AccessLab

Regional Labour Market Adjustments in the Accession Candidate Countries

Workpackage No. 2

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Adjustment Capability of Regional Labour Markets

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Description of Stylised Facts of Labour Market Developments in the Candidate Countries

Deliverable No. 3

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AccessLab

The 5th framework programme research project ACCESSLAB researches the capability of candidate countries' regions to deal with asymmetric shocks. Its goal is to provide analysts and policy makers with research results relevant to the process of enlargement. The project takes a broad and comparative view of labour market adjustments to address these issues. It examines the topic from both a macroeconomic and microeconomic viewpoint. It considers different adjustment mechanisms in depth and compares results with the European Union. It draws on a) the experiences in transition countries in the last decade, b) the experience of German integration and c) the experiences of border regions to gain insights on the likely regional labour market effects of accession of the candidate countries.

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The Adjustment Capability of Regional Labour Markets in Candidate Countries: Executive Summary and Policy Conclusions

Peter Huber and Iulia Traistaru

Over the past decade Central and Eastern European countries (CEECs) experienced a significant structural adjustment due to the transition to a market economy and increasing integration with the world economy, in particular with the European Union (EU). In the early phase of transition, in all CEECs, gross domestic product (GDP) and employment declined sharply. Growth resumed after 1993 and these countries have entered a new phase of structural changes in their economic development. In this phase, assessing the differences and similarities in regional labour market conditions in candidate countries and current EU member states, as well as the ability of labour markets in the candidate countries to deal with asymmetric shocks is a task of primary importance for the success of the accession process.

First, the capability of labour markets in the candidate countries to deal with idiosyncratic changes in labour demand and supply will determine the expectations of the outcomes of the accession process. Accession will be marked by a continued and probably intensified industrial restructuring process. The likelihood that accession to the EU will contribute to increased structural change in the candidate countries, at least in the short run, is particularly high in the face of the structural differences among candidate countries and member states. For instance, as pointed out in Weise et al (2001), candidate countries' regions are predominantly agriculturally or industry dominated and only very rarely service dominated.This restructuring will be reinforced by the accession process itself, which will lead to changes in labour demand, through foreign direct investments and foreign trade, labour supply, through migration and changes in the institutional framework, through the adoption of the acquis. Many studies (e.g. Boeri and Brücker, 1999) suggest that in sum these changes will bring benefits to both new and old members of the European Union. These studies, however, also tend to stress that benefits will not accrue to all industries, regions and persons to the same extent. It is likely that the integration will increase the reallocation of labour resources from inefficient to more efficient industries, regions and occupations. If this shift is to be achieved without increased unemployment, flexibility of the labour force and the labour market is a precondition.

Second, the capability of labour markets to adjust to changes in the labour market is also an important guiding line in a number of policy decisions to be made in the process of accession. As in pervious enlargements integration of the new member states will resemble a process rather than a point in time event. After the formal accession in 2004 the candidate countries and the European Union will have to take decisions concerning the further pace of integration. This applies in particular to the most favourable point in time for integration in the Monetary Union, which could be achieved at the earliest in 2006, and the optimal end of derogation periods in particular in the field of the freedom of movement of people and services, which could in principle end any time between 2004 and 2011.

The comparative labour market situation and the capability of candidate countries to adjust to changes in the labour market are important determinants for these decisions. For instance, optimal currency area theory (see: Mundell, 1961, McKinnon, 1963 and Kenen, 1969), which has been the central reference point of much of the economic debate on the viability of EMU, suggests that, all else equal, a currency area is more viable the higher the mobility within the region and the lower wage rigidity. Thus the decision when to join EMU should also be based on labour market flexibility considerations. In addition, migration, aside from depending on income differentials among regions, is also influenced by the relative labour market situation in sending and receiving countries. According to standard economic theory (see: Todaro, 1969, and Harris and Todaro, 1970) migrants move from places with low income and bad prospects for employment to regions with high income and good employment prospects in order to maximise their lifetime utility. The relative labour market position in candidate countries will thus be one important ingredient in the decision on when to best abolish derogation periods.

Third, differences in labour market performance and in the way labour markets adjust to shocks will also define the particular policy needs in the candidate countries. This is particularly visible in the field of regional policy, where the upcoming reform of structural funds opens the question, which policies are likely to foster cohesion and growth in the candidate countries, and in the field of labour market policy, where the issue is whether the strategies laid down in the European Employment Strategy are adequate for candidate countries. In this context, a number of analysts have voiced some provocative opinions concerning the special needs of candidate countries in these policy fields. For instance, Burda (1998) has argued that candidate countries' labour markets need more flexibility than western Europe's and that the social acquis may endanger structural adjustment in these countries. A recent contribution by Boldrin and Canova (2003) suggests that there is no economic rationale for regional

policies in the EU but only a political one. Again, gauging the validity of these suggestions depends crucially on the empirical evidence concerning differences in the labour market performance and adjustment in the candidate countries.

The Content of this Report

This report focuses on the capability of regional labour markets to deal with structural change. While other dimensions of labour reallocation will be analysed in later work, the adjustment capability of regional labour markets has a twofold importance: first, because cohesion is an important goal of European policy and second, because structural change is likely to be more noticeable at the regional level. This is so because on the one hand regions tend to be more specialised on individual industries and sectors. Thus industry specific shocks may be more important on a regional than a national level and on the other hand because regions themselves are endowed with different locational advantages. This as evidenced by the uneven regional development in the candidate countries makes them unequally prepared for accession and may cause further region specific problems to be adressed by regional policy.

The contributions to this report (which compiles the results of Workpackage 2 of the AccessLab project), focus on the adjustment capability of regional labour markets in candidate countries with the aim to evaluate the capability of regional labour markets in candidate countries to adjust to asymmetric change, to determine how unemployment, employment and participation react to changes to demand and supply in different regions and to compare these results both to literature as well as to own estimations for the countries in the Euro-Zone. Furthermore, the aim was to determine whether different regions react differently to certain shocks and to draw conclusions on regional labour markets' capability to absorb shocks during the accession phase in the candidate countries.

This report thus comprises a series of papers dealing with the comparison of labour market indicators of EU and candidate countries (Chapter one), an analysis of the relative importance of regional and national factors in explaining employment growth (chapter two) as well as quantity and wage adjustments (chapters three to six). One aspect of regional labour market flexibility, which is not dealt with in this report but in a parallel report (workpackage 3 of the AccessLab project) is inter-regional migration. Together with this parallel report the results of the AccessLab project provide a comprehensive discussion of various aspects of the issue of regional

"labour market flexibility" in the candidate countries, with results pertaining to eight of the ten central and eastern European candidate countries.

Results

The major research results can be summarised as follows:

1. There has been substantial structural change at the regional level over the last decade , but this change has varied substantially among countries. Traistaru and Wolff (chapter 2) show that at a crude sectoral level of 4 sectors (agriculture, construction, industry and services) structural change has been far from uniform across countries and even less so across regions. Over the period 1990 - 1999 employment in the industrial sector declined in all candidate countries but Hungary Slovakia and Poland, while employment in agriculture increased in Bulgaria and Romania.
2. Regional employment changes are primarily driven by region specific factors. The past employment dynamics in transition countries suggests that regional employment growth is almost entirely driven by region specific factors, while industry mix and regional competitiveness factors play only a minor role in explaining employment dynamics. Regions lagging behind thus suffer from uniform employment growth differentials across sectors and shocks are regional rather than industry-specific. According to Traistaru and Wolff (chapter 2) regional factors account for between 70% and 90% of the total variance of regional employment growth in the candidate countries.
3. Despite substantial structural change, regional labour market performance in candidate countries did not differ very strongly from EU member states until 2001. The results by Huber and Gacs (chapter 1) indicate that in general, the candidate countries' regions have higher unemployment rates, long-term unemployment and youth unemployment than EU member states but perform better than the EU's average labour market in some respects. In particular, they have slightly higher participation rates and significantly lower gender differences in both participation and unemployment than the EU average. Thus, in contrast to much of the earlier work, which likened the candidate countries to South European labour markets, this paper suggests that this analogy may be ill-placed due to the much higher participation rate and lower gender differences in candidate countries .
4. Furthermore, labour market problems are less asymmetrically spread in candidate countries and there is a more pronounced tendency of polarisation. This contrasts to current EU member states, where the

distribution of unemployment rates is skewed to the left, (i.e. high unemployment rates are a problem of a few regions,) the distribution in the candidate countries is more symmetric. Around 78% of the population (and around 75% of the workforce) of these countries live in regions which had average unemployment rates exceeding 10% in the period 1998 - 2001, and around one third of both the population and the workforce lived in regions with an average unemployment rate in excess of 15%. In EU member states by contrast only around 13% of the population lived in regions where average unemployment rates (from 1998 to 2001) exceeded 15% and less than 10% worked in such regions. Integration of the candidate countries (excluding Romania) would thus have increased the share of population living in such high unemployment regions by around 8.8 percentage points.

5. National rather than regional factors are more important for explaining differences in regional unemployment rates and participation rates among the candidate countries' regions (see: Huber and Gacs, chapter 1). These results are together with the findings of Traistaru and Wolff (chapter 2) suggest that, while regional idiosyncratic shocks are more important in determining regional development of employment, when it comes to how these shocks are absorbed in the labour market (i.e. wage changes, unemployment or participation), national factors such as unemployment benefit systems, employment protection and wage bargaining institutions seem to be important. This hypothesis is also supported by the econometric analysis undertaken by Huber and Gacs (chapter 4) which shows that idiosyncratic region specific developments of unemployment and participation rates are of a smaller importance in first round candidate countries (but larger in second round candidate countries) than in EU member states. The candidate countries have experienced however larger region specific shocks to employment.
6. Quantity adjustments such as changes in participation rates and unemployment rates are less long lived in candidate countries, but migration is unlikely to be efficient at equilibrating regional disparities. This seems to be a very robust result concerning the candidate countries. The results of Huber, (chapter 3) Huber and Gacs (chapter 4) and Büttner (chapter 6) suggest that persistence of regional unemployment rates is lower than in EU member states, in particular in first round candidate countries.In both first and second round candidate countries persistence in participation rates is lower than in EU member states. Furthermore, the evidence presented in Huber and Gacs (chapter 4) suggests that region specific shocks lead to a slightly higher long run change in employment.

7. The comparison of the above results with existing empirical evidence on the United States (US) and other non-European OECD countries (see: Gacs and Huber in chapter 4) suggests, however, that candidate countries represent typical European labour markets in the sense that participation rates carry a substantial part of the adjustment burden on the labour market and unemployment rates are more persistent than in the more flexible labour market environments of the US.
8. Wages in the candidate countries are slightly more responsive to regional labour market conditions in the candidate countries than in the EU. Following different methodologies, both Huber (chapter 3) and Büttner (chapter 6) find that wages are more responsive to regional labour market conditions in the candidate countries than in the EU. *A* more detailed country specific analysis by Iara and Traistaru (chapter 7), suggests, however, that there is substantial heterogeneity across candidate countries. Wage flexibility is particularly high in Hungary, Poland and in Bulgaria, while in Romania wages do not seem to respond to regional labour market conditions.
9. In contrast to the findings of much of the literature on the EU, regional interactions in wage setting and labour market conditions seem to be relatively unimportant in candidate countries. Traistaru and Iara (chapter 6) find that spatial interaction effects play an important role only in Hungary. In addition, Gacs and Huber (chapter 1) find that the labour market position of neighbouring regions has little explicative power for determining a regions labour market situation. This is indicative of the low spatial mobility found in candidate countries as documented in the results of workpackage 3. Since internal migration in the candidate countries is low, the unemployment rates of neighbouring regions' have little impact on the wage bargaining process in the home region and labour market conditions are largely independent of vicinity effects.
10. There are some important regional differences in labour market adjustment. In particular, regional typologies based on sectoral specialisation indicate that urban regions have experienced a substantially more favourable and peripheral regions a less favourable labour market development throughout transition while industrial regions range in between these two extremes. Some of these differences as well as the differences between high and low unemployment rate regions may be attributable to differences in the adjustment of regions to shocks in labour demand. In particular, high unemployment rate regions were characterised by larger (mostly negative) shocks to labour demand, a higher persistence of these shocks, and larger adjustment through unemployment rates rather than migration.

Results in a wider context and questions for further research

The results of this workpackage thus reflect positively on the capability of the candidate countries regions to absorb shocks through labour markets. Similarities relative to the current EU member states seem to be larger than differences. This finding is highly robust across methods of analysis. There are, however, a number of qualifications which have to be taken into consideration in order not to over interpret them. In particular, European labour markets themselves have not been considered the most dynamic and flexible. A large literature (see Bean, 1994 for a survey) finds that the EU's labour markets are sclerotic in the sense that wages are inflexible (e.g. Abraham, 1996), and adjustment to changes in labour demand – in contrast to the United States - primarily takes the form of participation rate changes, with highly persistent unemployment rates and low migration rates (e.g. Decressin and Fatas, 1995)). Thus the flexibility of candidate countries in comparison with EU countries should be interpreted as suggesting that these countries are at par with the EU labour markets, but that it would be unwarranted to refer to these countries as highly flexible labour markets.

Furthermore, the results presented in this study take only little consideration of the internal migration in the candidate countries. This topic has been dealt with in another Workpackage of the AcceesLab project. The findings of this workpackage suggest that migration rates are unlikely to be very effective at equilibrating regional disparities in the candidate countries: Migration rates in general are low in these countries, despite regional disparities comparable to the EU. The reactiveness of migration to regional disparities is lower than in the EU and migration rates have fallen in a number of countries despite increases in regional disparities. Higher wage flexibility in the candidate countries thus should be interpreted in the face of low inter – regional migration rates.

Related to this, a substantial literature (see Huber et al, 2002 for a survey) suggests that individuals in the candidate countries find it difficult to move from one employment position to another. This is reflected not only in low regional mobility, but also in low occupational and sectoral mobility rates of the labour force. Despite the macro-economic adjustments found in this research report, this stylised fact may be worrying, since it implies that individuals are "locked into" their respective regions, industries and occupations, with little chance to escape from an adverse shock by mobility. From the point of view of how individuals are affected by asymmetric structural change, higher wage flexibility in the candidate countries at the aggregate level holds the advantage that individuals affected by a region specific shock earn lower wages, rather than becoming unemployed., but low mobility may imply that they fail to move to regions, occupations and sectors where their capacity could

perhaps be used more effectively. For this reason determining the reasons for and consequences of regional "lock-in" in the candidate countries will be a primary research question of workpackage four in the AccessLab project.

Policy Conclusions

The findings of this report in conjunction with those of workpackage 3 and the existing literature on candidate countries have a number of important policy implications in the light of the issues discussed in the introduction. These apply in particular to the integration of the candidate countries into the European Monetary Union and to the particular needs of the candidate countries with respect to regional and labour market policy.[1]

In particular, the evidence found on a relativly high wage flexibility and low persistence in unemployment rates and a low propensity to migrate despite substantial regional disparities, suggests that any policy initiative to enhance the candidate countries capability to adjust to labour market changes should give high priority to enhancing mobility. While determining which policies are likely to be most effective in this endeavour is a question for future research, it seems likely that such a policy aside from focusing on improving human capital and live long learning, should also take into account a wide spectrum of measures such as infrastructure development and reducing housing market imperfection.

Furthermore, the finding that regional factors are very important for employment growth, while national developments are important for unemployment and participation rates, suggest that there is a key role for national policies to be played in the reduction of unemployment although regional policy may be more successful at fostering regional growth and in particular fostering economic cohesion within countries. Thus, continued national policies focused on reducing institutional barriers to mobility and regional policies aiming primarly at creating employnent should have an important role in these countries. In addition to promoting labour market adjustment in the candidate countries, regional development and labour market policies should be better co-ordinated and interlocked. Detailing these interactions will be an important step of the final workpackage of the AccessLab project. At this stage, it seems however clear that in the light of the repeatedly

[1]) Aspects of monetary Union are treated in more detail in the policy conclusions to workpackage 3, for this reason we focus on regional policy issues only, in this summary

stressed concern about the low administrative capacities concerning regional policies in the candidate countries, this co-ordination may prove to be a challenge to some countries.

This focus on mobility and institutional development is important not only from the point of view of the capability of regional labour markets to adjust to asymmetric shocks, but may also have implications for the optimal regional policy design in candidate countries. In principle, regional policy in these countries is faced with the classical trade off between the alternative goals of growth orientation (which would imply supporting primarily the "growth poles" of the fastest growing regions) and income equalisation (which would suggest focusing on the most disadvantaged regions) . In the context of transition this trade-off is, however, particularly strongly felt. On the one hand, growth oriented regional policy has a particular appeal in countries where overall income levels are low and catching up with the European Union is an important goal. On the other hand, such policies may run the risk of increasing regional disparities (and associated political problems), if growth in the centres does not trickle down to the less privileged regions fast enough. When there is substantial mobility between regions of a country this may be less of a concern, since in this case mobility will allow the population of less privileged regions to move to those more prosperous. In the absence of mobility, this channel is not open, which in turn may reinforce existing polarisation and the associated social and political consequences. Thus if mobility cannot be increased in these countries, a policy focusing not only on convergence to the EU average, but also on fostering cohesion within the country may be needed.

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Regional Labour Market Problems in the Candidate Countries: A Descriptive Analysis

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Abstract

This paper compares the regional labour market situation in candidate countries and EU member states. We find that candidate countries' regions have significantly higher unemployment rates than member states'. Also long-term and youth unemployment is high and almost 78% of the candidate countries' population lives in regions with unemployment rates in excess of 10%. Candidate countries are, however, also characterised by significantly lower gender differences than member states. Furthermore, cluster analysis suggests that the candidate countries' regional labour market situation is comparable to the French and Belgian border regions. There is substantial heterogeneity both among candidate countries and member states. Although regional disparities in candidate countries are comparable to those in EU member states, when focusing on the complete distribution of labour market indicators we find that in contrast to the current member states where high unemployment rates are a problem of a few regions, the distribution in the candidate countries is more symmetric. Thus more regions are affected by high unemployment and a number of indicators show polarisation to be more pronounced among candidate countries' regions. Finally, using non parametric techniques we show that in candidate countries national rather than regional factors are more powerful in explaining the regional labour market situation and that industrial specialisation patterns are more important than in member states.

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Introduction

Membership in the European Union will present the Central and Eastern European candidate countries with a set of economic and institutional challenges. In particular candidate countries will have to implement the acquis communautaire, become eligible for EU structural funds and will ultimately benefit from the liberties guaranteed in the European Economic Area. Integration of the new member states will also imply the integration of these countries into major European policy initiatives such as the European Employment Strategy (EES). An issue that will recurrently appear in the discussion on the consequences of integration is to what degree labour market situations in candidate countries differ from those in the EU. One would like to know what the relevant labour market problems of the candidate countries are, to what degree they can be addressed within the existing European policy framework and what strategies would be most beneficial in combating unemployment in candidate countries in order to guarantee successful integration.

This paper uses data from Eurostat's Regio database from 1998 to 2001 on 45 NUTS II regions of the candidate countries and 184 NUTS II regions of current member states to address three issues: First, we identify the differences in regional labour market conditions between candidate countries and the current member states. Second, we look at the distribution of labour market indicators across regions of candidate countries and current member states to determine differences in labour market problems in an enlarged Union. Third, we analyse to what extent labour market problems are region or nation specific to discuss whether labour market policy in the candidate countries should be focused on the national or regional level.

Our results indicate that candidate countries' regions have significantly higher unemployment, long-term and youth unemployment than do member states and that almost 78% of the candidate countries' population lives in regions with unemployment rates in excess of 10%. Candidate countries are, however, also characterised by both significantly lower gender differences than member states. Furthermore, cluster analysis suggests that these features are not unique to candidate countries, but that they are comparable to that in French and Belgian border regions.

We also show that although regional disparities in candidate countries are comparable to those in EU member states, when focusing on the complete distribution of labour market indicators, the distribution in the candidate countries is more symmetric, but that a number of indicators show polarisation to be more pronounced. Finally, using non-parametric techniques we show that in candidate countries, national rather than regional factors are

more powerful in explaining the regional labour market situation and that industrial specialisation patterns are more important than in member states.

The next section describes the data set used. Section three, discusses whether candidate countries and member states can indeed be considered distinctive regions in terms of labour market situation. Explorative data analysis is performed to isolate regions with similar labour market situations in an enlarged Europe and to determine significant differences in labour market performance between candidate countries and EU member states. In section four we then focus on the distribution of unemployment and participation rates, while in section five we use non-parametric techniques to discuss what role national factors, geographical vicinity and regional specialisation play in shaping regional labour market situations in the region. Finally, in section six we draw conclusions.

Data

The data for this paper stems from the Eurostat New Regio database.[1] We collected information on 45 NUTS II regions of 9 candidate countries for the years 1998 to 2001 and the 184 NUTS II regions of the 15 current EU member states.[2] Following the suggestion by Mosley and Mayer (1999) for benchmarking the labour market situation in EU member states, the labour market indicators we were interested in included the employment rate (in percent of total working age population), the gender difference in employment rates (as the ratio of male employment to female employment rates) and the employment share of the elderly (employment of those older than 55 relative to total employment) on the "employment" side. On the "unemployment" side we focused on overall unemployment, gender difference in unemployment rates, long-term unemployment (relative to total

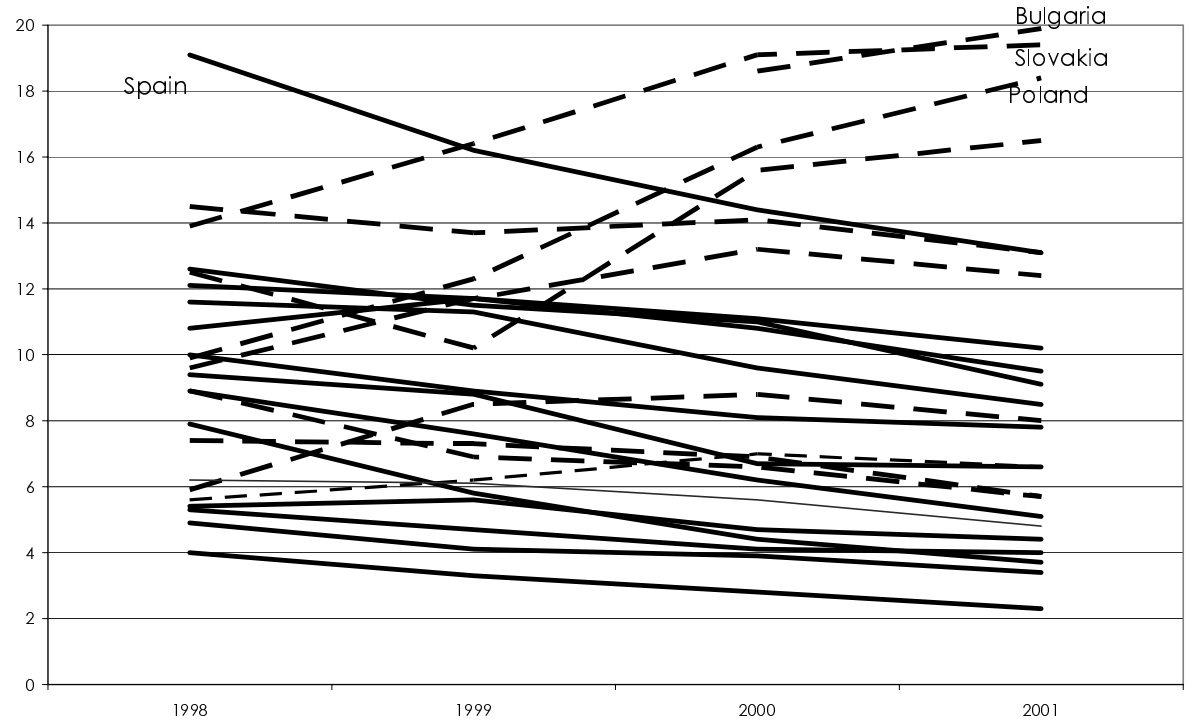
[1]) The focus on NUTS II regions can be justified by the fact that these regions are relevant for the definition of Objective one status. Similar data has been used for a number of studies on regional labour markets in the European Union (see: Taylor and Bradley, 1997, Padoa and Kastosis, 1999, Fagerberg et al, 1997, Overmann and Puga, 2002, Boldrin and Canova, 2001).

[2]) Although our data are collected from EU sources, which should guarantee comparability, national differences in reporting systems are of some relevance. In particular in Romania, persons with land ownership in excess of one hectare are not eligible for unemployment benefits and thus rarely register as unemployed. This reduces the unemployment rate and increases participation rates, since such unemployed are registered as self employed. Out of a concern about data quality we thus excluded Romania from the analysis.

unemployment) and the unemployment rate of the young (relative to total labour force).[3] Furthermore, we include the participation rate and gender differences in participation rate.

