0.002 (0.011)	0.010 (0.033)	0.065 (0.030)	-0.006 (0.306)	0.049 (0.288)	-8.913 (11.914)	0.43 (330)	0.79
EU	0.0004 (0.001)	0.006 (0.004)	-0.026*** (0.003)	1.061 (0.524)	0.629 (0.445)	0.069 (0.131)	0.68 (388)	0.54
Czech Republic	-0.003 (0.002)	0.001 (0.001)	-0.019*** (0.002)	-0.012 (0.032)	-0.010 (0.019)	0.009 (0.173)	0.59 (518)	0.28
Poland	-0.001 (0.002)	0.003** (0.001)	-0.009*** (0.002)	-0.557 (0.080)	-0.486 (0.101)	-0.942*** (0.343)	0.52 (294)	0.48
Hungary [c)]	-0.006 (0.008)	0.024*** (0.006)	0.045** (0.022)	0.032 (0.090)	0.548 (0.259)	-0.736 (0.709)	0.28 (100)	0.05
Bulgaria	-0.034* (0.019)	0.080 (0.017)	0.024 (0.030)	-1.863 (1.802)	-3.115* (1.744)	- 15.486*** (3.816)	0.85 (84)	0.04
Romania	0.004 (0.003)	-0.011*** (0.001)	0.076*** (0.004)	-0.242*** (0.021)	-0.169*** (0.044)	2.656*** (0.878)	0.80 (246)	0.01

Since I deflate nominal wage levels by the national CPIs I was concerned that the use of regional rather than national price data may influence results. Given the high inflation rates in the countries considered, this may lead to some distortion even when analysing wages if regional inflation rates vary across regions. The lack of regional price data and the use of national deflators is, however, common in regional analysis in the candidate countries

or member states, similar approaches have been chosen by Abraham, (1996) Taylor and Bradley (1997) amongst others. Nonetheless to gauge the potential bias resulting from this omission I checked on regional CPI data reported for the Czech Republic for the years 1993 and 1994, the only data on regional price levels available in the countries analysed. This data is unreliable, since it is based on very few observations in each region, but it suggests some variance in regional price developments in candidate countries. In December 1994 regional Price indices relative to December 1992 ranged between 136% (Rokycany) and 123% (Karlovy Vary).

When equation (4) was estimated for the Czech Republic with data for the two years (1993 and 1994) where I have regional price data available (see table A5.1), this did not have a very strong impact on my results (I had to however exclude national unemployment rates because of too little variance over two years). If anything the marginal effects on unemployment rates rather than reducing them. Thus this change tends to reinforce the picture of higher responsiveness to regional unemployment rates in candidate countries, since one would expect regional prices to vary more strongly in the high inflation candidate countries rather than the low inflation EU member states.

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NOTES

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[2] A detailed description of the data is provided in the appendix.

[3] Burda (1998) finds that most candidate countries adopted a continental European mode of labor market regulations. In a literature survey, Svejnar (1999) concludes that firms in all CEE economies adjusted employment to output changes so that the estimated elasticities rose rapidly to levels that are comparable to those estimated in Western economies. Knogler (2001) finds that, for many labor market indicators, candidate countries do not differ significantly from the EU average. Similarly, Boeri and Burda (1996), Lubyova and van Ours (1999) and Puhani (2000) present evidence that labor market policy is equally efficient and workers react similarly to incentives in candidate countries and in the EU.

[4] Equilibrium levels of wages, unemployment rates and participation rates may differ among regions for several reasons. Both equilibrium wage levels and unemployment rates may vary due to sectoral specialization across regions. Long-run natural unemployment rates may be influenced by differences in matching technologies or skill mismatch at the regional level. Finally, participation rates may differ if regions are characterized by different demographic compositions.

[5] Fatas (2000) shows that these procedures represent implicit detrending methods so that the choice of method has implications for the results. Operating with differences between regional and national indicators yields more persistence than using the method of Decressin and Fatas (1995)

[6] A further determinant of this choice is whether the resulting series are stationary. Panel unit root tests indicate that some original series are integrated; however, the residuals of equation (1) are stationary. The results of estimating equation (1) and the unit root tests are available from the author.

[7] Estimating dynamic panels using least squares (LSDV) techniques results in biased estimates because dependent variables are correlated with the residuals. Thus, equation (2) was estimated using the consistent generalized methods of moments (GMM) estimator suggested by Arellano and Bond (1991). In simulation studies, Kiviet (1995) and Judson and Owen (1999) show that this method outperforms the LSDV estimator for data sets of similar size to our own. To check for robustness a number of further estimates of equation (2) were performed. These included estimation using the LSDV estimator, using the method proposed by Blanchard and Katz (1992) and including two lags rather than one. None of these procedures changes the qualitative results concerning the persistence of the indicators relative to those in the EU.

[8] Boeri, Burda and Köllö (1998) cite evidence that, in Hungary, an average commuting distance of 15 kilometers results in transportation costs equivalent to the minimum wage and

that costs for distances in excess of 50 kilometers could equal an average salary. Hence, commuting as a labor market adjustment mechanism is of limited value.

[9] This high share of churning flows could be associated with the process of transition because transition induced structural change at the regional level that may have led to higher shares of such migration.

[10] The different sizes of the regions in the EU and the candidate countries may have important consequences, because migration across regional borders should be higher for countries with smaller regions. To check for this possibility, we aggregated the Czech data to larger regional entities (the European Unions' "Nomenclature Unifie des Territoire Statistique" II level) and re-estimated the model. The results confirm the finding of a low responsiveness of migration to regional disparities in the candidate countries. We also omitted bilateral fixed effects and included only fixed effects for sending and receiving regions. However, this strategy reduced the fit of the equation substantially.

[11] Results of wage-curve or Phillips-curve estimates are also ambiguous for EU member states as Winter – Ebmer (1996) demonstrates.

[12] The total long-run effect of a change in unemployment rates on wage levels is given by the sum of the coefficients on the regional unemployment rate and its lagged value.

[13] These results are robust to several different specifications. In particular, excluding national unemployment rates and including population to correct for potential biases that may result from the different sizes of regions reconfirms the higher responsiveness of wage growth to regional unemployment rates in the first-round candidate countries. We were also concerned

that the use of regional, rather than national, price data may influence the results. Hence, we estimated equation (4) with data for the two years (1993 and 1994) for which regional price data were available. Deflating by regional prices increases the marginal effect of regional unemployment rates. Therefore, this change reinforces the results of higher responsiveness to regional unemployment rates in candidate countries.

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