The reason for focusing on these indicators is that they are closely related to the goals of the European employment strategy. For instance the Lisbon European Council meeting identified the high unemployment, low employment rates in particular of women and elder workers as well as high long term unemployment as important shortcomings of the European Labour market, and the European employment strategy, aside from aiming at reducing unemployment and increasing employment, has a particular focus on reducing gender differences in the labour market as well as on the labour market situation of youths, elder and long term unemployed (see for example Burger, 2002).

Figure 1: Development of National Unemployment Rates



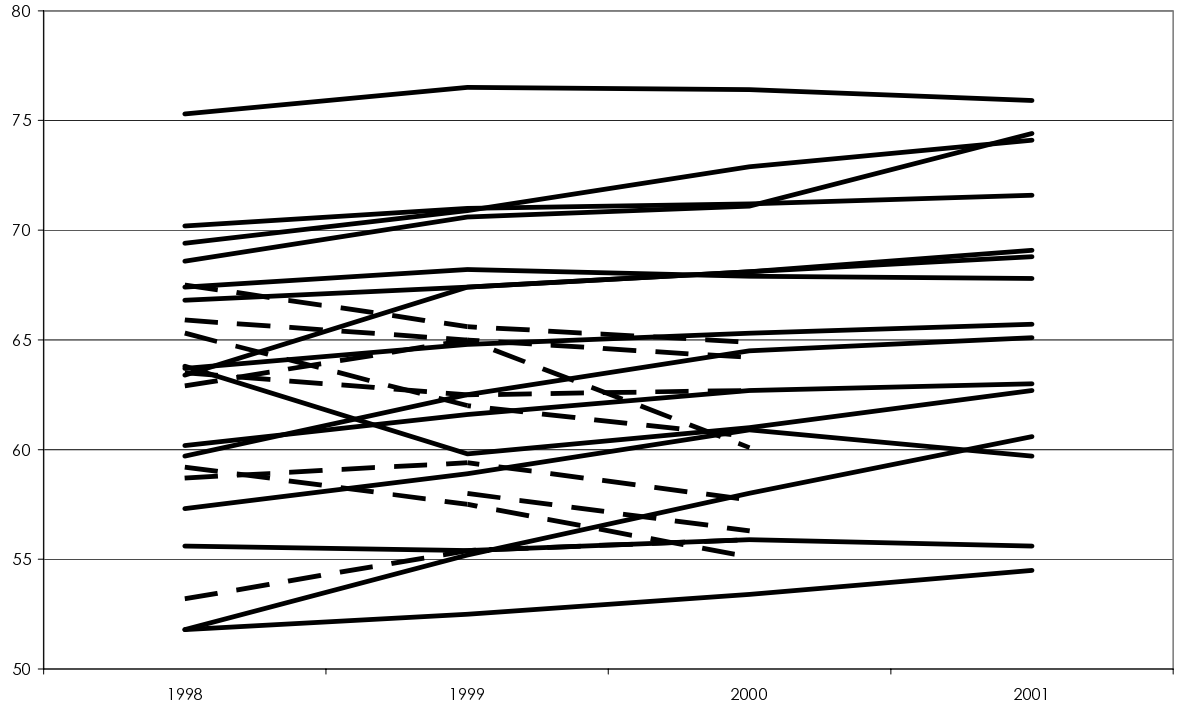
Note: Doted lines= candidate countries, Thick line=member states Source: Eurostat, New Cronos

The data span a relatively short time period. (The maximum time period available for the candidate countries ranges from 1998 to 2001.) This is a problem because both employment rates and unemployment rates have

[3]) According to Mosley and Meyer (1999) normalising long-term unemployment by total unemployment and youth unemployment by labour force is preferable to the long-term unemployment and youth unemployment rates, since these measures are less influenced by aggregate unemployment.

moved in opposite directions in candidate countries and member states in these years (see: Figures 1 and 2). A number of candidate countries which ranged in the upper middle of the European unemployment rates (such as Poland and Estonia) in 1998, reached unemployment rates exceeding levels of Spain by 2000; Traditional low unemployment countries such as the Czech Republic saw a substantial increase in unemployment rates relative to EU levels. The only two countries where unemployment rates have declined as in Western Europe were Hungary and Slovenia. Similarly, employment population ratios (employment rates) have tended to decline in the candidate countries, but almost ubiquitously increased in the member states (see Figure 2). In particular Poland and Slovakia moved from middle range employment rate countries in 1998 to low employment rate countries in 2000.

Figure 2: Development of National Employment – Population Ratios



Note: Doted lines= candidate countries, Thick line=member states Source: Eurostat, New Cronos

There are a number of potential explanations for these developments. First, it could be that the increasing unemployment rates and declining employment - population rates in the candidate countries are themselves an effect of the planned accession. Burda (1998) provides evidence that previous accessions to the EU led to an increase in unemployment in the acceding countries some years before accession. Second, asymmetries in

business cycles between the European Union and candidate countries may have caused this development.[4] Determining which of these explanations contributes most to the development is beyond the scope of this paper. We, however, deal with the non-stationarity of relative labour market conditions in different ways. First, for the descriptive analysis we focus on averages of the indicators for the years 1998 to 2001, to limit the impact of an individual year on results. Second, for the kernel estimates reported in sections four and five we pool data for the years 1998 to 2001.[5]

Table 1: Average and Standard deviation of NUTS II regions in terms of Population and Area (1998)

	Average			Standard Deviation		
	Population (in Thousands)	Population Density (Inhabitants per km2)	Area (km2)	Population in Thousands	Population Density (Inhabitants per km2)	Area (km2)
Austria	897.6	500.9	9317.2	496.8	1185.3	5991.9
Belgium	927.6	836.2	2774.4	419.5	1611.8	1213.1
Denmark	5304.2	123.1	43088.5	0.0	0.0	0.0
Finland	858.9	38.4	50494.1	577.3	50.1	41612.5
France	2654.5	134.9	24727.5	2179.6	180.6	10949.3
Germany	2051.2	426.4	8925.4	1099.2	683.4	5660.6
Greece	808.9	120.9	10126.8	859.9	227.3	5078.6
Ireland	3704.9	52.7	70301.7	0.0	0.0	0.0
Italy	2879.4	176.4	15066.3	2265.6	105.1	7225.5
Luxembourg	426.5	164.9	2586.4	0.0	0.0	0.0
Netherlands	1308.9	469.2	2823.5	949.6	318.6	1138.8
Portugal	1444.5	149.4	13369.1	1385.0	108.4	10249.1
Spain	2307.9	135.8	29693.3	1998.2	143.2	29521.1
Sweden	1106.4	63.6	51201.7	507.2	84.0	43662.8
United Kingdom	1601	774.8	6588.9	795.2	1522.8	6834.8
Bulgaria	1376.1	72.0	18491.8	578.2	16.6	5228.4
Czech Rep.	1286.9	414.8	9856.7	180.2	756.8	4915.5
Estonia	1449.7	33.4	43404.6	0.0	0.0	0.0
Hungary	1444.8	132.3	13290.3	607.5	115.3	3687.8
Latvia	2448.9	37.9	64615.4	0.0	0.0	0.0
Lithuania	3702.4	56.7	65297.7	0.0	0.0	0.0
Poland	2416.6	131.5	19543.4	1198.7	78.2	6632.3
Romania	2812.9	229.9	29798.0	569.7	383.2	10796.0
Slovakia	1347.7	151.9	12256.0	460.9	87.5	5907.4
Slovenia	1982.6	97.8	20272.0	0.0	0.0	0.0

Source: Eurostat

Finally, although all our data was collected on the level of NUTS II regions, territorial units differ in size both among member states and candidate countries. This may be important because larger regions tend to mask some

[4]) See Horvath, (2002) Maurel and Boone (2002) for evidence on business cycle asymmetries between candidate countries and member states.

[5]) Year by year results for kernel density estimates are shown in Appendix D.

of the heterogeneity at the sub-regional level and lead to an underestimation of regional disparities relative to countries with small regions.[6] When comparing EU regions with candidate countries regions this problem is not of particular relevance. Both region size and heterogeneity in regions size across countries is comparable among the two country groups (see Table 1). In terms of population the smallest NUTS II regions among EU member states can be found in Greece with 0.8 million inhabitants and the largest are in Italy with 2.8 million inhabitants in average. In terms of area Swedish regions average over 51.000 square kilometres and Belgian regions cover less than 5% of this territory. The NUTS II regions of the candidate countries lie well within this range. The largest regions in terms of population are found in Romania with 2.8 million inhabitants, the smallest in the Czech Republic with 1.3 million inhabitants. The average area of regions varies between around 30.000 square kilometres (Romania) and 10.000 square kilometres (Czech Republic).

Do CEEC Regions Differ from Member States?

ANOVA - Tests

The first question we set out to address is to what extent candidate countries differ from current member states with respect to their labour market outcomes. A number of recent studies find that national labour market conditions in candidate countries do not differ dramatically from those in the EU. For instance Knogler (2001) concludes that in 1998 candidate countries did not perform worse than many EU member states concerning most indicators and that they outperform most EU member states with respect to gender differences in unemployment and employment rates. Similarly, Huber et al (2002) in a literature survey conclude, "concerning most indicators of labour market development candidate countries are within the range of EU member states".

With regional data from a more recent time period we are able to test these hypotheses more formally. We conducted a series of ANOVA tests of the hypothesis that the average unemployment, employment and participation rates in the candidate countries regions differ significantly from European Union member states. We performed these tests for the average over the years of 1998 to 2001 of each indicator in our data. Furthermore, since comparisons of candidate countries with the full sample of the member states may be unwarranted and a number of authors (e.g. Boeri and Brücker, 2000) suggest that candidate countries' labour

[6]) For evidence on the large heterogeneity on a smaller regional level in candidate countries see: Fazekas, 2000

markets are comparable to the peripheral labour markets of the European Union, we also compared the candidate countries to the southern EU member states (Spain, Portugal, Italy, and Greece).

Table 2: Results of Anova Tests for differences in labour market situations of the average region in the candidate countries from EU member states (Averages over the years 1998 to 2001)

	Candidate Countries	All member states		Only Southern European member states	
Unemployment rate	13.31	8.94	**	11.35	
Youth unemployment	8.39	6.31	**	8.30	
Long Term Unemployment	47.82	40.48	**	46.59	
Participation Rate	55.59	56.34		50.03	**
Employment Rate	57.73	63.61	**	56.66	
Employment Rate of the elder	7.21	10.17	**	10.87	**
Gender differences in employment rate	0.83	0.74	**	0.59	**
Gender differences in participation rate	1.32	1.43	**	1.67	**
Gender differences in unemployment rate	0.92	0.80	**	0.47	**

Note: Table reports unweighted averages across 45 NUTS II Regions of candidate countries and 184 NUTS II regions of member states and 56 NUTS II regions of Italy, Spain, Portugal and Greece, ** average significantly different from candidate countries

Results (in table 2) suggest that average unemployment rates, long term unemployment and youth unemployment over the period 1998 to 2001 were significantly higher in candidate countries than in the current member states and employment rates as well as employment shares of the elder significantly lower. Gender differences in employment, participation as well as unemployment rates were, however, significantly smaller than in the current member states. By contrast, unemployment rates as well as youth and long term unemployment rates relative to the southern European member states are comparable (except for employment rates of the elder) but gender differences are lower throughout.[7] Thus while candidate countries are comparable to southern European member states in many respects of their labour market structure, the important difference between the two regions are the smaller gender differences in candidate countries and, with respect to gender differences, candidate countries' regions even outperform the average EU region.

Furthermore, a substantial part of the population and work force in the candidate countries live in regions with extremely high unemployment rates. Around 78% of the population (and around 75% of the workforce) of these

[7]) Due to the changes in relative unemployment and employment rates, these results depend somewhat on the time period used. In 1998 and 1999 unemployment rates (including youth and long term unemployment rates) were only insignificantly higher than in the current member states. By 2000 they exceeded even southern European levels significantly. Results concerning gender differences are robust to the choice of time period. They are significantly smaller than in the current member states and the southern European member states, throughout.

countries live in regions which had average unemployment exceeding 10% in the time period 1998 to 2001, and around one third of both the population and the workforce lived in regions with an average unemployment rate in excess of 15%. In EU member states by contrast only around 13% of the population lived in regions where average unemployment rates (from 1998 to 2001) exceeded 15% and less than 10% worked in such regions. Integration of the 9 candidate countries (excluding Romania) would thus have increased the share of population living in high unemployment regions (with unemployment rates in excess of 10%) by around 8.8 percentage points.

Table 3: Resident Population and Employment Share by Unemployment Rate Categories

	less than 4.9%	5.0% to 9.9%	10.0% to 14.9%	15.0% to 19.9%	more than 20%
			Share of Population living in regions in..		
Candidate Countries	6.1	15.6	44.7	23.5	10.1
EU Regions	24.7	41.6	20.6	6.4	6.6
Total	21.4	36.9	25.0	9.5	7.3
			Share of Employment working in regions in..		
Candidate Countries	6.9	17.3	44.9	22.3	8.6
EU Regions	27.9	43.0	19.3	5.6	4.2
Total	24.3	38.6	23.6	8.4	5.0

Notes: Data excluding Romania, Source Cronos.

Cluster Analysis

Although these stylised facts suggest that first candidate countries' regions can be characterised as having a being highly affected by unemployment, they tend to mask the heterogeneity among both member states and candidate countries. A potential shortcoming of the above analysis is that there may be a number of types of regions characterised by relatively similar labour market problems in both candidate countries and the EU. We thus performed a cluster analysis using unemployment rates, the share of youth unemployment and long term unemployment as well as the employment population rate, the employment share of the elder and gender differences in unemployment and employment rates for the averages of these indicators over the years 1998 to 2001.[8] We transformed these variables to Z-values by subtracting the mean across regions from each observation

[8]) Participation rates and gender differences in participation rates were dropped to avoid problems of co-linearity with employment rates and unemployment rates.

and dividing by the standard deviation.[9] Furthermore, we used squared Euclidean distances and the Wald method to define groups. To decide on the number of clusters reported we looked at the distance between the two merged clusters. We decided for 4 groups in order to avoid an excessive amount of groups. Table 4 displays the characteristics of the members of these groups for several years; figure 3 shows the geographic location of cluster members. [10]

Table 4: Cluster Means and Summary Statistics on Cluster Membership of European labour Market Clusters

	Cluster 1	Cluster 2	Cluster 3	Cluster 4
Unemployment rate	12.97	4.82	6.09	14.57
Youth Unemployment	8.46	3.86	4.71	10.28
Long Term Unemployment	45.69	35.56	36.91	51.57
Employment Rate	58.64	65.60	69.23	52.82
Employment Rate of the elder	7.57	7.48	11.91	11.83
Gender differences in employment rate	0.82	0.70	0.81	0.55
Gender differences in unemployment rate	0.84	0.55	1.12	0.47
		Number of regions from		
Candidate Countries	41	3	1	0
EU-Regions	38	37	71	38
of this Southern Europe	2	15	4	37
Total	81	55	76	75
		Share of Population living in Clusters from…		
Candidate Countries	93.92	4.62	1.46	0.00
EU-Regions	23.55	17.04	39.06	20.36
Total	36.28	14.79	32.25	16.68

Notes: Data are excluding Romania

Our findings suggest that candidate countries are not characterised by completely different regional labour market problems than those of the current member states. The cluster where most of the candidate countries regions can be found is cluster one, which is characterised by relatively high overall unemployment rates, slightly below average employment rates and low employment of the elderly as well as low gender differences in both unemployment and employment. Aside from regions of the candidate countries in Poland and Eastern

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[9]) i.e. each variable was transformed such that $z_i = \frac{x_i - \mu_x}{\sigma_x}$ with μ_x the (unweighted) mean of the indicator and σ_x its standard deviation across all European regions.

[10]) Clearly there is a trade off between the number of groups provided and the detail with which description can be provided. Focusing on few groups glosses over some important details which are provided in national studies (see for instance Fazekas and Koltay, 2002) and more detailed national typologies (see: Gorzelak, 1996 Fazekas, 1996)

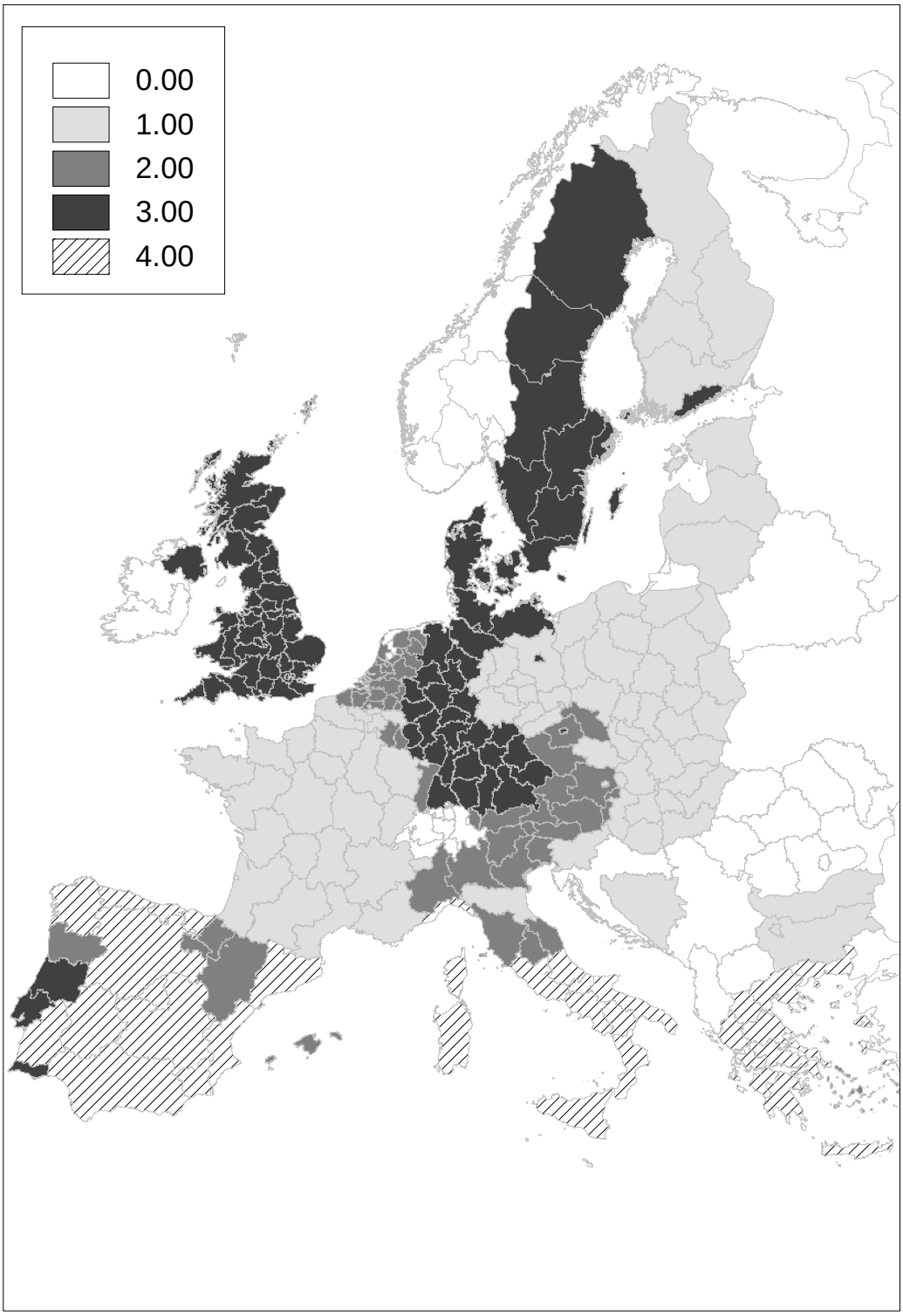
Hungary this cluster draws substantial membership from 38 EU regions, which are mostly located France, Germany and Belgium. Thus these regions rather than southern European labour markets are the most comparable to candidate countries regions.

Further clusters where candidate countries' regions are represented are clusters two and three. Three Czech regions are grouped into cluster two. This comprises the low unemployment rate regions in Central and Northern Europe (Austria, northern Italy, Netherlands, and Belgium) as well as a few low unemployment southern European regions. Furthermore, this cluster has employment rates only slightly above average as well as low employment rates of the elder. Prague (the capital city of the Czech Republic) is clustered into Cluster three, which otherwise may be considered a cluster of the northern labour markets of Sweden, Denmark and Great Britain as well as Germany. This cluster is characterised by only slightly higher unemployment rates as cluster two, but substantially higher employment rates (in particular for the elder) and lower gender differences.

In consequence our analysis suggests that southern European labour markets, which have often been viewed as the most comparable to candidate countries on account of their high unemployment may not be the best comparison group. The southern European regions of Italy, Spain and Greece are put in altogether different groups than the candidate countries, when looking at the larger labour market situation. Most of the southern European regions end up in cluster four. This is characterised by even higher unemployment rates as in the candidate countries, and substantially higher rates of youth and long term unemployment as well as lower participation and employment population rates and extremely high gender differences.[11]

[11]) These results are robust to changes in the time period for which the analysis is conducted as well as changes in methods. We conducted similar analysis using only data for the years 1999 and 2000 in earlier versions of the paper as well as other clustering methods (such as average within group linkage). In all cases southern European regions showed to be distinct from candidate countries' regions and the French and Belgian regions in cluster 1 showed to be the most comparable to candidate countries. Furthermore, similar clusters as cluster 2 (central Europe) and 3 (northern labour markets) appeared in all these analyses. Finally, the distinction between candidate countries and southern Europe is also reinforced by looking at the tendrogram of the cluster analysis. This shows that the Southern European cluster and the cluster with the majority of the candidate countries' regions are clustered together, when only two clusters exist, i.e. in the next to the last step of the analysis.

Figure 3: Cluster Membership

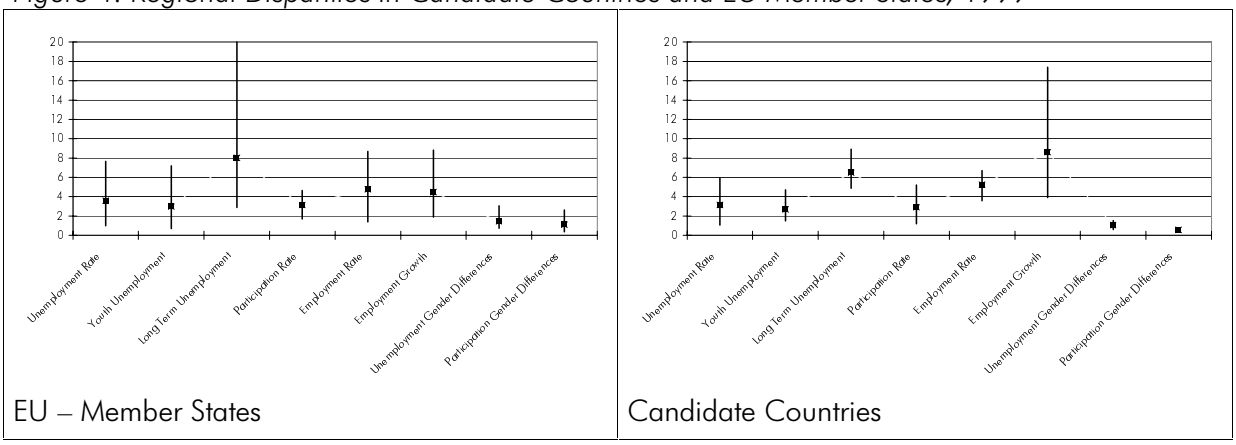


Legend: 0-regions not included in the analysis, 1,2,3,4 – clusters as defined in the text and table 4

The Distribution of Labour Market Indicators

The second question we addressed is whether the distribution of labour market indicators in the candidate countries differs from that in member states. In the European Union, a number of studies (see: Boldrin and Canova, 2001, and Elhorst, 2002 for surveys) establish some important stylised facts concerning the distribution of unemployment across regions. In particular there are large regional disparities in the labour market situations within countries and unemployment rates and participation rates seem to be highly correlated over time in the EU. These stylised facts apply to candidate countries as well. As reported in chapter 4 of this report correlation coefficients of unemployment rates, wage levels and participation rates in candidate countries are only marginally smaller than in the member states. Furthermore, intra-national disparities in labour market outcomes are of similar magnitude as in member states (Figure 4). The only differences are that disparities (measured by the standard deviation) of employment growth vary substantially more among candidate countries and long term unemployment rate disparities more across member states.

Figure 4: Regional Disparities in Candidate Countries and EU Member States, 1999



Note: Figure displays the standard deviation of indicators across countries. The line displays the range of standard deviations in the member states and candidate countries. The dot represents the unweighted average across country groups

More recently, however, growth literature (see: Quah, 1997, Overmann and Puga, 2002) has stressed that issues of regional disparity should be addressed by looking at the complete distribution of regions, rather than only at first and second order moments. This is important because the shape of the distribution provides information concerning issues such as the share of regions affected by a certain problem and polarisation of regions in different groups. If a substantial part of the mass of a distribution is to the left of the mean (i.e. the distribution is left skewed), this indicates that many regions exhibit values below the average of the relevant indicator and only few above average values. Overman and Puga (2002) for instance show that the distribution of unemployment

rates is skewed to the left in member states and that thus high unemployment in the EU is concentrated in relatively few regions. Furthermore, looking at complete distributions allows identifying the existence of different regional clusters. If the distribution is bipolar, this may considered as a sign of polarisation into high and low unemployment regions.[12] Again Overmann and Puga (2002) find increasing polarisation in member states. These findings are also mirrored in Figure 5 which presents kernel estimates of the distribution of labour market indicators separately for the candidate countries and member states. The distribution of unemployment rates is skewed to the left in member states and a small "bump" to the right of the mean typically comprising regions in Southern Spain, Southern Italy, and Eastern Germany indicates a cluster of regions well above the EU average.

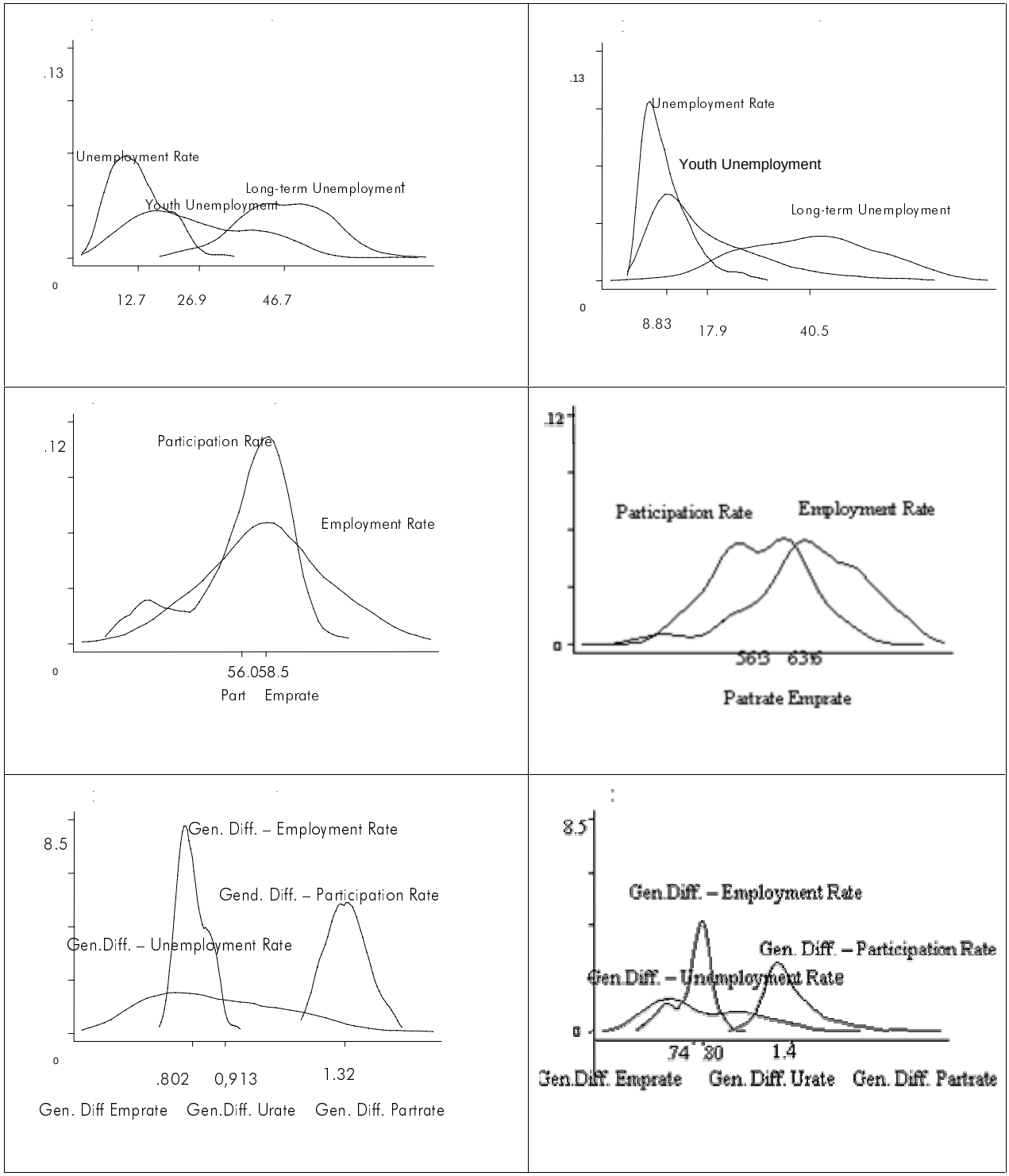
The shape of the distribution of unemployment across regions of candidate countries differs from that of member states. It is more symmetric and less strongly skewed to the left. A majority of regions has unemployment rates around the average and the discrepancy between regions with below-average and above-average unemployment rates is less extreme. In particular levels of high unemployment twice or three times the average, which is common in the member states, are rare among candidate countries. A more noticeable bump to the right of the average also suggests the existence of a distinct group of high unemployment regions mainly in Bulgaria, Eastern Slovakia and Poland.

This also applies to youth unemployment, which is also more symmetric in member states than in candidate countries and exhibits more pronounced bi-polarity in candidate countries. The below average peak in youth unemployment includes the Baltic countries, Slovenia and some Czech and Southern and Eastern Hungarian regions, while above average youth unemployment can be found in Bulgaria, Eastern Slovakia and Poland. Long term unemployment by contrast is relatively symmetrically distributed in both regions but with much greater variance in the member states, which leads to the "flatter" shape of the distribution.

[12]) Pench et al, 1999 argue that this skewness of regional unemployment rates may be a result of the lacking responsiveness of regional wage rates to regional unemployment.

Figure 5: Estimated density for Labour Market Indicator by Region (Pooled Data 1998-2001)

Candidate Countries | Member States



Notes: Data are excluding Romania

The good performance of candidate countries with respect to gender differences in employment, participation and unemployment rates, is due to a large number of regions with a relatively low unemployment rate of women.

The distribution of gender differences in unemployment rates is left-skewed in candidate countries but right-skewed in member states. Similarly gender differences in participation rates are more symmetrically distributed in candidate countries than in the EU (where skewness to the left suggests that a relatively large number of regions has low female relative to male participation rates). Also concerning gender differences in employment rates the candidate countries show a more symmetric distribution than member states.

In all these cases there is some indication of bipolarity. Among candidate countries the labour markets of a number of regions are characterised by high female employment rates (Baltic States, Eastern Poland and Slovakia), while among member states, low female employment rates can be found for the group containing Spanish, Greek and Southern Italian regions. Concerning gender differences in unemployment rates, regions with comparatively high female unemployment are mainly Czech and Polish regions, while in the EU, these regions contain Belgian, French and some Austrian as well as Spanish, Greek and southern Italian regions.

Density estimates of aggregate employment and participation rates reconfirm the picture of a more symmetrical distribution of labour market problems which is also characterised by clearer tendencies of polarisation. The employment rate distribution of candidate countries is symmetric, while employment rates of member states are skewed to the right. Thus in member states a large number of regions have above average employment rates, and few low employment rate regions. Participation rates are more symmetrically distributed in member states but polarisation into two peaks slightly below and above average participation is also more visible. A large number of candidate countries regions are characterised by high participation rates while a small "bump" indicates the importance of a group of regions with very low participation rates, the majority of which are in Hungary and Bulgaria.

Labour market Problems in Candidate Countries: National or Regional?

These findings thus suggest that although differences in regional disparities between candidate countries and member states are not large, when looking at the complete distribution of labour market indicators some important differences appear. In particular labour market problems are more symmetrically spread in many respects and concerning a number of indicators such as aggregate unemployment and participation rates a more pronounced polarisation into clusters of regions exists. We were interested to what degree these differences are caused by nation specific factors, such as differences in the national wage setting mechanisms, and to what

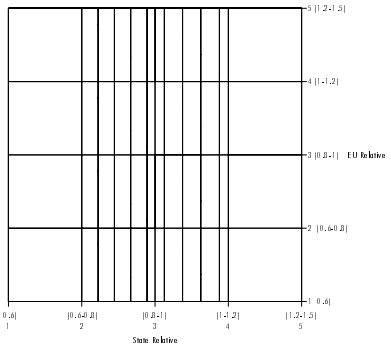
degree these problems are caused by regional specificities of labour markets that may arise from localised labour supply and demand problems.

To address these issues we employ the apparatus of kernel mappings suggested by Overmann and Puga (2001). In constructing these mappings, we first transform all labour market indicators to EU relative variables by dividing through the EU average. Furthermore, we also divide the same indicators by national averages. If national factors were very important in determining unemployment, then a region's unemployment relative to the national average would be close to unity, irrespective of the Europe relative rate. Plotting the nation relative indicator on a mapping with the Europe relative indicator would result in a figure such as figure 6a, where all the mass is located along the line where the nation relative unemployment rate is 1. By contrast if national differences are only of little importance in the EU, we would find contour map such as in 6b.

In this set up Overmann and Puga (1999) show that, in the European Union, a region's outcome in terms of unemployment is more closely associated to the labour market situation of neighbouring regions (domestic and foreign) than to national unemployment rates (i.e. nation relative to EU relative maps resemble figure 6b more closely than Figure 6a while neighbour relative to EU relative mappings resemble figure 6a).

Figure 6: Examples of results of kernel mappings

6a



6b

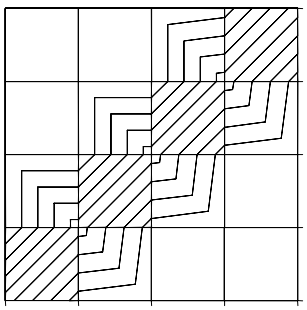
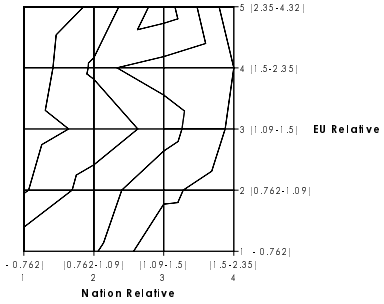
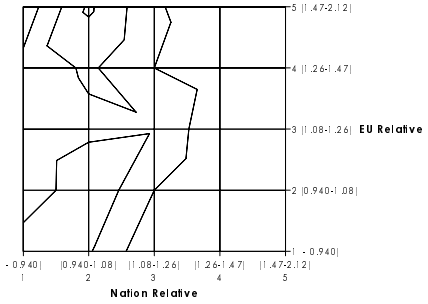


Figure 7: Nation Relative to EU Relative contour mappings for candidate countries 1998-2001

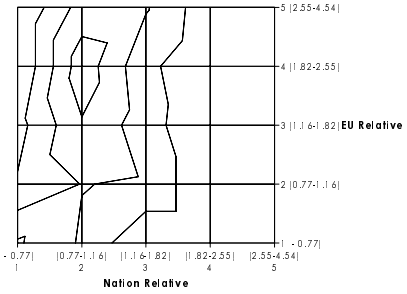
unemployment rate



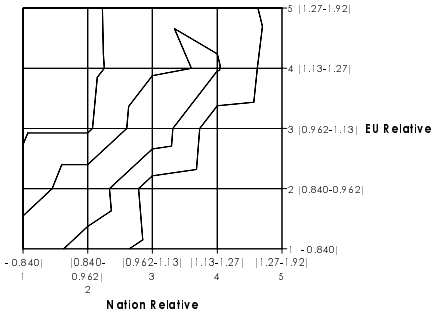
Gender difference – unemployment rate



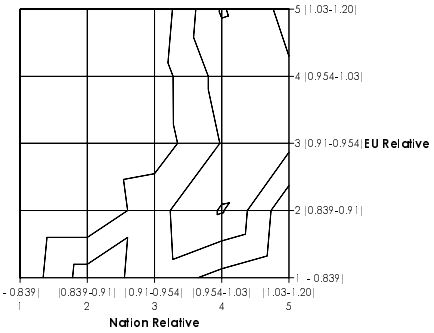
Unemployment rate of the Young



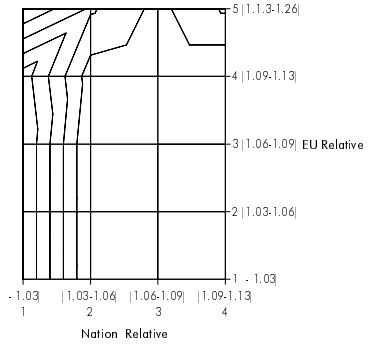
Long-term unemployment rate



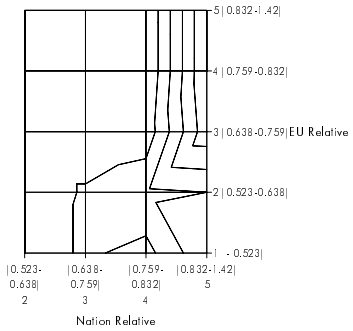
Employment Rate



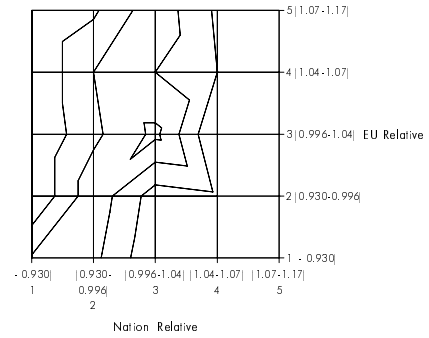
Gender Difference-Employment Rate



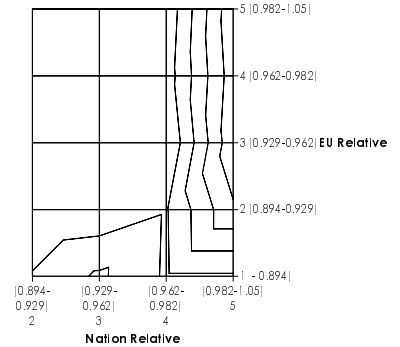
Employment Rate of the Elderly



Participation Rate



Gender Difference – Participation Rate



Following this approach, we constructed such contour maps of both the nation relative to EU relative distribution of labour market indicators and the neighbour relative to EU relative distribution for candidate countries and member states.[1] Our results indicate the high relevance of national factors in candidate countries. When looking at the "unemployment" side, relatively large numbers near to a nation relative of 1 can be observed for overall unemployment as well as for unemployment structure indicators, such as the gender difference in unemployment and youth unemployment. The exception is long-term unemployment: Here, the mass along the diagonal indicates a relatively small importance of national factors for a region's outcome of long-term unemployment relative to total unemployment. Interestingly, the reverse is the case for the European Union (see Appendix C): As in Overmann and Puga (2002) the member states kernel mappings suggest a relatively small relevance of national factors for aggregate unemployment rate while the structure of unemployment (gender differences in unemployment, youth unemployment rates and most notably long-term unemployment) are more strongly influenced by nation specific factors.

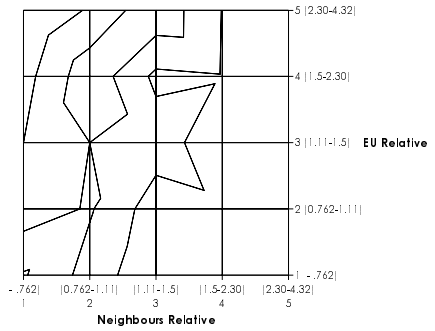
The importance of national factors is less clear-cut especially for CEE regions with employment rates below the EU average. Nevertheless, the dominance of nation specific factors persists for all structural labour market indicators of the "employment" side. In the EU area, nation specific factors are found to be of negligible importance for employment indicators. In particular, member states' kernel mappings of aggregate employment rates, the employment rate of the elderly and employment growth show a distribution of mass along the diagonal of the graphs while EU gender differences in the employment rate still depend to a large extent on national factors (see Appendix C).

Thus the comparison with EU kernel mappings as well as with results from Overmann and Puga (2002) suggests that national developments are more important in candidate countries than in member states. There are, however, also other potential influences on regional labour market outcomes. In particular one could hypothesise that regional proximity may be an important determinant of the regional labour market situation or, as has been the case in much of the literature on regional labour market development in the candidate countries (Boeri and Scarpetta 1995, Scarpetta and Huber, 1996, Gorzelak, 1996 , Smith, 1998); that the sectoral specialisation pattern may have an important impact on the labour market situation.

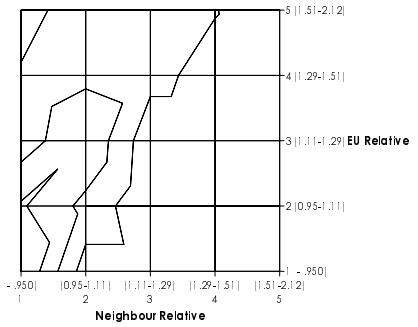
[1] In doing this, we divide each of the distributions into quintiles and report the contour maps .

Figure 8: Neighbour Relative to EU Relative contour mappings for candidate countries 1998-2001

Unemployment Rate

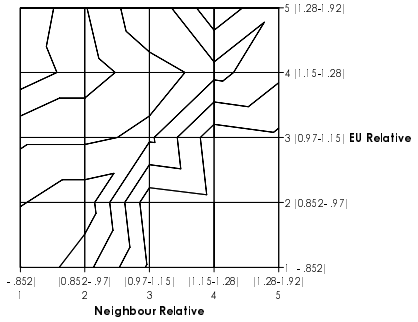


Gender Difference - Unemployment Rate

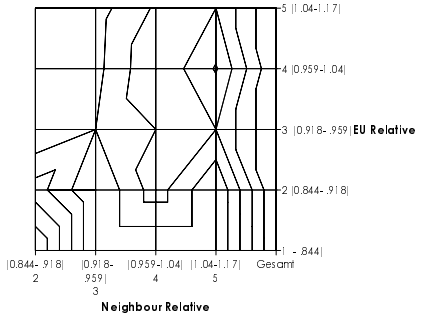


Unemployment rate of the Young

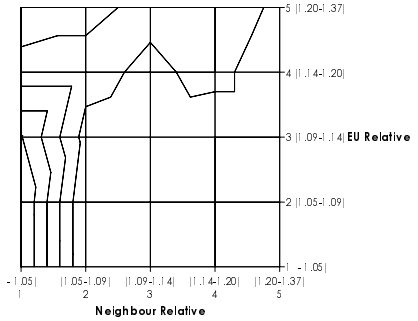
Long-term unemployment rate



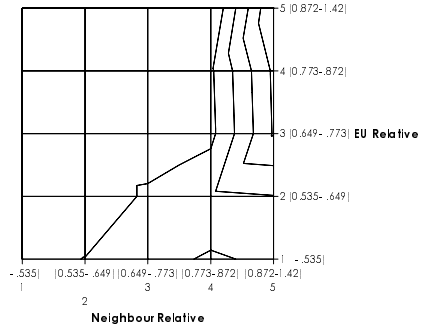
Employment Rate



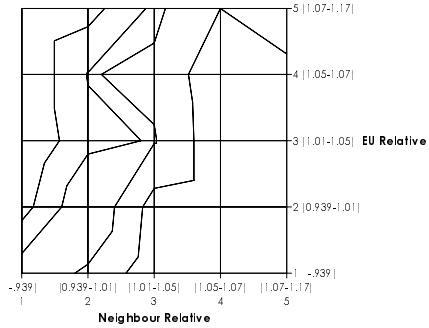
Gender difference – Employment Rate



Employment of the Elderly



Participation Rate



Gender Difference – Participation Rate

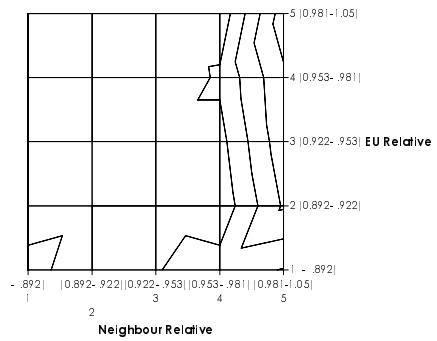
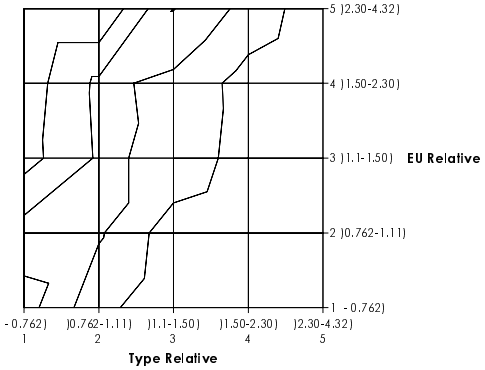
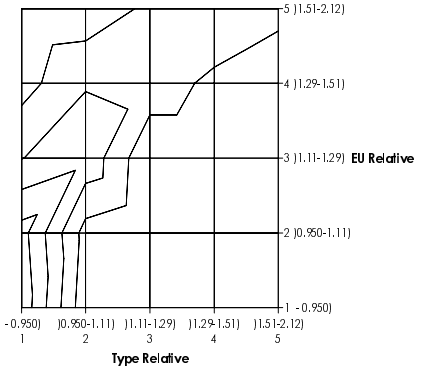


Figure 9: Type Relatives to EU Relative contour mappings for candidate countries 1998-2001

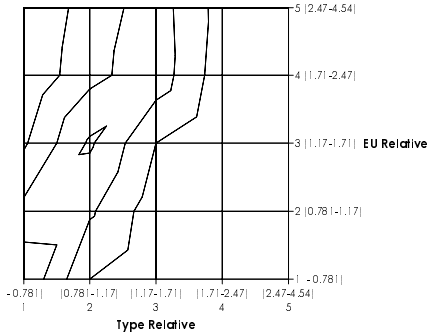
Unemployment Rate



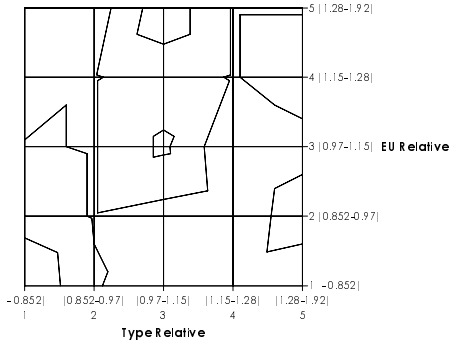
Gender Difference – Unemployment Rate



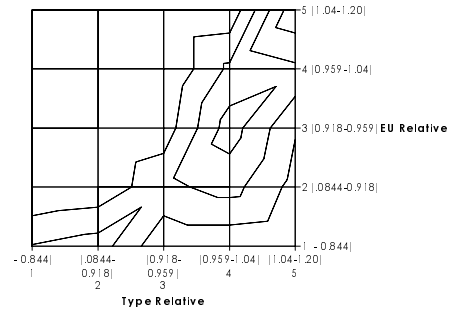
Youth Unemployment



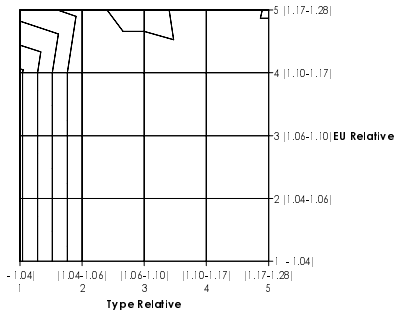
Long-term Unemployment



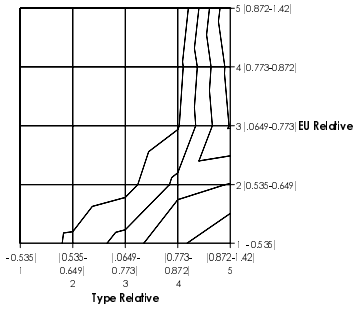
Employment Rate



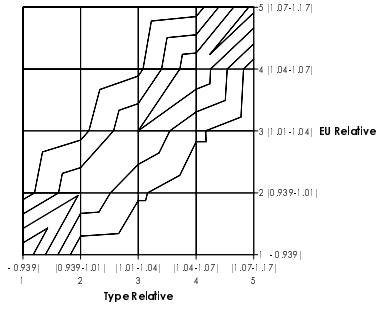
Gender Difference – Employment Rate



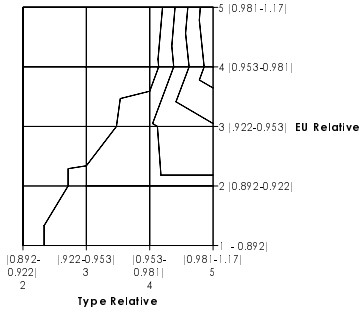
Employment Rate of the Elderly



Participation Rate



Gender Difference- Participation Rate



To test whether any of these explanations can improve on the "fit" of nation relative to EU relative mappings we also computed neighbour relative to EU relative and type relative to EU relative mappings. In these cases neighbour relative unemployment rates were calculated by dividing a region's labour market indicator by the weighted average for all its neighbours and, in the case of the type relative, labour market indicators were divided by the weighted average of NUTS2 regions with similar specialization patterns according to a typology developed by Wiese et al (2001)[1]

When looking at these kernel mappings two main conclusions can be drawn. First, nation relative and neighbour relative figures lead to similar results. This is not surprising since the definition of the two groups overlaps: domestic neighbours are included in both group definitions. Other domestic regions and the region itself are contained in the nation definition, while in the neighbour definition only foreign geographical neighbours are considered additionally. Second, a clear significance of neighbour specific factors can be observed mainly on the "employment" side. Large probabilities along a neighbour relative of 1 can be found for employment rate, the gender difference in employment rate and the employment of the elderly. On the "unemployment" side, it is mainly the kernel mappings of the aggregate unemployment rate and youth unemployment rate that show some importance of neighbour specific factors. Thus, in contrast to the EU, in the accession countries geographical neighbours do not affect a region's unemployment situation to a large degree. Neither unemployment rate nor its structural components show a higher importance of neighbouring regions.

Finally, regional specialisation patterns (with the important exceptions of long-term unemployment rate and gender differences in employment rates) do not perform better than national averages in explaining general regional labour market outcomes in the candidate countries. In comparison to EU member states (see Appendix C) sectoral specialisation, however, seems to be more important in explaining such regional differences. Thus

[1] This typology divides candidate countries' NUTS2 regions into agglomerations, service-biased, service-dominated, industrial, agriculture-biased and agriculture-dominated regions. Due to the small number of observations for candidate countries we aggregated these into 4 groups: Agglomeration, Service-biased regions and Service-dominated regions (Type 1), Industrial regions (Type 2), Agriculture-biased regions (Type 3) and Agriculture-dominated regions (Type 4) (see Appendix B)

results suggest that the importance of sectoral specialisation may be lower in candidate countries than in early phases of transition, but is still higher than in the EU.

Conclusions

This paper provides a descriptive comparison of labour market situations in the candidate countries and EU member states. Our results indicate that:

1. Candidate countries' regions have significantly higher unemployment, long-term and youth unemployment than member states and that almost 78% of the candidate countries' population lives in regions with unemployment rates in excess of 10%. Candidate countries are, however, also characterised by both significantly lower gender differences than member states. Furthermore, cluster analysis suggests that these features are not unique to candidate countries, but that they are comparable to French and Belgian border regions.
2. Although regional disparities in candidate countries are comparable to those in EU-member states, when focusing on the complete distribution of labour market indicators, the distribution in the candidate countries is more symmetric and, concerning a number of indicators (in particular unemployment and participation rates), polarisation is more pronounced among candidate countries regions.
3. In the candidate countries national rather than regional factors are more powerful in explaining the regional labour market situation and that industrial specialisation patterns are more important than in member states.

These findings suggest that although the heterogeneity of labour market problems in Europe will remain after accession, it will not increase to a degree that it may become unmanageable. The European Employment Strategy will thus need to continue to provide relatively decentralised and flexible co-ordination mechanisms as are currently implemented in through the open method of co-ordination. The fact that - in contrast to member states - national factors are important in the candidate countries suggests that, while in the current member states a more regional focus in combating unemployment may be in place, in candidate countries a national focus, which continues to focus on institutional and implementation issues of labour market policies may be warranted.

This national employment strategy in candidate countries will, however, have to be closely co-ordinated with regional policy, and between national and regional actors. In the light of repeatedly stressed concerns about the short tradition of regional policies in candidate countries (see: Szemler, 2000 and Quaisser and Woodward, 2002) this will represent a major policy challenge to candidate countries.

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Appendix A1. Standaed deviation of Labour Market Indicators among Countries 1999

	urate	you%pop	lturate%u	partic	emprate	employment growth	urgedi	partgedi
At	0.993	0.007	19.999	2.184	1.408	0.019	0.135	0.056
Be	4.033	0.044	7.677	1.696	4.123	0.025	0.123	0.070
De	4.543	0.013	7.779	2.867	3.843	0.021	0.147	0.078
Es	5.782	0.043	6.860	2.938	5.425	0.038	0.072	0.149
Fi	3.167	0.072	3.167	3.818	5.513	0.057	0.101	0.091
Fr	6.989	0.016	4.406	3.787	5.144	0.088	0.092	0.094
Gr	2.919	0.030	11.095	3.656	5.398	0.060	0.072	0.170
It	7.668	0.055	16.934	3.513	8.689	0.029	0.103	0.262
Nl	1.152	0.015	4.649	2.279	2.394	0.053	0.141	0.035
Pt	1.427	0.015	2.881	4.628	6.205	0.036	0.184	0.238
Se	1.697	0.019	3.886	2.325	3.406	0.062	0.304	0.042
Uk	2.517	0.028	6.879	3.877	5.623	0.048	0.257	0.043
Cz	3.212	0.025	5.309	1.200	4.150	0.054	0.064	0.050
Hu	2.512	0.017	4.882	3.483	5.218	0.039	0.148	0.042
Pl	3.055	0.031	8.916	1.512	3.573	0.110	0.109	0.063
Ro	1.072	0.015	6.784	5.199	6.562	0.053	0.153	0.066
Sk	5.923	0.047		3.115	6.700	0.174	0.059	0.059

Source: EUROSTAT

Appendix B Clusters of Regions in 1998

Cluster 1: Agglomeration, Service-biased region, Service-dominated region

Cluster 2: Industrial region

Cluster 3: Agriculture-biased region

Cluster 4: Agriculture-dominated region

Source: DIW&EPRC: The Impact of EU Enlargement on Cohesion

Explanations

Agglomeration: extremely high population density

Service-dominated: remarkably high share in service employment (69% and more compared to EU-27average of 62%). Industrial and agricultural employment is below EU 27 average (8% and 30%)

Service-biased: above-average share in services that are not dominated by services, i.e. close to average share of employment in either agriculture or industry

Industry: above-average share of industrial employment and no specific strength in either agriculture or industry

Agriculture-biased: above average shares of agricultural employment. These values less pronounced than in "Agriculture-dominated", i.e. comparatively high shares in either industrial or service employment

Agriculture-dominated: very high shares of agricultural employment

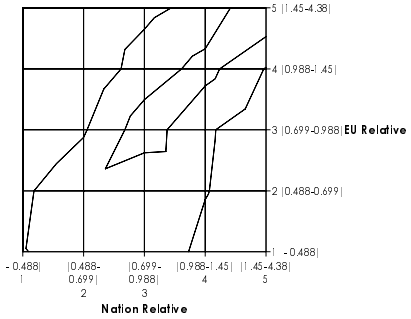
Table B.1:Agglomeration, Service-dominated region, Service-biased region: n=3

:Agglomeration, Service-dominated region, Service-biased region		Industrial Region: n=10		Agriculture-biased: n=18		Cluster 4: Agriculture-dominated region: n=8	
cz01	Praha	cz02	Strední Cechy	cz03	Jihozápad	lv	Latvia
hu01	Közép-Magyarország	cz04	Severozápad	cz06	Jihovýchod	pl02	Kujawsko-Pomorskie
sk01	Bratislavský kraj	cz05	Severovýchod	ee	Estonia	pl03	Lubelskie
		cz07	Strední Morava	hu04	Dél-Dunántúl	pl05	Lódzkie
		cz08	Ostravsko	hu06	Észak-Alföld	pl06	Malopolskie
		hu02	Közép-Dunántúl	hu07	Dél-Alföld		
		hu03	Nyugat-Dunántúl	lt	Lithuania		
		hu05	Észak-Magyarország	pl01	Dolnoslaskie		
		pl04	Lubuskie	pl07	Mazowieckie		
		pl0c	Slaskie	pl08	Opolskie		
				pl0b	Pomorskie		
				pl0e	Warminsko-Mazurskie		
				pl0f	Wielkopolskie		
				pl0g	Zachodniopomorskie		
				si	Slovenia		
				sk02	Západné Slovensko		
				sk03	Stredné Slovensko		
				sk04	Východné Slovensko		

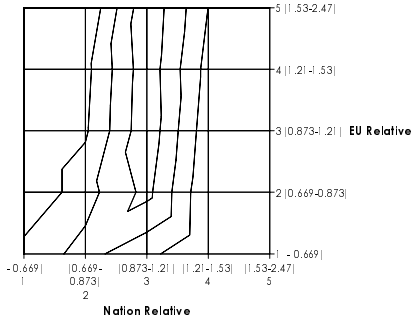
APPENDIX C: Comparison Results for Section four on EU Countries

Figure C1: Nation Relatives to EU relative for EU member states

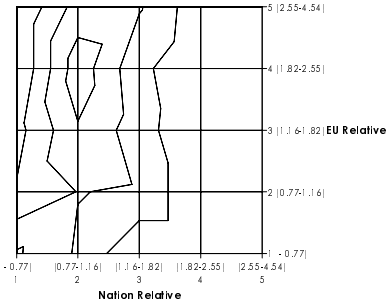
Unemployment Rate



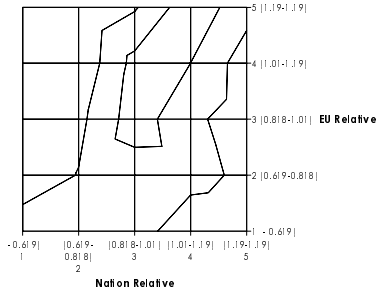
Gender Difference – Unemployment Rate



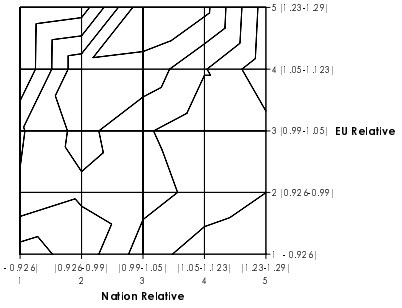
Unemployment Rate of the Young



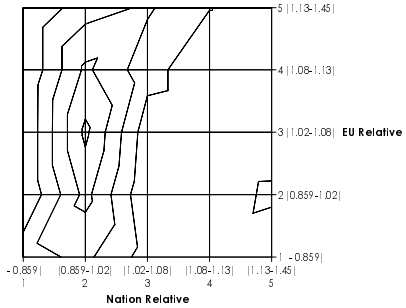
Long-term Unemployment Rate



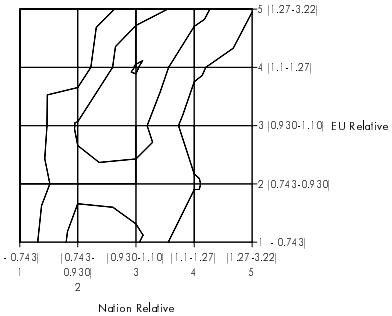
Employment Rate



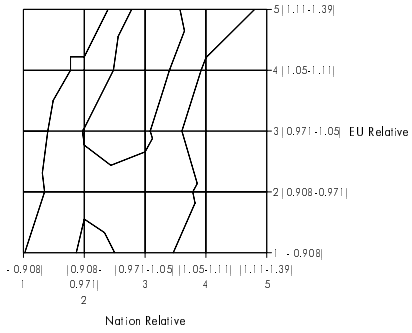
Gender Difference – Employment Rate



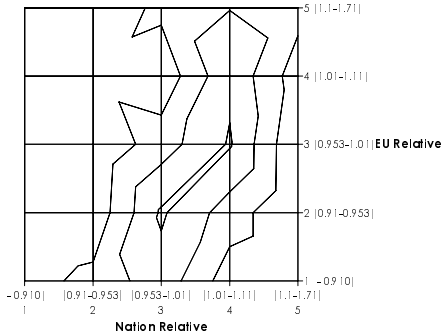
Employment Rate of the Elderly



Participation Rate

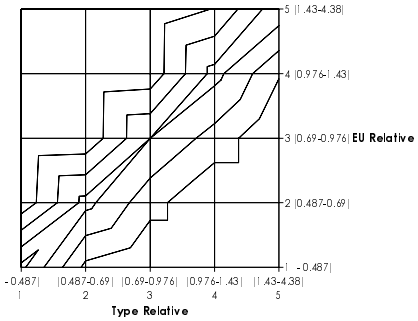


Gender Difference – Participation Rate

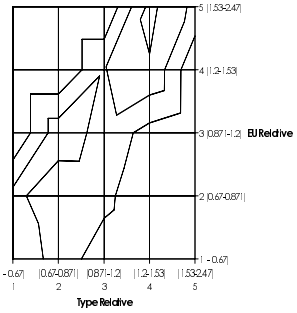


APPENDIX C.2: EU – Type relatives for member states

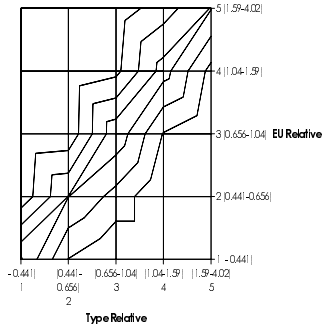
Unemployment Rate



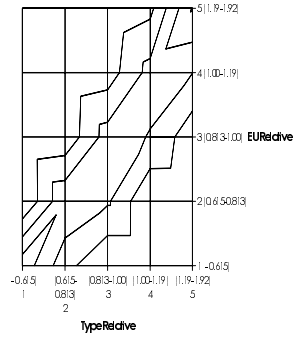
Gender Difference – Unemployment Rate



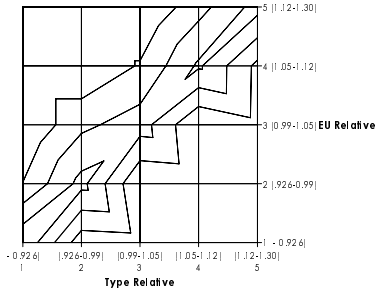
Youth Unemployment



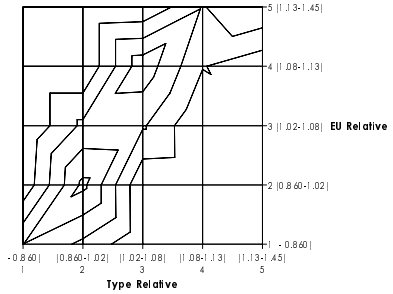
Long-term Unemployment



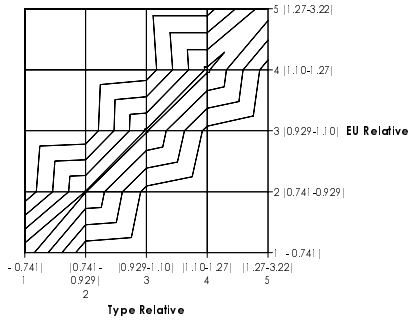
Employment Rate



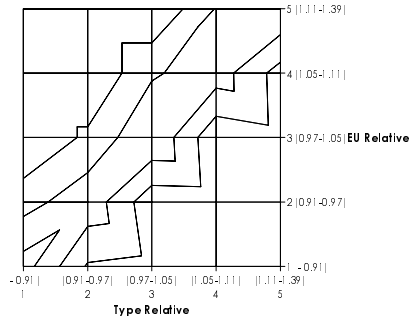
Gender Difference – Employment Rate



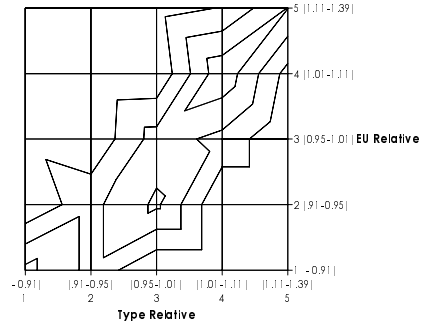
Employment Rate of the Elderly



Participation Rate

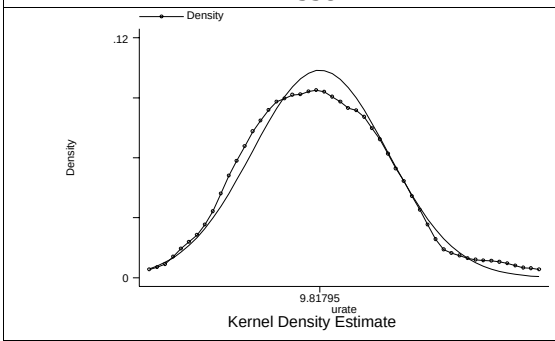
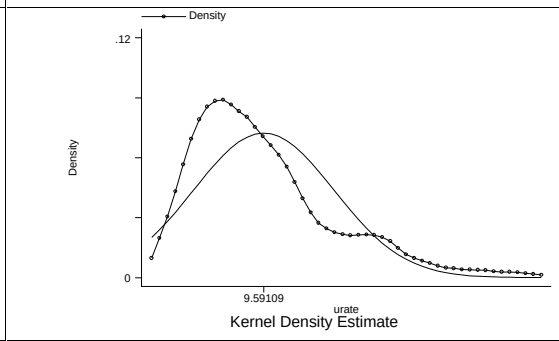
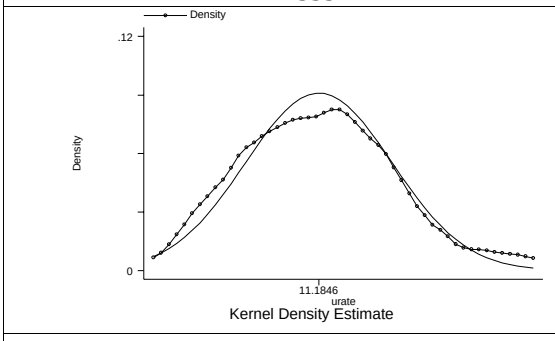
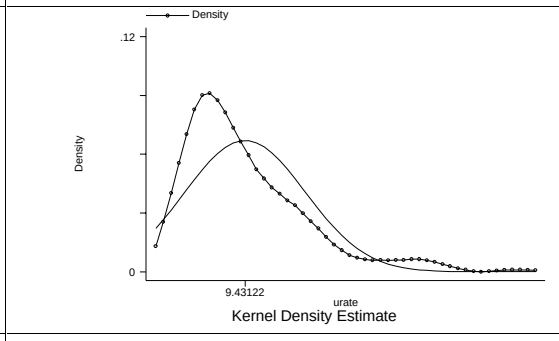


Gender Difference – Participation Rate



APPENDIX D: Kernel estimates by year

Figure D1:Unemployment rates

CEE	EU
1998	
	
1999	
	
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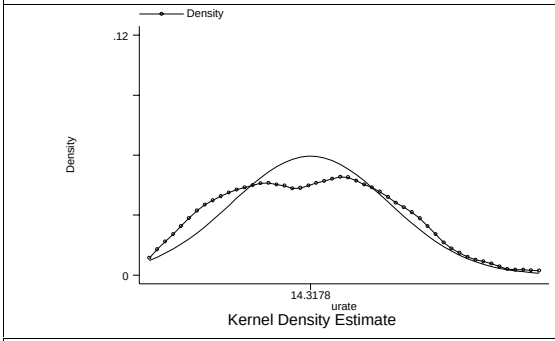	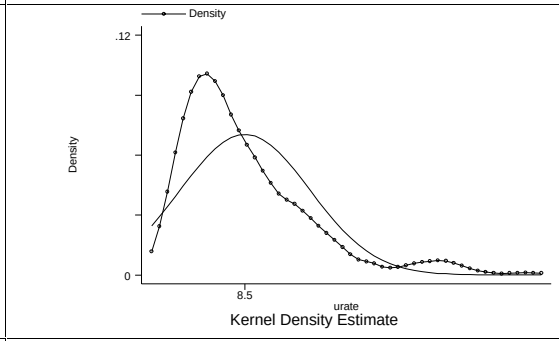
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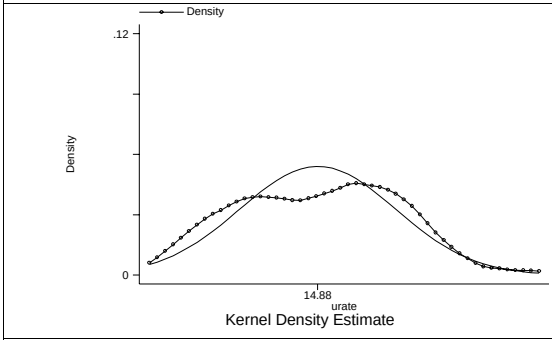	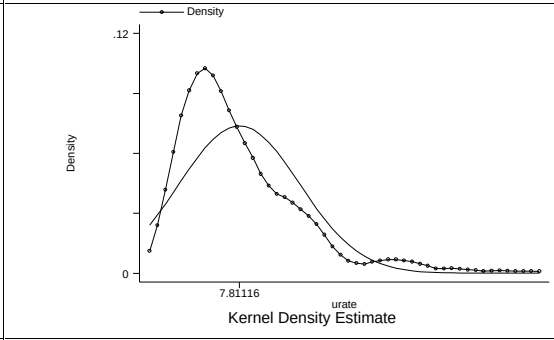
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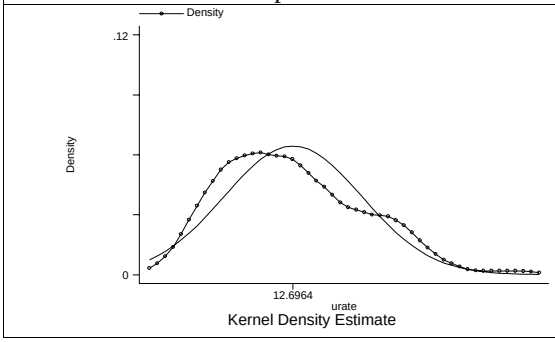	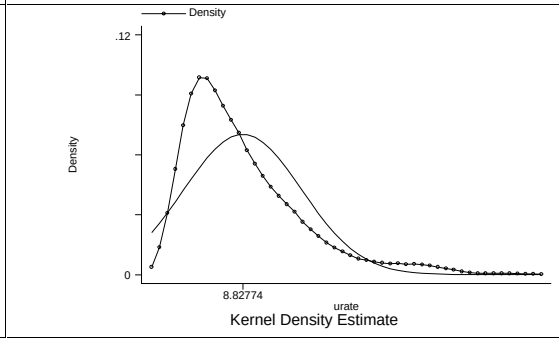

Gender Difference in Unemployment

CEE	**EU**
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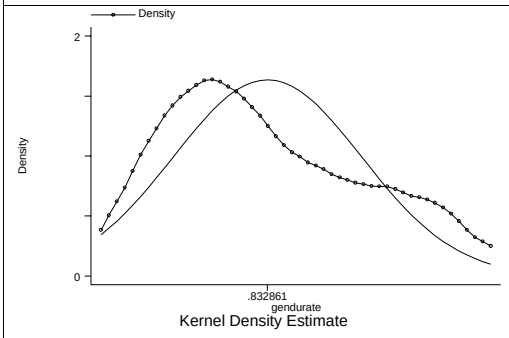
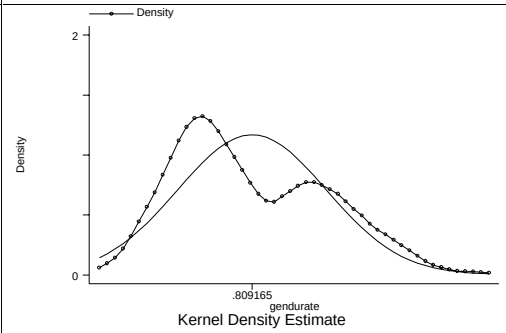
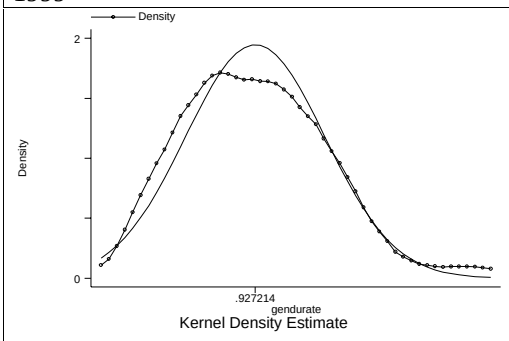
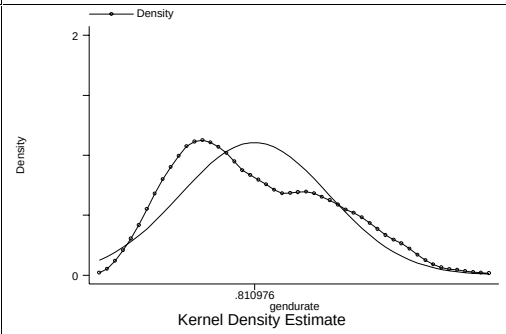
	
1999	
	
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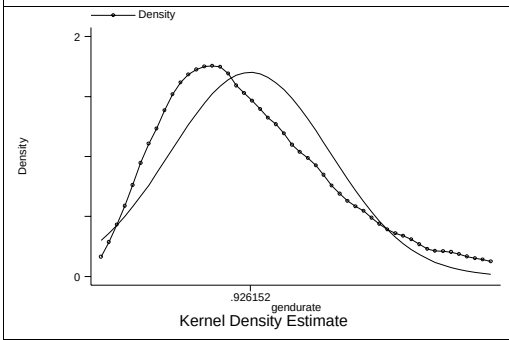
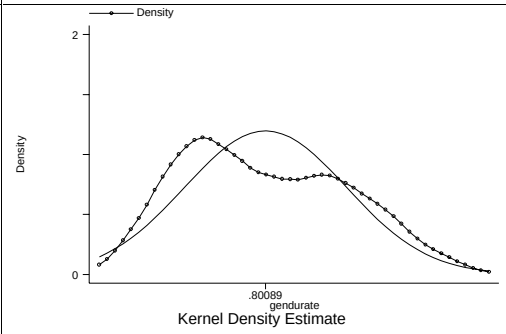
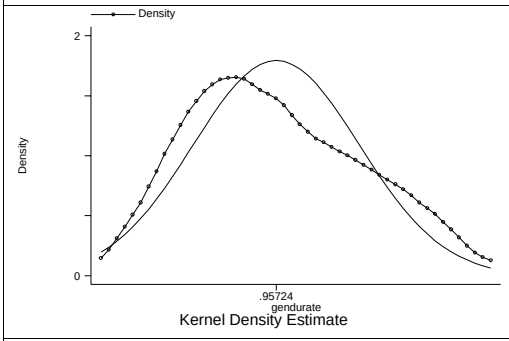
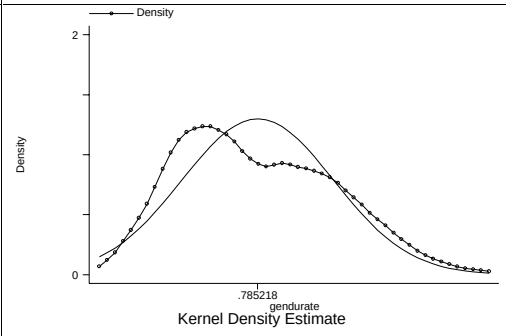
	
2001	
	
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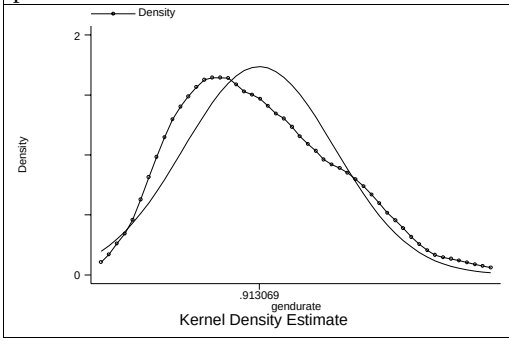
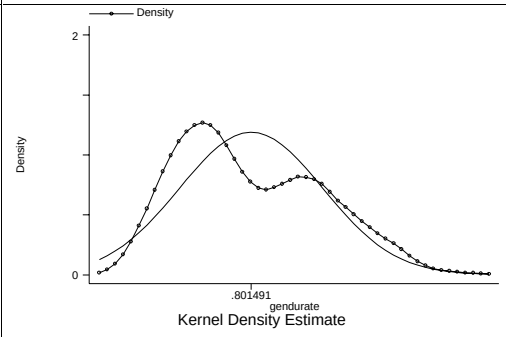
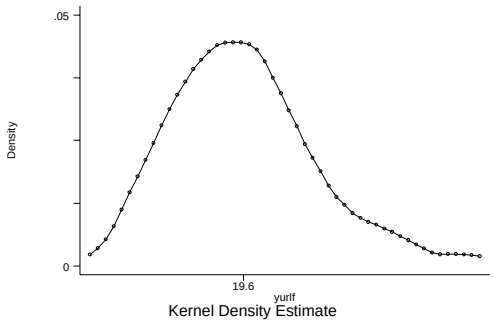
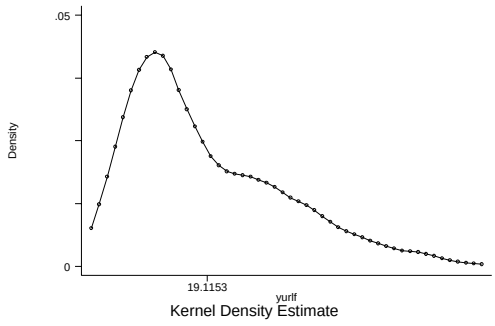
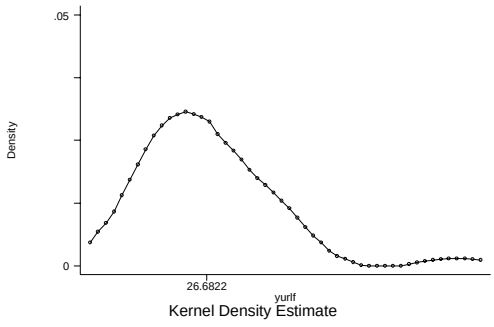
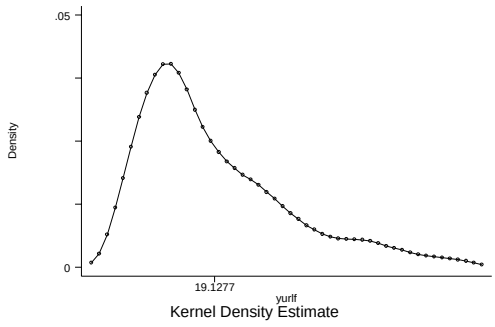
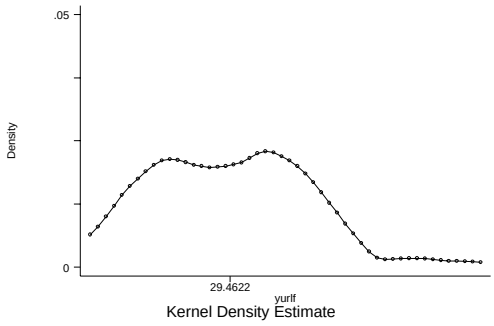
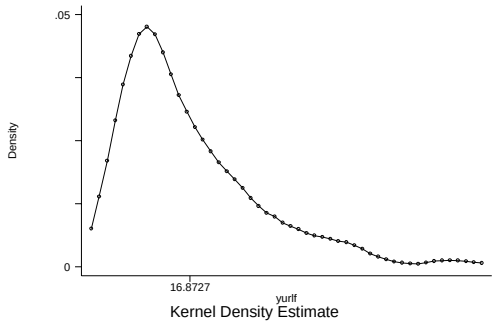
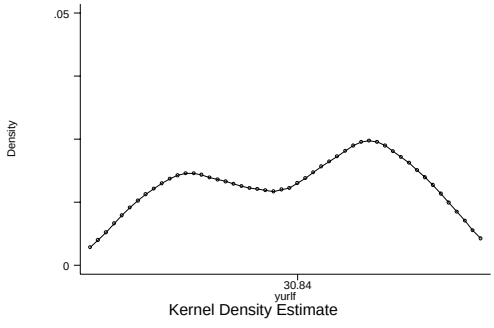
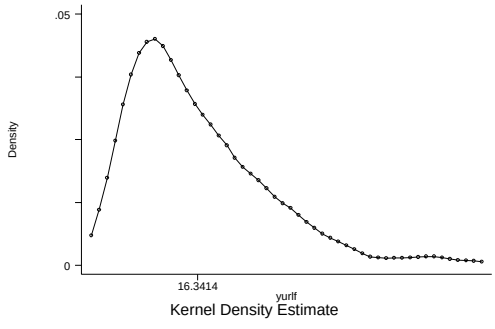
	

Youth Unemployment Rate

CEE	EU
1998	
	
1999	
	
2000	
	
2001	
	
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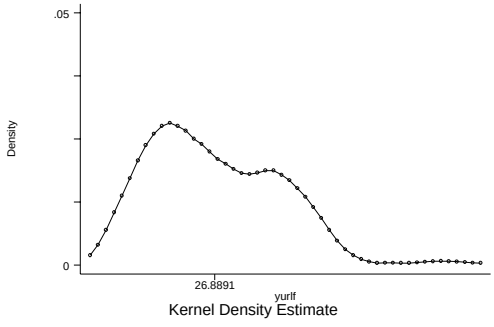	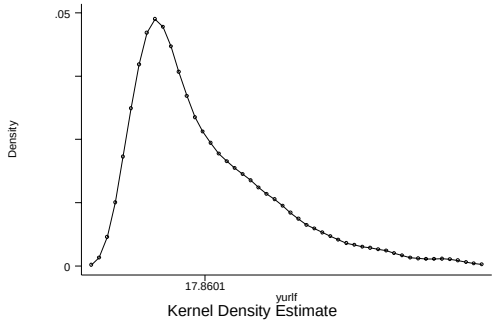

3. Long-term unemployment rates

CEE	EU
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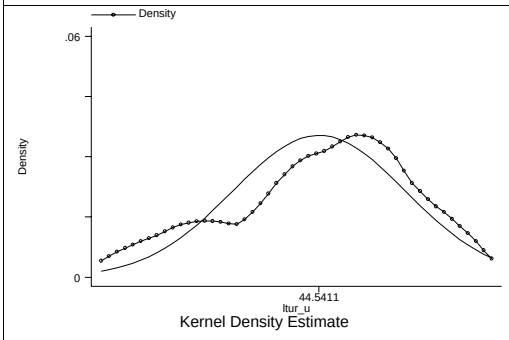	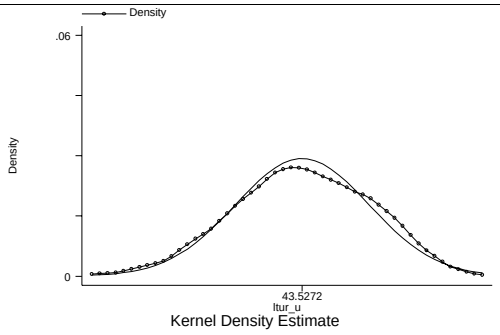
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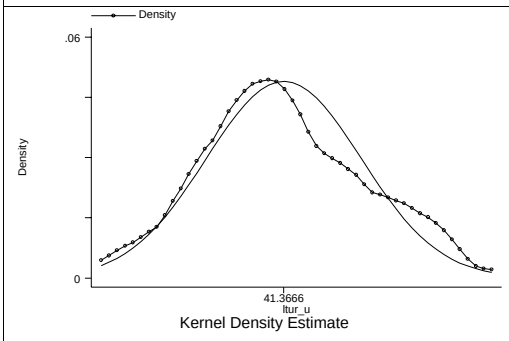
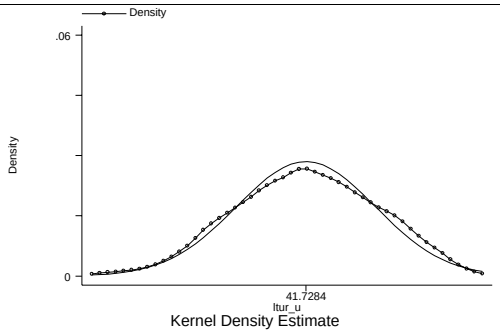
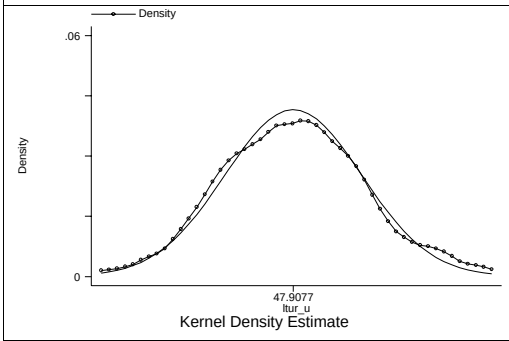
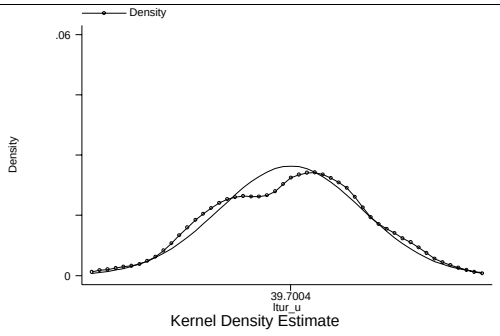
	
2000	
	
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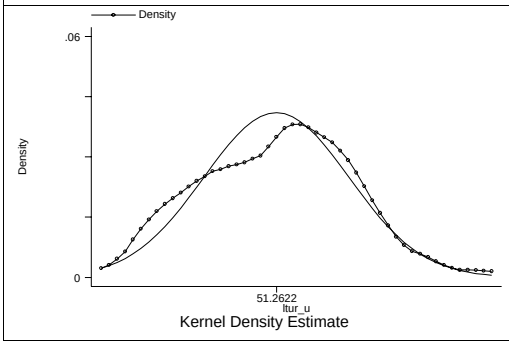	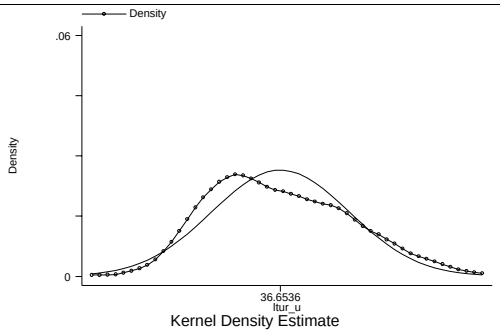
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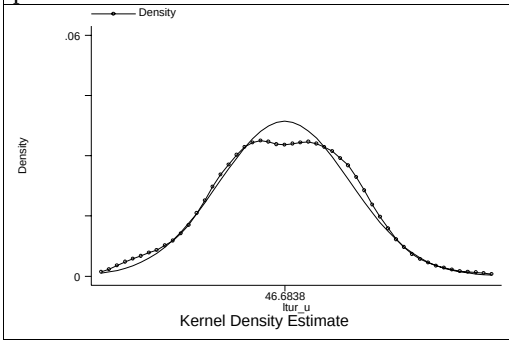	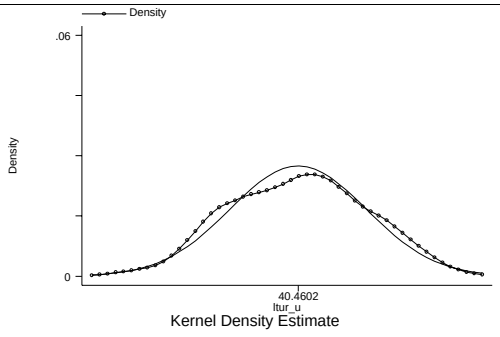

Employment rates

CEE	EU
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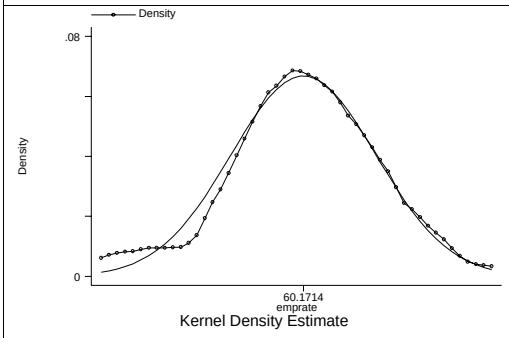	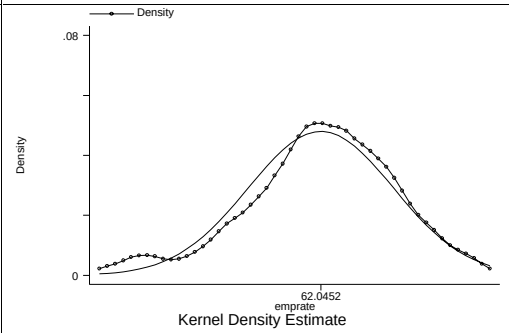
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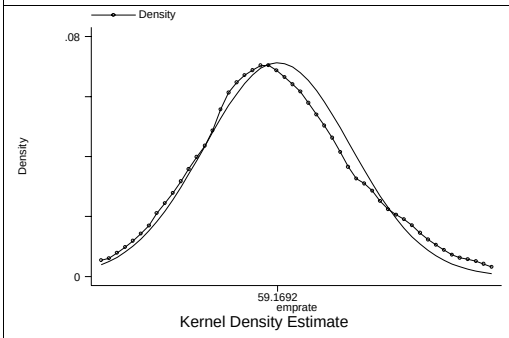	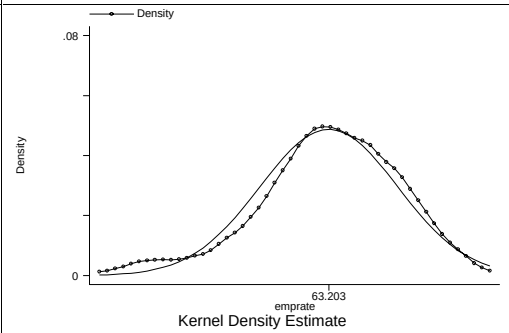
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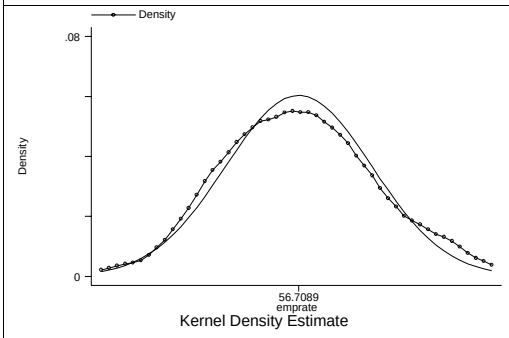	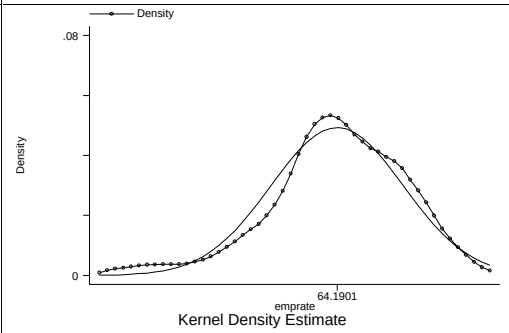
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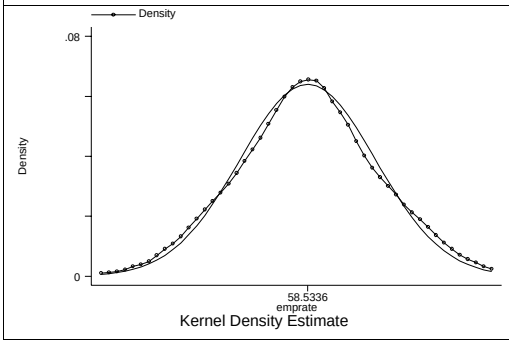
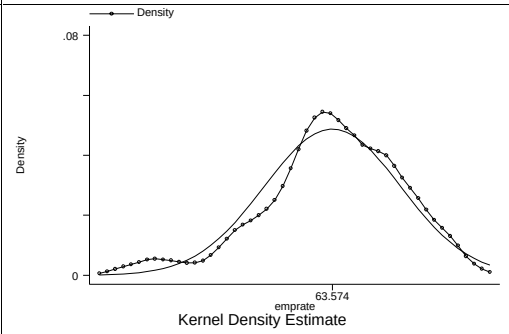
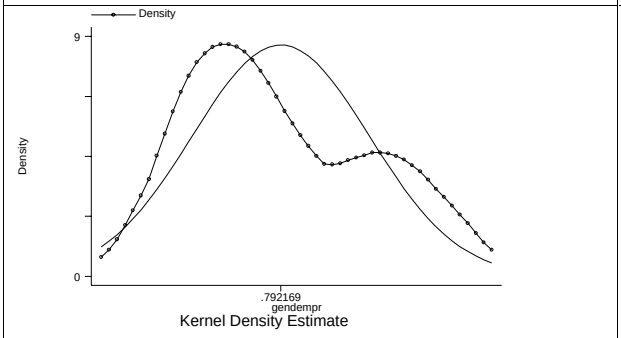
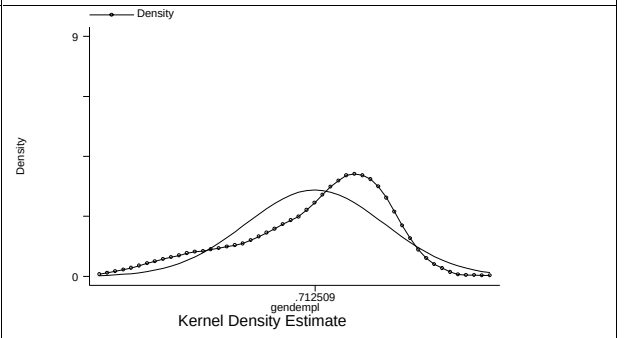
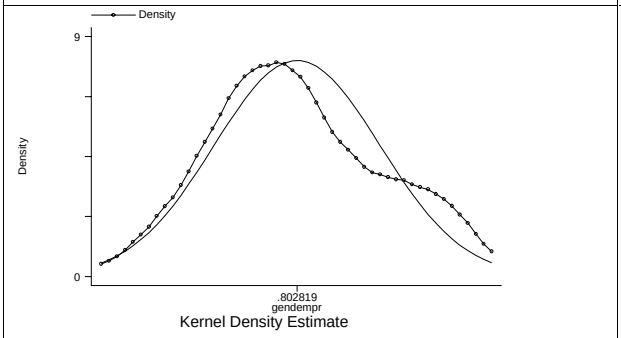
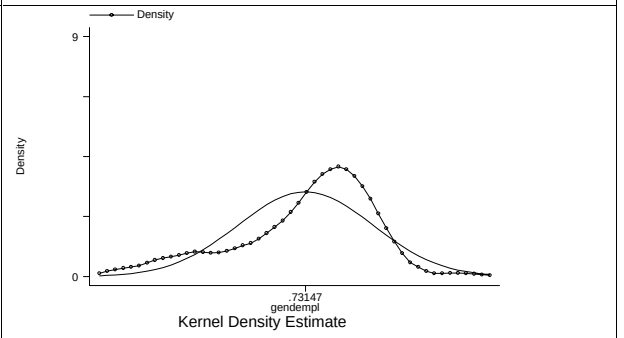
	

Gender difference in employment rates

CEE	EU
1998	
	
1999	
	
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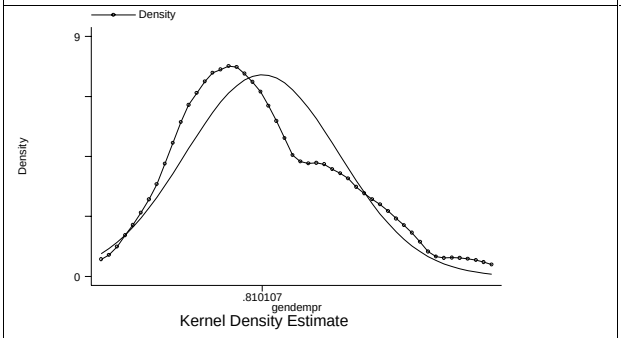	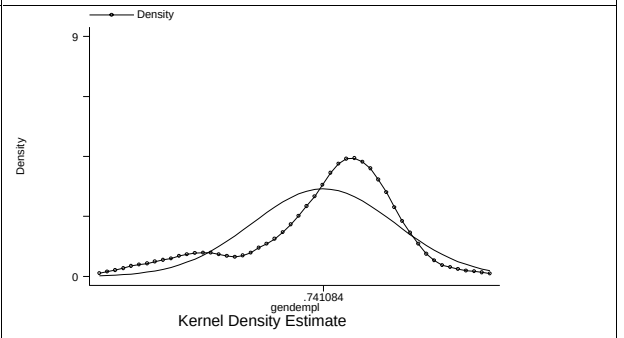
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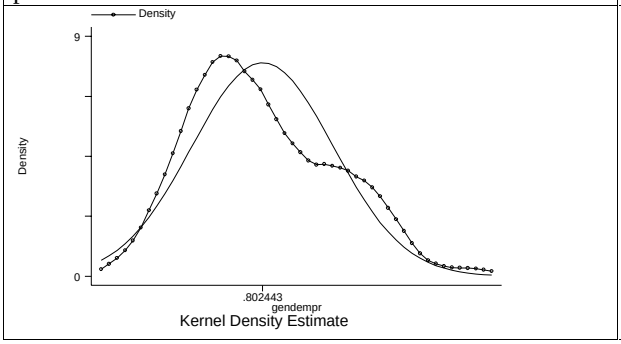
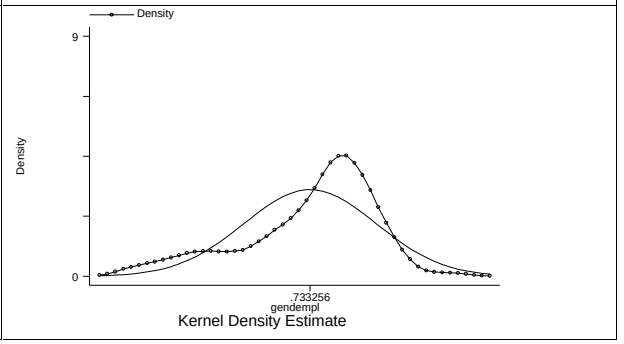
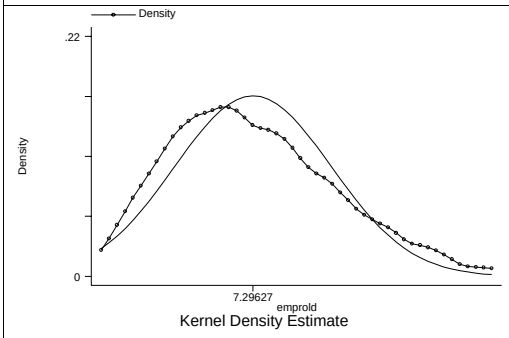
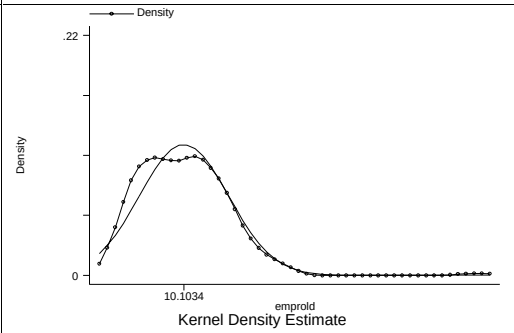
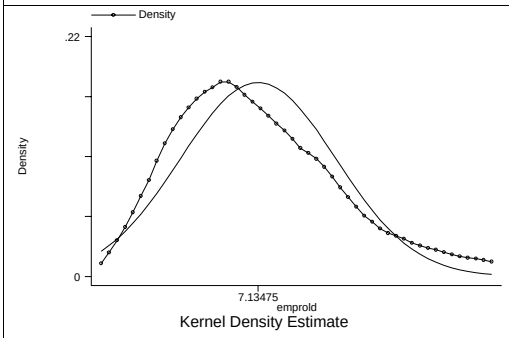
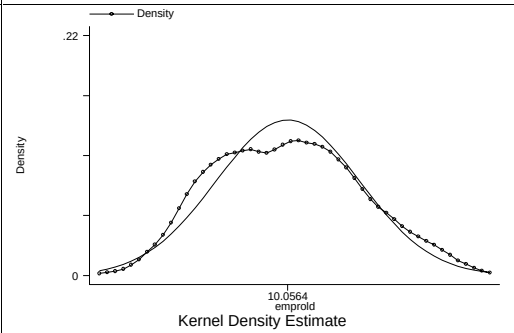
	

Employment of the elderly

CEE	EU
1998	
	
1999	
	
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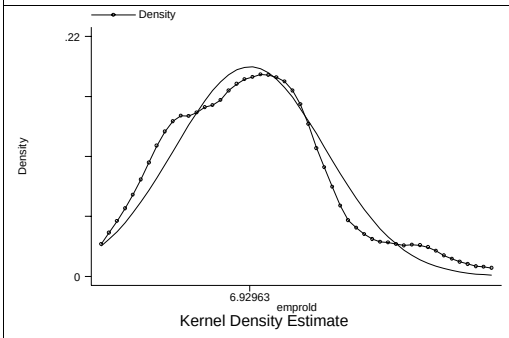	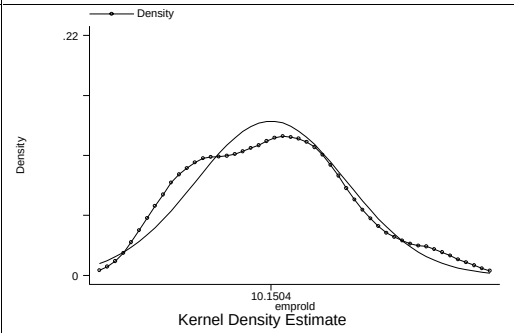
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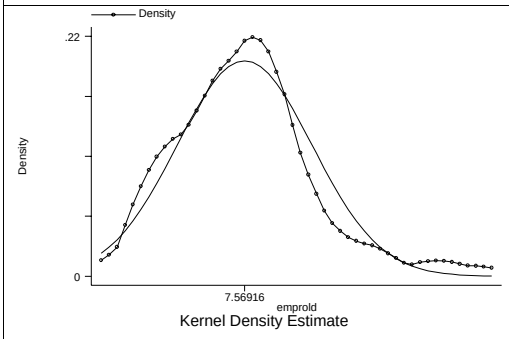	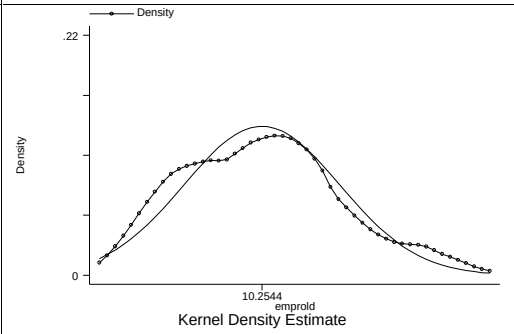
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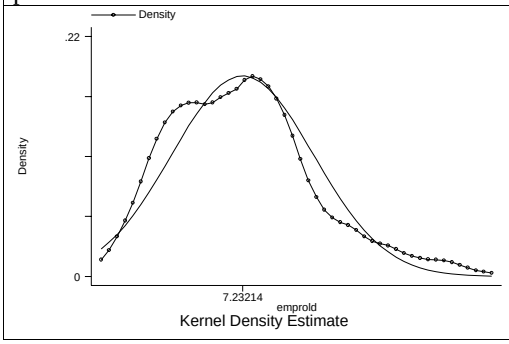
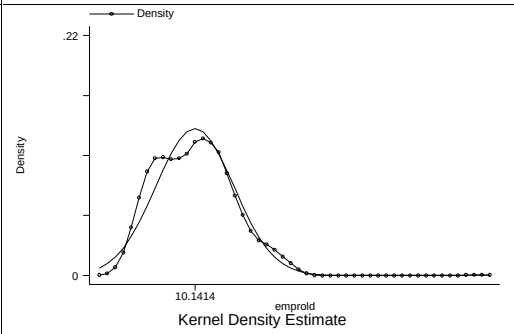
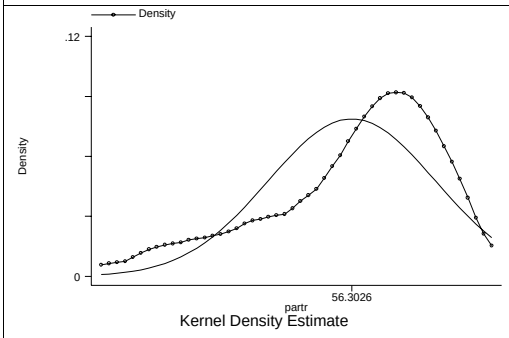
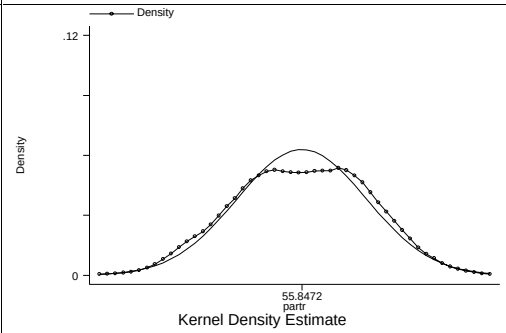
	

Participation Rate

CEE	EU
1998	
	
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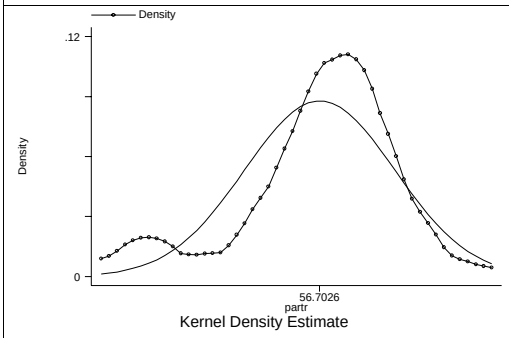	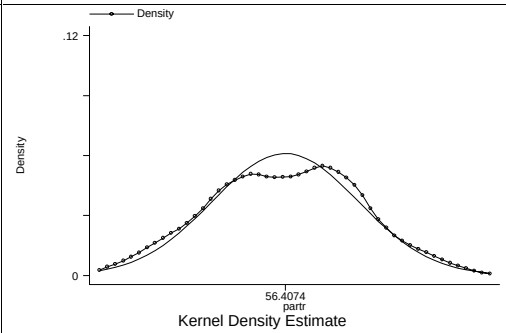
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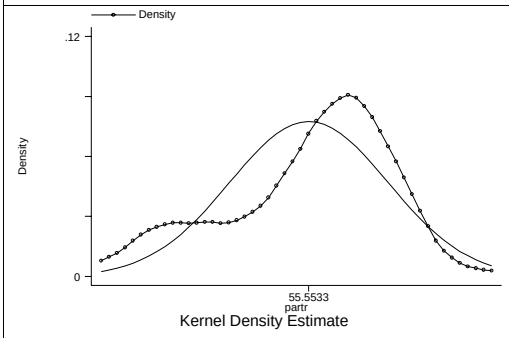	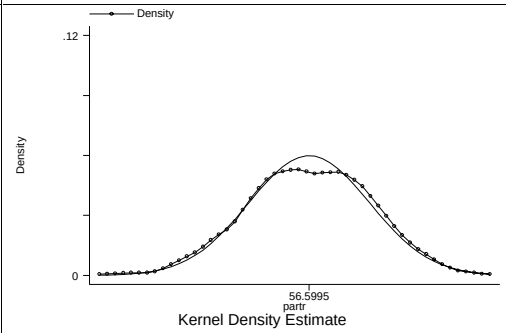
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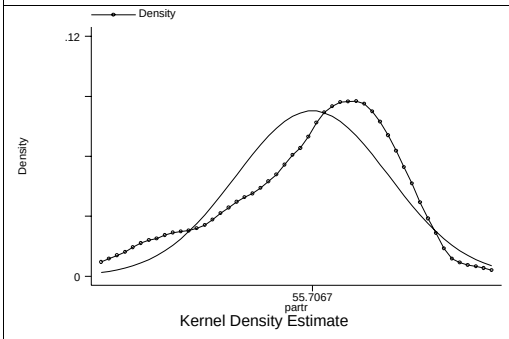	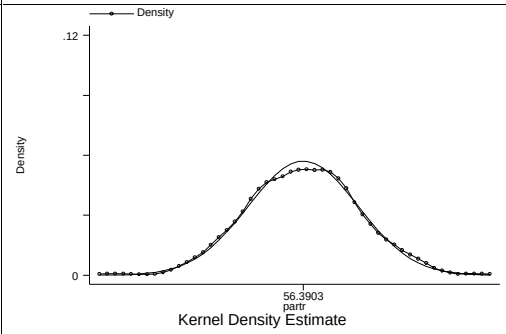
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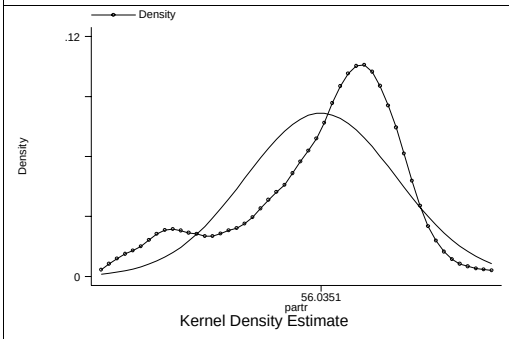
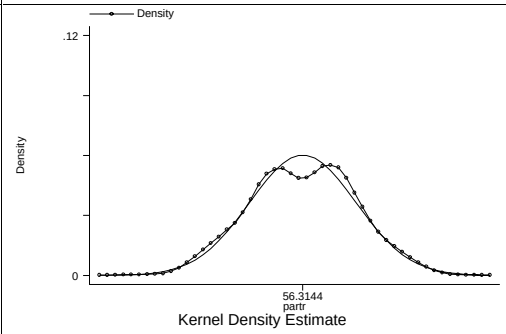
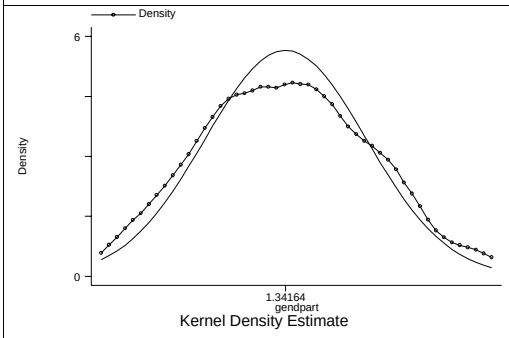
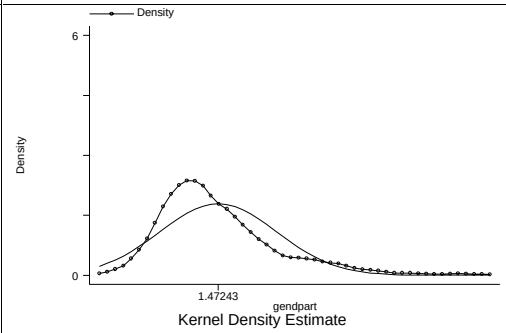
	

Gender gap in participation rates

CEE	EU
1998	
	
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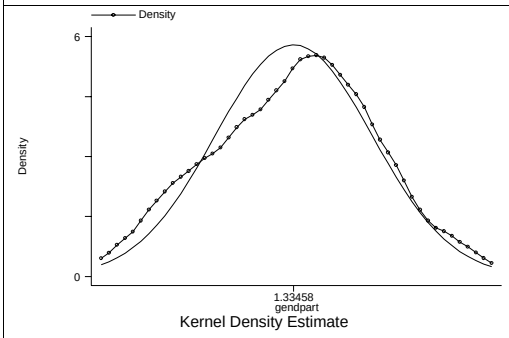	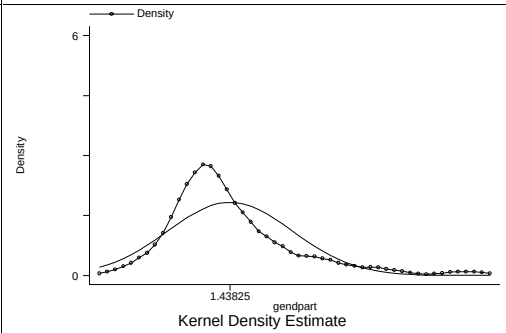
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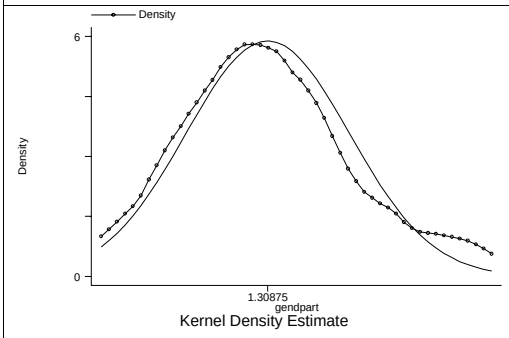	
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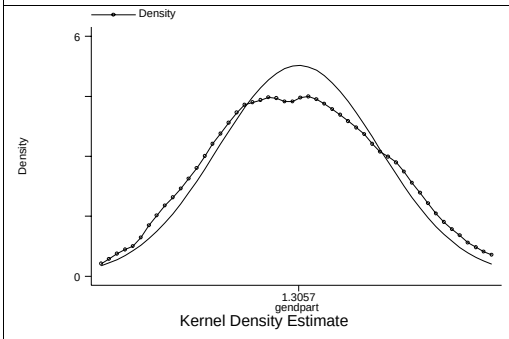	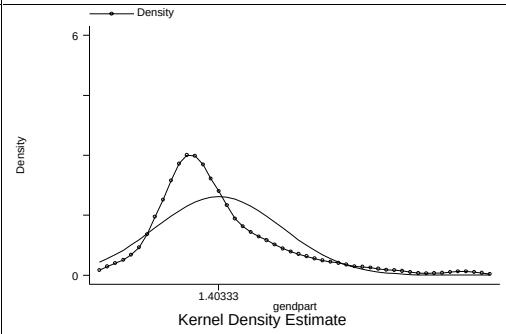
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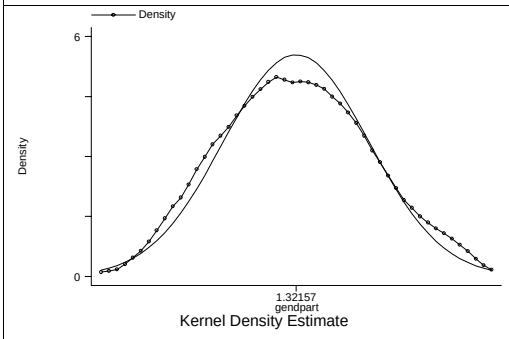	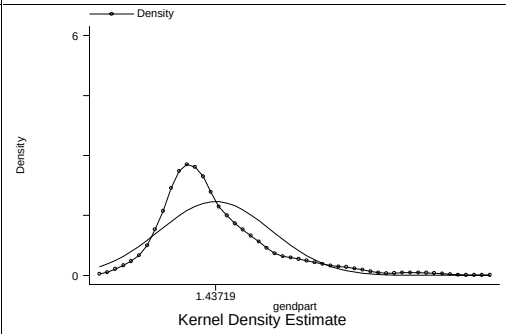

Regional Specialization and Employment Dynamics in Transition Countries.

Iulia Traistaru* and Guntram B. Wolff**

Bonn, April 18, 2003††

Abstract

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

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

JEL classification: J21, O41, R12, P23

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

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1 Introduction

Since 1990, Central and Eastern European countries (CEECs) have gone through a major structural adjustment following the trade re-orientation towards Western markets and the transition to a market economy. In the early phase of the transition process, all CEECs experienced a sharp decline of GDP and substantial employment drops. Growth resumed after 1993 but it was followed in some countries such as Bulgaria and Romania by a second economic decline and further employment reductions. Furthermore, there have been strong sectoral shifts in employment structures which have become more similar with the sectoral structures of more advanced economies (Landesmann and Stehrer 2002). Meanwhile, the patterns of structural change have been uneven across space and have thus led to increasing regional inequalities (Petrakos 1996) (Petrakos 2000) and changing patterns of sectoral specialization of regions and concentration of industries (Traistaru, Nijkamp and Longhi. 2002) (Resmini 2002).

While macro-structural changes have been often analyzed, the spatial dimension of the structural adjustment process in the CEECs needs to be investigated in more depth. This paper uncovers and explains regional employment change differentials in six CEECs, namely, Bulgaria, Hungary, Poland, Romania, Slovakia and Slovenia. In particular, we assess the importance of sectoral specialization and region specific factors in explaining regional employment change differentials. In addition, we analyze the case of Germany as a benchmark.

This analysis is important and policy-relevant for a number of reasons. First, highly specialized regions are more vulnerable to asymmetric shocks, since industry demand shocks may become region-specific shocks. While in the long term regions may benefit from specialization via productivity growth, short run adjustment costs could be high in the case of relocation of firms. Second, structural funds provided by the European Union target differences in regional performance. It is therefore necessary to find out, why regions differ in growth rates.

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

as Hungary and Slovakia (Boeri and Scarpetta 1996). These results, however, refer to the early years of transition.

In this paper, we use sectoral employment data at regional level for the period 1990-1999 and investigate regional differentials in employment growth in Bulgaria, Hungary, Poland, Romania, Slovakia and Slovenia, as well as Germany. We apply a shift-share analysis using a three-factor decomposition suggested by Esteban (2000) and assess the role of sectoral mix (structural component), region-specific factors (differential component) and regional competitiveness (allocative component) in explaining regional differentials in employment change. To our knowledge this is the first contribution bringing empirical evidence on the role of these three components in explaining regional employment change differentials in transition countries. We find that in all countries investigated the variance of regional employment change is driven almost entirely by region-specific factors. Sectoral mix and regional competitiveness factors play only a minor role in explaining regional employment dynamics in the three countries included in our study.

The remainder of this paper is organized as follows. Section 2 discusses the three-factor decomposition methodology applied. Section 3 introduces the data and section 4 describes the patterns of structural change at the macroeconomic and regional levels. The results we obtain from our shift-share analysis are presented and discussed in section 5. Finally, in section 6 we formulate the main conclusions of our findings as well as their policy implications.

2 Methodological Framework

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

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

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

In order to disentangle the role of industry mix and region specific factors in explaining the regional employment differentials we compare each region with a benchmark region having sectoral employment growth rates and sectoral mix equal to the national average (Esteban (1972) called the sectoral mix of the national average "homothetic employament"). The differences between actual and the benchmark regions with respect to industry mix and sectoral employment growth capture the importance of these two factors in each region.

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

Table 1: Notations and definition of variables.

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

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

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

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

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

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

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

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

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

It can be rewritten as:

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

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

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

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

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

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

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

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

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

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

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

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

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

3 The Data

We use employment data at regional NUTS 3 level for Bulgaria, Hungary, Poland, Romania, Slovakia (NUTS 4) and Slovenia for the period 1990-1999[2]. Our data

[2]In Hungary and Romania, data were only available from 1992-1999, in Poland from 1992-1998 and in Slovakia and Slovenia from 1992 to 1996.

set[3] contains employment on sectors of economic activity and on manufacturing branches for 28 regions in Bulgaria, 20 regions in Hungary, 49 regions in Poland, 41 regions in Romania, 39 regions in Slovakia and 12 regions in Slovenia. The sectors of economic activity include agriculture, industry and services and in some countries in addition the construction sector. For Bulgaria, Hungary and Romania regional manufacturing employment is available disaggregated on 14 manufacturing branches for Bulgaria, 12 manufacturing branches for Romania and 8 manufacturing branches for Hungary. The data included in this data set has been collected from national statistical offices.[4] Employment refers to persons employed in Bulgaria, Poland and Romania and employees only in Hungary and Slovenia. The GDP growth figures and value added shares of sectors are taken from the EBRD Transition report, 2001 edition.

The average population size of NUTS 3 regions is similar in Hungary and Romania while in Bulgaria it is around half as big, and in Slovakia and Slovenia it is even smaller, in Poland it is largest. The average size of NUTS 3 regions has declined in the investigated period in most countries while it increases in Poland and Slovakia. Regional size differentials are highest in Slovenia and smallest in Slovakia. Regional size differentials have increased in Bulgaria while they stayed constant or declined in all other countries.

	Bulgaria	Hungary	Poland	Romania	Slovakia	Slovenia
Population size 1990, average	309.2	514	783.0	566.0	139.6	165.8
min	155.5	225.4	248.3	237.7	44.5	46.9
max	1202.9	1993.9	4009.1	2394.3	446.2	512.6
standard deviation	216.2	378.6	604.0	337.9	69.5	138.5
coefficient of variation (in %)	69.9	73.7	77.1	59.7	49.7	83.5
Population size 1999, average	292.5	505	789.1	547.8	141.1	165.2
min	138.8	217.8	248.8	239.5	45.0	46.6
max	1211.5	1838.7	3894.9	2286.1	451.6	517.0
standard deviation	220.2	355	590.5	325.1	70.3	139.0
coefficient of variation (in %)	75.3	70.3	74.8	59.3	49.8	84.1

Table 2: The average size of NUTS 3 regions in Bulgaria, Hungary, Poland, Romania, Slovakia and Slovenia. Dates for Poland and Slovenia are 1992 and 1998, for Slovakia 1992 and 1995.
Source: Data set REGSTAT, own calculations.

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

[4]We performed an outlier analysis by dropping all observations with very high, respectively very low growth rates($g > 0.2, g < -0.2$). This, however, did not qualitatively change any of our results.

4 Patterns of Structural Change in EU Accession Countries

This section aims at understanding the regional employment specialization and dynamics in the six transition countries. We first analyze the evolution of GDP and aggregate employment figures, so as to gain insights into the process of transition. We also look at the aggregate changes of the structure of the economies, namely changes in the shares of sectors and growth differences of sectors. The evolution of sectoral employment shares in the economy describes the process of economic restructuring in the transition countries. In a second step, we present the regional employment growth and industry shares. Considerable regional variation in employment change is found, which we then decompose using a shift-share analysis.

4.1 Structural Change at the Macroeconomic Level

The Bulgarian and Romanian economies are characterized by substantial decreases in GDP in the early 1990s, with signs of a recovery in the mid 1990s and again substantial losses of GDP in 1996-1998 (Figure 8 and Figure 12).[5] However, while in Bulgaria employment co-moved with GDP, in Romania the growth of employment appears to be detached from GDP growth, in the mid 1990s, there are even considerable productivity increases due to increasing GDP growth rates and falling employment growth rates.

In Hungary, employment decreased over the period 1992 - 1997. In the initial phase of transition, GDP decreased strongly, but it resumed positive growth by 1994. With higher GDP growth rates since 1997 (almost 5 percent), employment increased again (Figure 10). Poland resumed positive employment growth in 1994 (Figure 11). In Slovakia, employment growth was negative during 1993 to 1996, so it was in Slovenia (Figures 13 and 14). In all four advanced transition countries (Hungary, Poland, Slovakia and Slovenia), as in Germany, we observe in the early phases of transition negative growth rates of employment, which improved in the course of the 1990s, however with a decline in growth rates in Poland and Slovenia in the late 1990s. GDP growth and employment growth seem to co-move in the period.

Germany's development is similar to the development of Poland. There was some loss in employment in the early 1990s (though of a much lower magnitude due to the small percentage of the East employment), however by the mid 1990s the situation had stabilized and employment started growing in 1998. However, the East German

[5] Bulgaria has experienced large losses in GDP and employment since the beginning of transition (EBRD 2001). While GDP per capita was more than 1500 US$ in 1990, it declined to 1150 US$ in 1994 and to similar values again in 1996.

economy by itself lost around one third of its jobs in the course of the 1990s (von Hagen, Strauch and Wolff 2002), most of this loss was however during 1989 to 1991.

In Bulgaria and Romania, the industrial sector lost importance and the agricultural sector increased to magnitudes of around 40 percent in terms of employment (Figures 15 and 19). In Bulgaria, the employment share of the industry sector fell from 45 percent to less than 30 percent. In Romania, the industrial share fell from 32 to less than 25 percent. Remarkable is the strong increase in the agricultural share in Bulgaria and especially Romania. In absolute terms, total employment in the agricultural and service sector, however, stayed broadly constant in Bulgaria. In Romania, the agricultural sector kept constant employment, while the service sector lost almost 20 percent of its employment and the industry sector lost more than 35 percent of its employment.

Industrial employment in Hungary kept a constant share of around 30 percent in the 1990s. In Slovakia and Poland, industry employment share slightly increased during the 1990s (Figures 20 and 18), while in Slovenia (Figure 21) this share declined. The service sector gained importance in Hungary and Slovenia to employment shares of around 60 percent, a level comparable to Germany with around 68 percent (Figure 16).

Thus in all investigated countries we observe changes in the sectoral composition of employment in the course of the 1990s. In all countries except Poland and Slovakia a process of deindustrialization can be noticed. The change in importance of different sectors was particularly pronounced in Bulgaria, Romania (declining industry sector) and Poland (declining service sector).

Figures 22 to 27 give the share of the different sectors in valued added as reported in the Transition Report (EBRD 2001). In all countries the service sector has the largest share of value added with values between 45 and 70 percent, it increases over time except in Hungary. In all countries this share is higher than the share of employment, which means that productivity in the service sector is higher than in the other sectors. The industry sector has in all countries the second highest share of value added. The share of GDP generated in the industry sector, however, declines everywhere except in Hungary, reflecting the general process of deindustrialization already noted in the employment data. In Bulgaria we can clearly notice the recession of 1997, during which the agricultural sector gained importance, while the industrial sector lost relative importance in terms of value added shares. In Romania, we observe a significant change in 1998 with an increase in importance of the service sector and a decrease in industry and agriculture.[6]

Figures 28 to 34 give the growth rates of the different sectors. Bulgaria and Hungary are characterized by co-movements of all the sectors. Both countries had

[6] 1998 was also a recession year. However, already in 1997, Romania was in a deep recession. So what happened?

very high negative growth rates of up to 20 percent loss in employment in the early 1990s. By 1993, however, the agriculture and service sector resumed positive growth in Bulgaria, only interrupted by the crisis of 1997. In Hungary, positive growth of all sectors occurred only by 1997, in the agricultural sector even later.

In Poland, the service sector moved counter the cycle of the industry and agricultural sector. Especially in 1994 and 1995 the service sector growth was first very high compared to negative growth rates of the industry and service sector and then strongly negative, while agriculture and industry increased again their employment. The growth rate of the service sector was also counter-cyclical to the three other sectors in Romania. In 1994 and 1995 service sector growth was positive, while the rest of the economy lost employment, in 1996 the other sectors increased employment, while the service sector lost employment. In Slovenia and Slovakia, especially the agricultural sector lost substantial employment with only slight signs of improvement in the late 1990s, however still with negative growth rates. In Slovenia, only the service sector kept employment more or less constant.

In Germany, especially the construction sector boomed after German reunification. This growth, however, was over after 1995, and since then the construction sector is in a period of downsizing with considerable lay-offs back to levels of pre-Unification. The industry and agriculture sector lost employment all through the 1990s, especially in the early 1990s the industrial sector lost employment.

4.2 Structural Change at the Regional Level

The descriptive statistics and the evolution of the coefficient of variation in appendix A.2 allow to assess the regional variation of sectoral employment changes. The regional variation is then decomposed in the next section into the three shift-share components.

The size of the regions in terms of employment is quite different across countries. The average region in Bulgaria is of about 120 thousands employed, as the average region of Hungary. The Romanian regions (230 thousands) and Polish regions (310 thousands) are considerably larger. The average region of Slovakia and Slovenia is much smaller with around 50 thousands employed. In Germany, the average size of a Land is 2.3 million. The variation of size is substantial in all countries with a coefficient of variation between 60 and 120.

The shares of the different sectors is also very different in different regions. In all countries, the agricultural sector has in some regions less than 4 percent of total employment. While the maximal share of agricultural employment is above 50 percent in Poland, Romania and Slovakia, around 50 percent in Bulgaria, it is substantially lower in Hungary (21 percent) and Slovenia (6 percent). The regional variation of employment shares in agriculture is rather large in all countries and varies between 30 and 60 percent. The industrial sector share varies roughly between

10 and 60 percent of employment in different regions. The coefficient of variation is of similar magnitude of around 20 to 25 percent in all countries, thus the regional variation of the industrial sector is lower than the variation of the agricultural sector. The regional variation of the service sector is the lowest, with a coefficient of variation of around 15 to 20 percent. Thus regions differ most in terms of agricultural share and least in terms of service shares.

In terms of growth rates remarkably high regional variations are reported. The maps (Figure 38 to 41) in the appendix visualize the regional differences in employment change during the 1990s for entire employment. Also for individual sectors there is substantial regional variation in growth rates. This variations is especially high in the construction sector since the absolute figures are rather small so that increases in employment lead to high growth rates. In addition, the construction sector is in general subject to substantial business cycle effects, so that higher variations can be expected.[7]

The evolution of the coefficient of variation reported in appendix A.3 allows to assess the variation in time of regional disparities. In terms of total employment size regions in Bulgaria and Hungary have become more unequal. In the other countries, this coefficient of variation stayed broadly constant in the course of the 1990s. As regards absolute employment values in different sectors, regions differ most with respect to service sector employment. These differences have increased substantially in Bulgaria, Hungary and Poland, while in the other countries there is less movement in time. The shares of the sectors in total employment of the region also differ across regions. This variation is, of course, lower than for absolute employment values, since size differences of the regions are not counted. We observe a slight increase in the variation of industry shares during the 1990s, except for Poland, Slovakia and Slovenia. Interestingly these three countries are the ones in which we observed almost no de-industrialization, while the other countries can be characterized by a process of de-industrialization, which apparently increased the differences of the regions. Thus the de-industrialization was not evenly distributed in space. With respect to the service sector share, regions became more dissimilar in Bulgaria, (Hungary), Poland and Romania, while in Germany, Slovakia and Slovenia the coefficient of variation fell. In Bulgaria the coefficient of variation for growth rates was especially high in the early periods of transition and during the recession of 1997. In general construction and industry sector experience the largest variation in all countries.

To summarize the content of the tables in appendix A.2 and A.3, in all investigated transition countries, we observe regional differentials in terms of size,

[7]The high coefficient of variation might be due to data accuracy issues. However, even for Germany, where data accuracy is very high the coefficient of variation is very high with values of up to 6000. Of course the Land size in Germany is very different to region size of the accession countries. It is however not clear, whether larger regions make regions more or less homogenous.

employment levels, sectoral shares, and especially growth rates. Also, we observe a change of the regional structure of these economies during the process of transition and trade reorientation during the 1990s.

5 Determinants of Regional Employment Change

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

Figures 1 to 7 present the evolution of the share of variance of the industry mix factor, μ, the regional factor, π, and the allocative component, α in the different transition countries. We observe that regional factors play the predominant role in

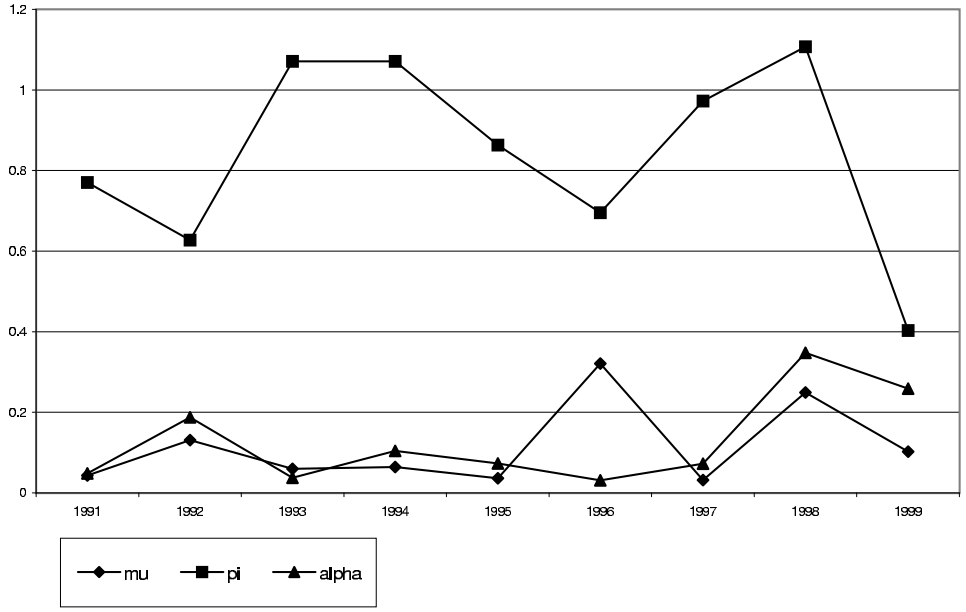

Figure 1: The evolution of variance shares over time in Bulgaria.

explaining regional differences in employment change in all countries. The share of variance of growth differences across regions determined by regional factors, π, is by far the highest in all countries and all years. The sectoral/industry mix factor, μ, explains only little or nothing. Thus, the differences in the composition of industries and sectors in the regions does not matter for the differences in growth rates of regional employment. The allocative component, α, has a variance share between 5 and 50 percent. Thus the combination of sector/industry mix and regional factors plays a certain role. However, the importance of this factor is comparatively small. It played a certain role in Bulgaria in 1996, and also in Germany in 1993. For Poland this component was important in early stages of transition until the

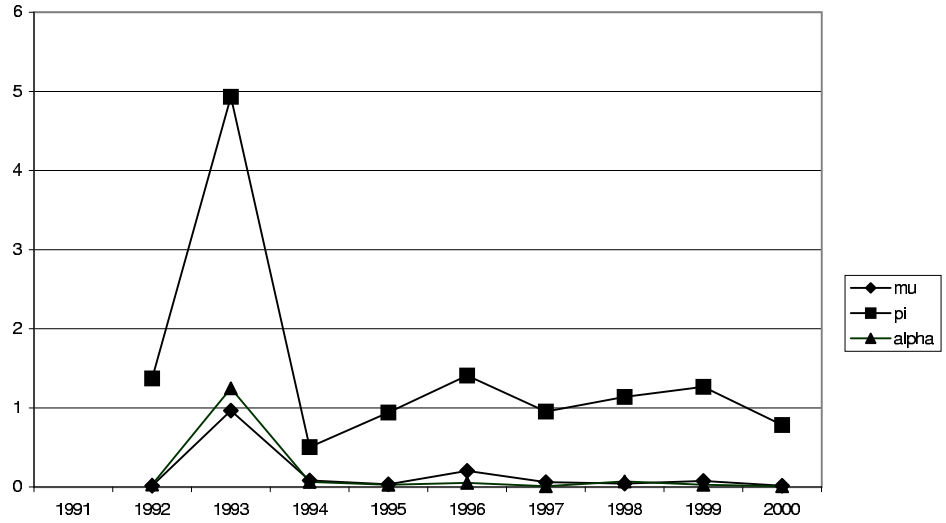

Figure 2: The evolution of variance shares over time in Germany.

mid-1990s. The fact that regional factors are the predominant source of regional growth differentials is quite astonishing in view of the fact that the three sectors included in the analysis are expected to have very different growth potentials and different responsiveness to shocks. In section 4 we showed that there is considerable variation in the regional shares of sectors in total regional employment. Regional employment growth differences, however, are driven by factors specific to a region, not by differences in the shares. Furthermore in all countries except for Romania and Slovakia, we find rather high values for the regional factors in the early stages of transition, while the importance of these regional factors tends to decline in the course of transition. The decline is especially pronounced in Germany, Poland, and Slovenia.[8] But also in Slovakia the importance of π diminished during the 1990s. In Romania, the importance of regional factors increases during the 1990s. Thus, in the early phase of transition, we can observe large differences in employment growth across regions, which can not be explained by sectoral composition of the economies. Apparently the regional organization of the economies changed after the fall of the planned economic organization, leading to massive lay-offs in some regions, independent of the sectors and industries predominant in these regions. In Bulgaria, the importance of regional factors declined from 1993 to 1996, it had a second (lower) maximum in 1998. It is interesting to note that the regional component attains its two maxima in times when GDP growth was positive. Thus, especially in times of booms, which coincide with times of expanding employment in Bulgaria, some re-

[8]The decline, however, is not reflected by an increase in importance of the other factors. It is rather the covariance term, which changes in size. So in years of high variance of π, the covariance between π, μ, and α is negative. In almost all cases, at least 2 of the 3 covariances were negative. In some years, they weigh heavily since overall variance is rather small. In those regions, in which π is high, the values for μ and α are small. This indicates that as a tendency growth was high holding constant the industry share a national average, if the region has a sectoral composition close to national average or smaller share in those sectors that grow faster than average.

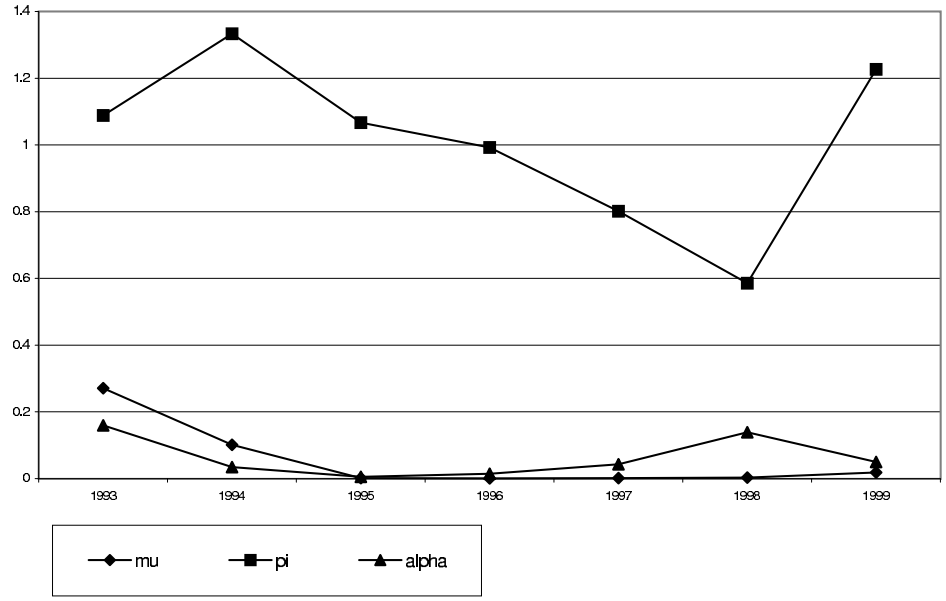

Figure 3: The evolution of variance shares over time in Hungary.

gions grow faster than others. Growth of the economy thus appears to be unevenly distributed spatially. This result is in line with Petrakos and Saratsis (2000), who show for Greece that regional inequalities are pro-cyclical, increasing in times of economic booms and decreasing in times of recessions. In Germany a similar pattern is visible, however not as strongly as in Bulgaria. In the German recession of 1993, regional factors became very important, also in 1996, when growth rates were under trend, the regional factors gained importance.

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

[9]The regression results are presented in Tables 18 to 23 in the appendix.

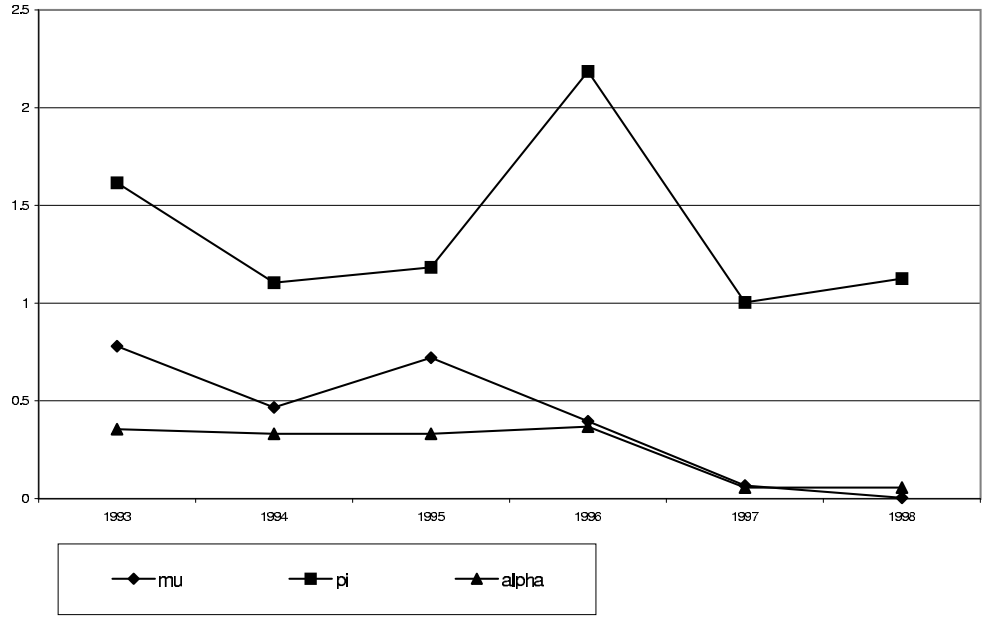

Figure 4: The evolution of variance shares over time in Poland.

5.1 Robustness Check and Interpretation

In the preceding exercise we assessed the role of sectoral employment composition in explaining regional employment growth differentials in six transition countries. We find that the sectoral mix does not play a major role in accounting for regional employment growth in Bulgaria, Germany, Hungary, Poland, Romania, Slovakia, and Slovenia. It is rather factors specific to a region which are important.

Since yearly growth rates also reflect strong business cycle movements, which are possibly unevenly distributed across space, we also performed the analysis, using 5 year growth rates.[10] Thus, we assess whether today's sectoral structure of a region has an influence on the relative performance of this region in the next 5 years. The

Variance share of	Bulgaria98	Hungary97	Poland97	Romania98	Slovakia96	Slovenia96
μ	0.000	0.116	0.123	0.053	0.029	0.358
π	0.954	0.945	0.855	0.971	0.813	0.647
α	0.005	0.049	0.406	0.027	0.122	0.036
$2cov$	0.040	-0.110	-0.385	-0.052	0.036	-0.041

Table 3: Results for shift-share analysis. Growth rates are 5 years, except for Slovenia and Slovakia, where data for only 4 year-growth were available.

results are summarized in Table 3. In all six investigated transition countries, the region specific factors represent the largest share of variance. The other components, however, also play a certain role. While the sectoral composition of the region plays virtually no role in Bulgaria, it is of high importance in Slovenia. The allocative

[10]For Slovakia and Slovenia, data availability limited our analysis to taking only 4 year growth rates.

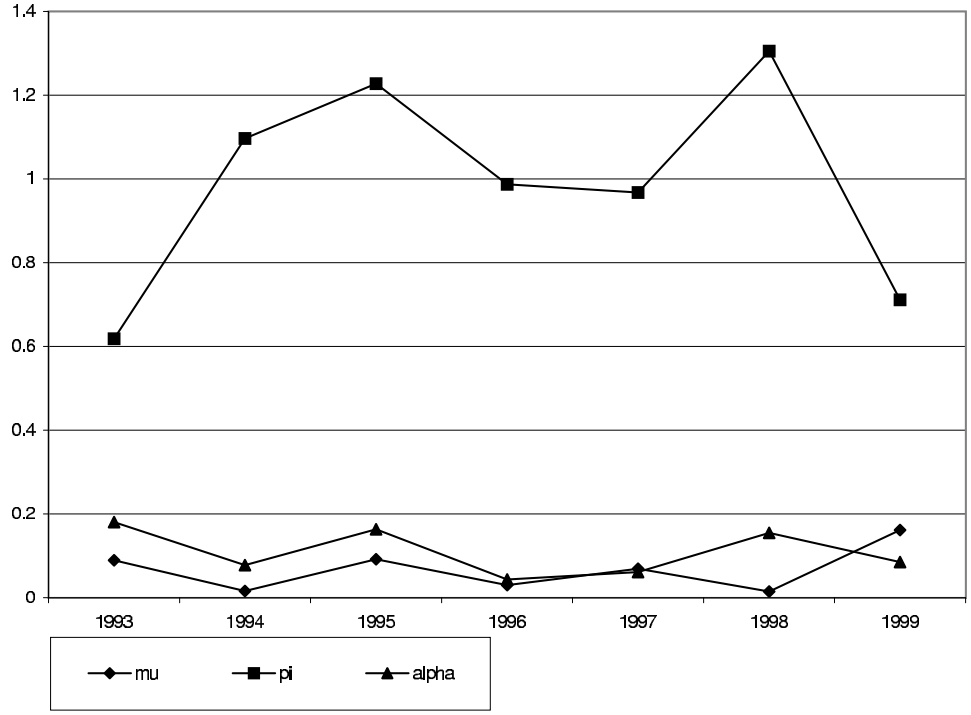

Figure 5: The evolution of variance shares over time in Romania.

aspects are important in Poland and Slovakia.

Highly aggregated data on a sectoral level may bias our results. Therefore, as a robustness check, the analysis with yearly growth rates was applied to Hungarian data with a 1-digit industrial classification with 12 sectors. The results stayed qualitatively the same, indicating that our high level of aggregation with 4 sectors does not drive our results. Furthermore for Bulgaria, Hungary and Romania, we implemented the shift-share analysis for a 2-digit classification of the manufacturing sector[11] (see Figures 35, 36 and 37 in the appendix.). The results are qualitatively identical to those presented above.

The analysis shows that in transition countries, the sector-composition of employment in a region does not explain regional growth patterns. The results of the shift-share analysis rather indicate that by far the largest part of regional employment growth differentials can be ascribed to the fact that the industries in a region grow slower or faster than the national average. This is surprising given the regional differentials of sectoral shares. These broadly defined sectors are possibly subject to quite different shocks leading on a regional level to diverging growth performances.[12]

[11]In Bulgaria, national statistics published distinguish between 14 different manufacturing sectors, in Romania 12 and in Hungary 8. The analysis of the data showed that indeed regions have quite different compositions of sectors. All three capital regions, e.g. have a very low share in agriculture and very high shares in the service sector, whereas the opposite is true for the country side. Also, the coefficient of variation of sectoral shares is high in all cases. For the other countries these data were not readily available.

[12]Consider the following thought experiment: The occurrence of a particularly long and strong

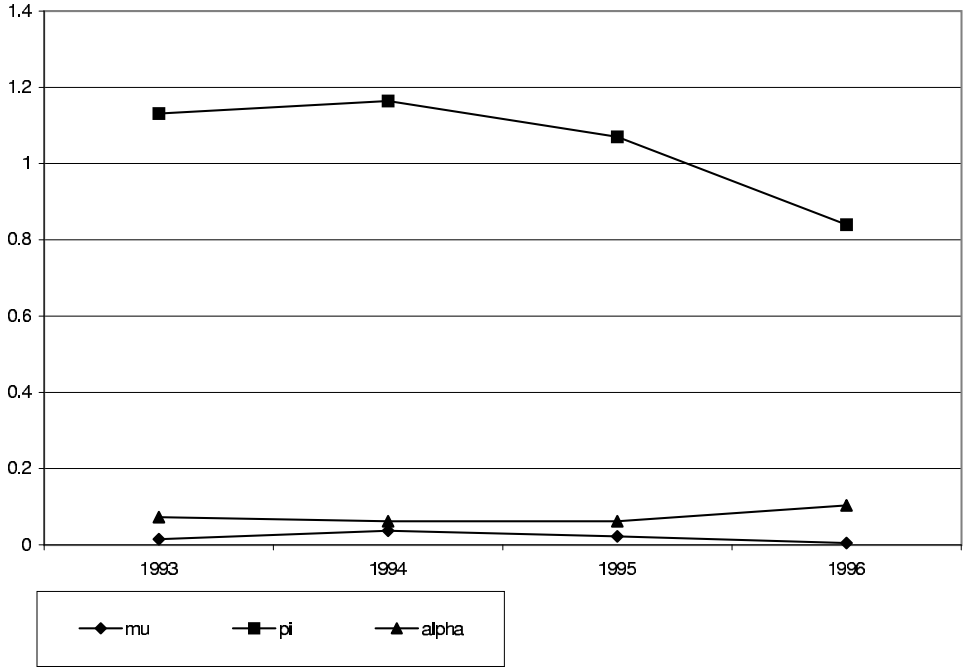

Figure 6: The evolution of variance shares over time in Slovakia.

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

An additional stylized fact is the especially large importance of region-specific factors in early stages of transition, with a subsequent decline. The transition and reorganization of the economies was thus driven by regional factors, and not by the industrial composition of regions. In Bulgaria and Germany, the importance of regional factors also seems to positively correlate with aggregate fluctuation of the economy.

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winter should impact on the production of the agricultural sector, which should lead to significant lay-offs in employment. Regions with a high agricultural sector should be affected much more by this winter than regions with virtually no agricultural sector.

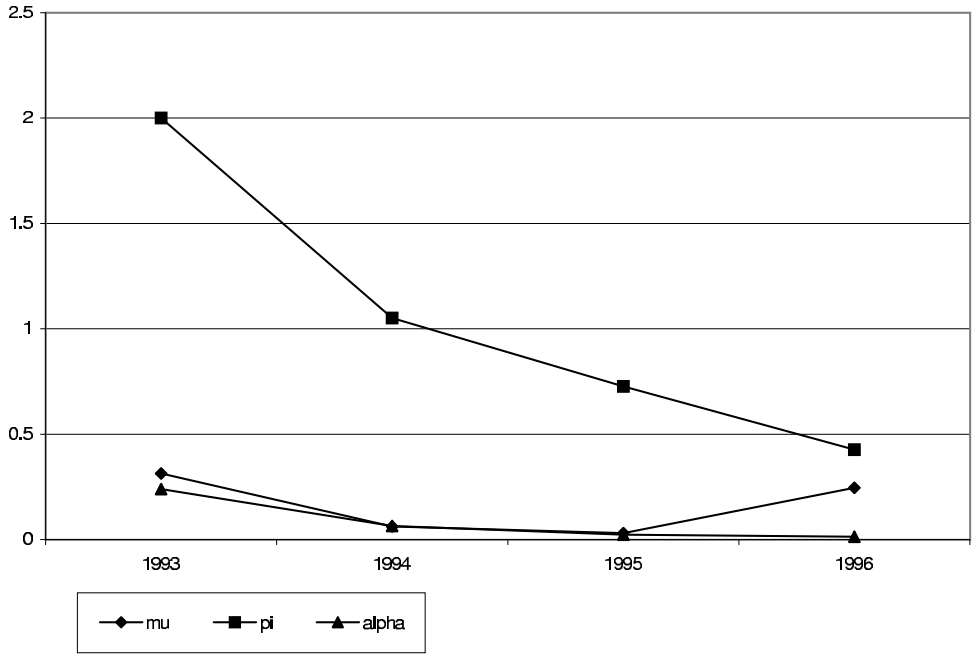

Figure 7: The evolution of variance shares over time in Slovenia.

6 Conclusions and Policy Implications

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

1. We find both commonalities and particularities in the patterns of regional employment growth in the six above mentioned transition countries. Over the period 1990-1999 the industrial sector has declined everywhere with the exceptions of Slovakia and Poland, most strongly in Bulgaria and Romania, while the service sector has grown in Bulgaria and especially in Hungary and Slovenia. Bulgaria and Romania have experienced a growing share of employment in agriculture. Regional disparities in employment have been increasing in Bulgaria and Hungary while in the other investigated countries have remained constant.

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

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

3. Our findings suggest that there is no scope for an industrial policy to foster a specific industrial mix in promoting regional growth in the six transition countries analyzed here. In this respect we differ from Ghatak and Roberts (1997), who calibrate a CGE model for Poland and advocate on the basis of this model to support certain key industries. This industrial policy will not be successful in reducing regional differences. Regions lagging behind suffer from an uniform employment growth gap across sectors. This suggest the need for (regional) policy measures to increase employment opportunities and attractiveness in these regions such as upgrading of infrastructure and human capital.

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A Appendix

A.1 Macroeconomic Background

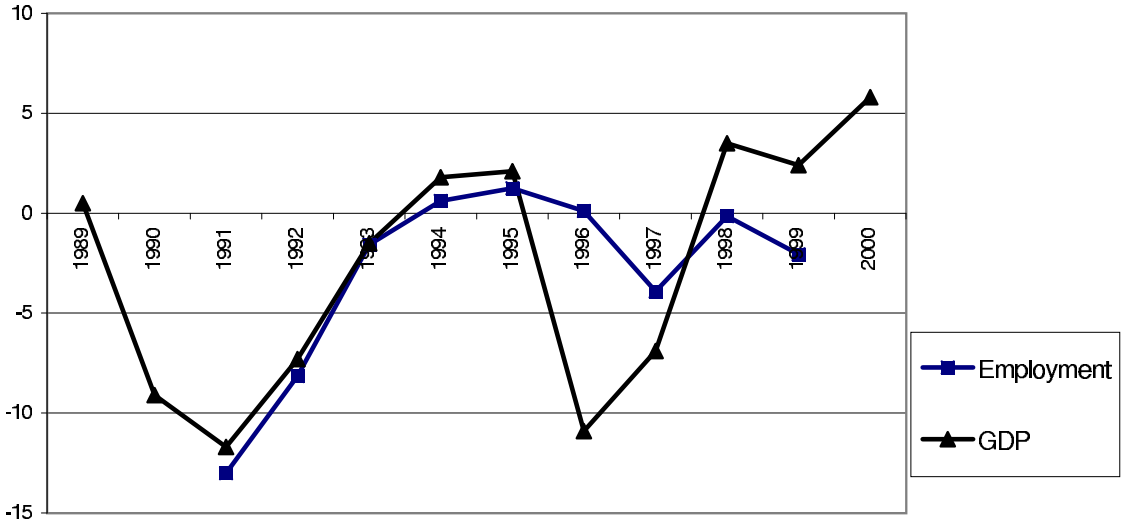

Figure 8: Real GDP and employment growth in Bulgaria.

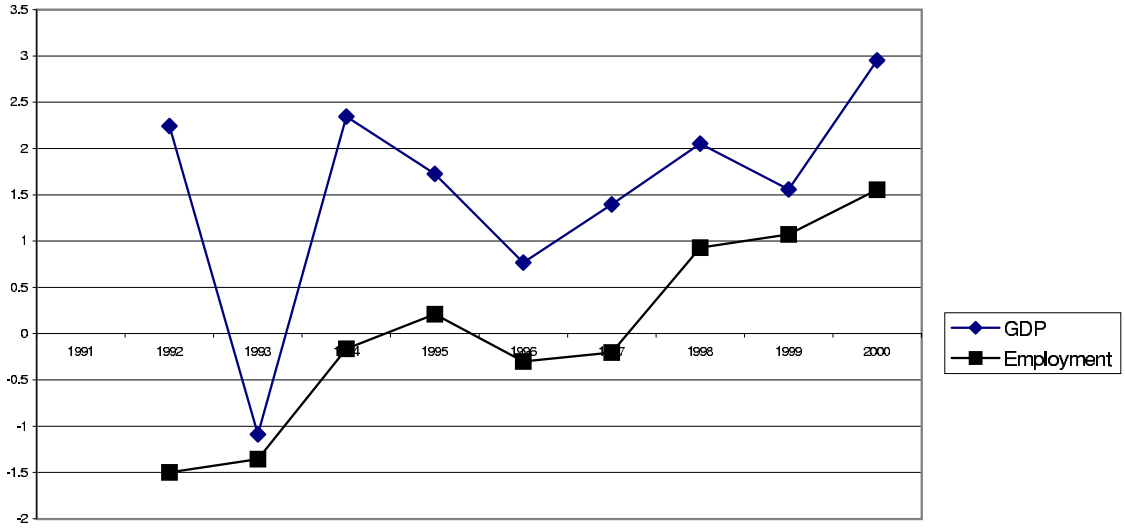

Figure 9: Real GDP and employment growth in Germany.

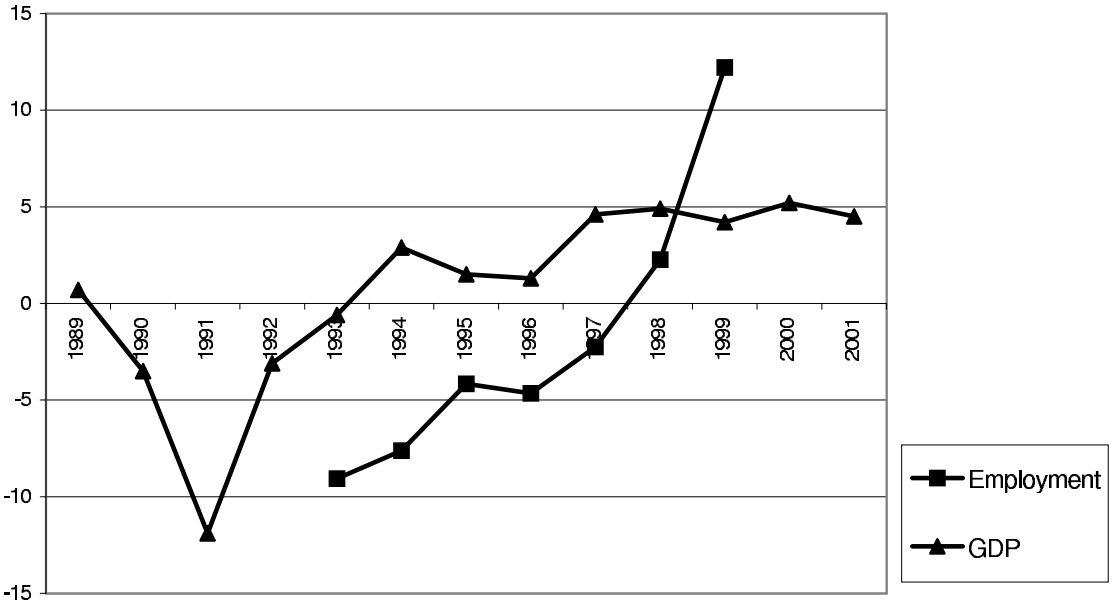

Figure 10: Real GDP and employment growth in Hungary.

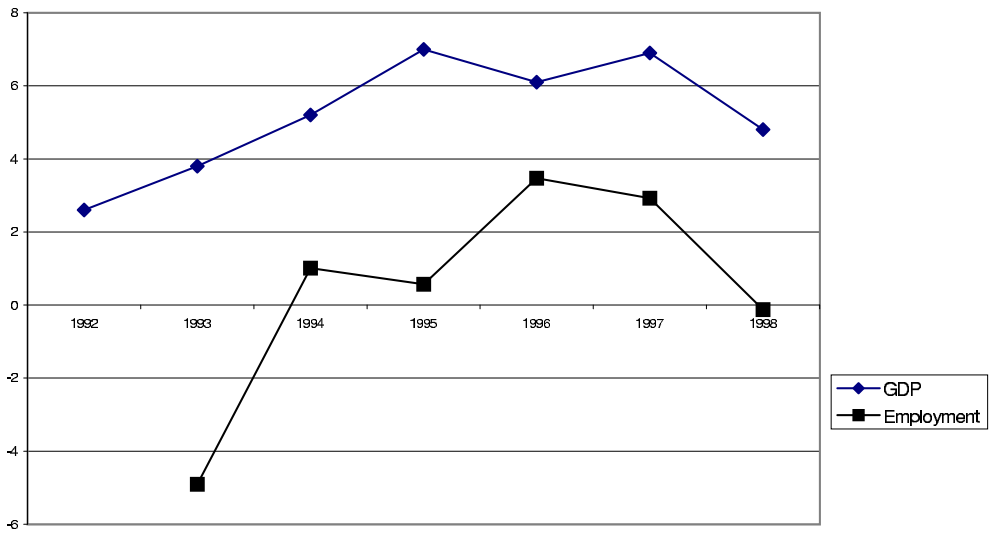

Figure 11: Real GDP and employment growth in Poland.

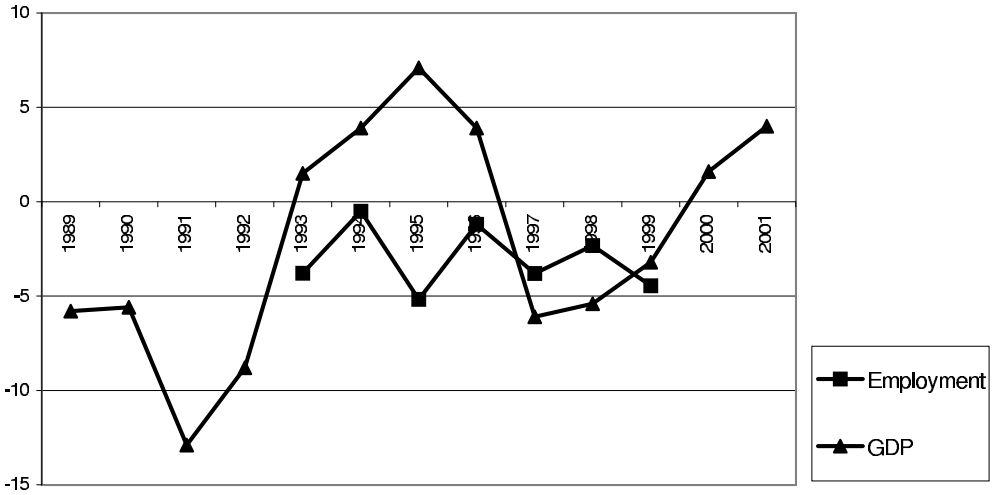

Figure 12: Real GDP and employment growth in Romania in percent.

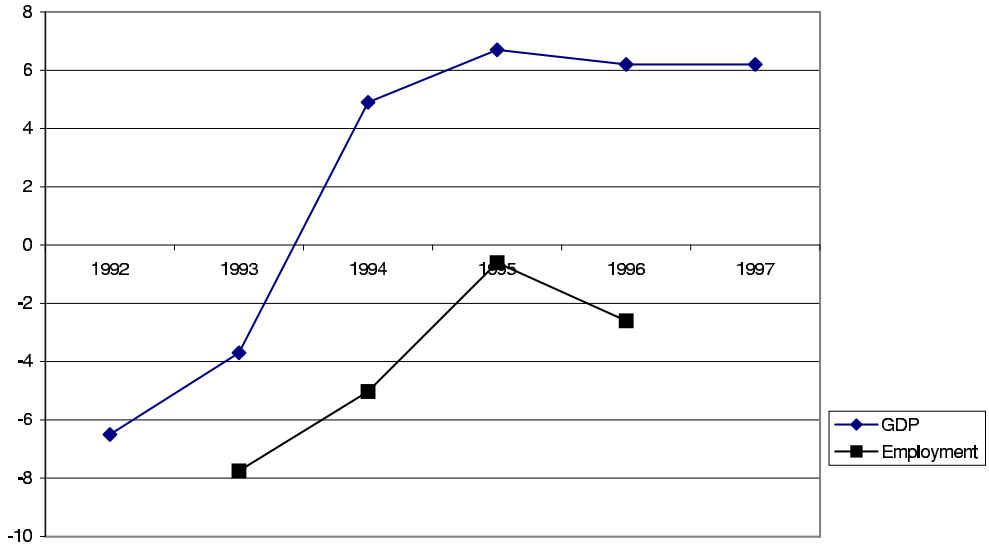

Figure 13: Real GDP and employment growth in Slovakia.

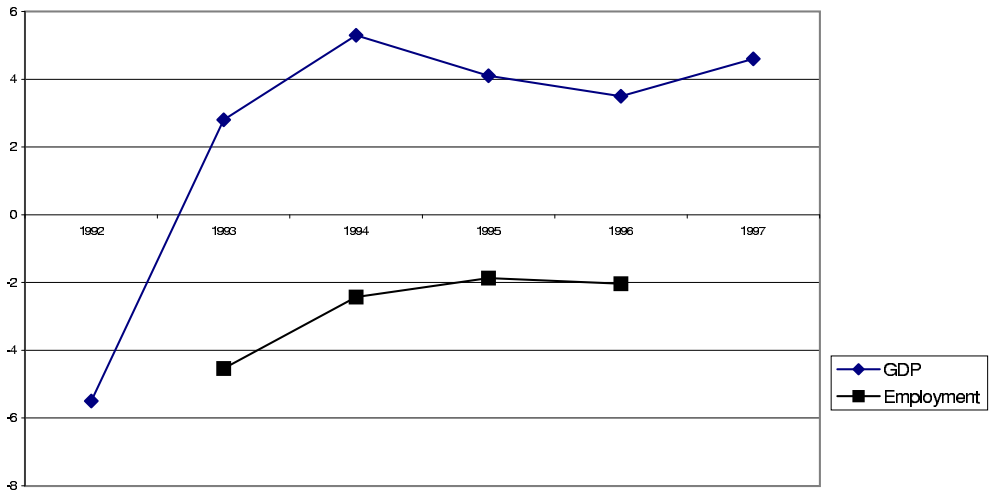

Figure 14: Real GDP and employment growth in Slovenia.

A.2 Descriptive Statistics

Variable	Obs	Mean	Std. Dev.	Min	Max	coefficient of variation
Total regional employment	278	116933.4	87677.76	41921	580041	75.0
Sectors						
Agriculture	278	27012	11566	2125	70646	42.8
Industry	278	42706	34422	9180	260037	80.6
Service	278	47216	54289	17758	382675	115.0
Regions	28					
Shares						
Agriculture	278	0.27	0.09	0.01	0.48	34.7
Industry	278	0.36	0.08	0.18	0.59	23.3
Service	278	0.37	0.06	0.28	0.73	17.4
Growth						
Total regional employment	248	-0.03	0.16	-0.78	1.00	-514.4
Agriculture	250	0.07	0.78	-0.92	11.76	1126.5
Industry	250	-0.08	0.18	-0.84	1.03	-232.3
Service	250	-0.01	0.17	-0.85	1.36	-1325.0

Table 4: Summary statistics for regional employment, sectoral employment shares and (sectoral) employment growth in Bulgaria.

Variable	Obs	Mean	Std. Dev.	Min	Max	Coeff. of variation
Total regional employment	160	2355381	2134256	379264	8271355	90.6
Sector						
Agriculture	160	70850	68997.99	1322	329559	97.4
Industry	160	579881.2	638703.2	73759	2543148	110.1
Construction	160	185750	131973	19240	498956	71.0
Service	160	1518900	1337597	281823	5721569	88.1
Share						
Agriculture	160	0.03	0.02	0.00	0.12	64.1
Industry	160	0.22	0.06	0.11	0.36	27.9
Construction	160	0.09	0.04	0.04	0.19	45.9
Service	160	0.66	0.06	0.51	0.82	9.7
Growth						
Total regional employment	142	0.00	0.03	-0.15	0.03	-778.8
Agriculture	142	-0.05	0.08	-0.45	0.13	-177.9
Industry	142	-0.04	0.06	-0.40	0.04	-160.6
Construction	142	0.00	0.05	-0.11	0.16	6856.3
Service	142	0.01	0.01	-0.04	0.04	105.2

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

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

Table 6: Summary statistics for regional employment, sectoral employment shares and (sectoral) employment growth in Hungary.

Variable	Obs	Mean	Std. Dev.	Min	Max	coeff. of variation
Total regional employment	343	313204.4	243424	97602.46	1595700	77.7204918
Sectors						
agriculture	343	88073	42465.94	24300	232300	48.2169765
industry	343	84337	102338	13600	737100	121.3
service	343	140795	146024	28667	882000	103.7
Regions	49					
Shares						
agriculture	343	0.34	0.16	0.04	0.69	46.22
industry	343	0.24	0.08	0.08	0.49	31.47
service	343	0.41	0.11	0.19	0.75	26.44
Growth						
Total regional employment	294	0.004	0.050	-0.217	0.172	1245.6
agriculture	294	0.025	0.172	-0.489	0.958	692.9
industry	294	0.053	0.115	-0.154	0.586	218.8
service	294	-0.004	0.224	-0.679	1.213	-5890.6

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

Variable	Obs	Mean	Std. Dev.	Min	Max	coeff. of variation
Total regional employment	328	230.7	139.9	88	1201	60.6
Sectors						
Agriculture	328	83.8	28.2	32.4	159.3	33.6
Industry	328	65.5	52.1	10.8	417.1	79.6
Construction	328	11.7	15.2	1.9	141.9	130.2
Service	328	69.6	73.9	21.9	597.8	106.1
Regions	41					
Shares						
Agriculture	328	0.408	0.122	0.043	0.653	29.9
Industry	328	0.270	0.081	0.107	0.507	30.2
Construction	328	0.045	0.018	0.015	0.129	41.2
Service	328	0.278	0.063	0.169	0.560	22.7
Growth						
Total regional employment	287	-0.025	0.045	-0.180	0.131	-176.0
Agriculture	287	0.002	0.061	-0.294	0.338	2942.6
Industry	287	-0.057	0.098	-0.342	0.509	-172.5
Construction	287	-0.031	0.314	-0.705	3.258	-1025.1
Service	287	-0.018	0.110	-0.361	0.589	-619.8

Table 8: Summary statistics for regional employment, sectoral employment shares and (sectoral) employment growth in Romania.

Variable	Obs	Mean	Std. Dev.	Min	Max	Coeff. of variation
Total regional employment	190	41537.93	43415.27	7854	380003	104.5
Sector						
Agriculture	190	4834.3	2107.6	293.0	9611.0	43.6
Industry	190	14168.8	9526.2	2048.0	68782.0	67.2
Service	190	22534.8	35540.2	1809.0	319161.0	157.7
Regions	39					
Share						
Agriculture	190	0.16	0.09	0.00	0.58	55.8
Industry	190	0.36	0.09	0.15	0.64	25.6
Service	190	0.48	0.09	0.18	0.84	19.0
Growth						
Total regional employment	152	-0.04	0.16	-0.49	0.81	-386.3
Agriculture	152	0.00	0.57	-0.57	5.03	23459.3
Industry	152	-0.03	0.13	-0.55	0.76	-387.7
Service	152	-0.01	0.33	-0.67	3.09	-2567.6

Table 9: Summary statistics for regional employment, sectoral employment shares and (sectoral) employment growth in Slovakia.

Variable	Obs	Mean	Std. Dev.	Min	Max	Coeff. of variation
Total regional employment	84	50427.99	46468.98	12748.00	188881.00	92.1
Sectors						
Agriculture	60	1055.18	805.47	52.00	3346.00	76.3
Industry	60	21250.03	15028.97	5978.00	61419.00	70.7
Service	60	28549.47	32100.17	5535.00	128348.00	112.4
Regions	12					
Shares						
Agriculture	60	0.02	0.02	0.00	0.06	61.9
Industry	60	0.46	0.11	0.22	0.63	23.2
Service	60	0.51	0.11	0.36	0.78	21.5
Growth						
Total regional employment	72	-0.02	0.02	-0.06	0.04	-126.1
Agriculture	48	-0.09	0.09	-0.40	0.05	-97.8
Industry	48	-0.05	0.04	-0.15	0.07	-69.3
Service	48	0.00	0.03	-0.08	0.16	-4044.5

Table 10: Summary statistics for regional employment, sectoral employment shares and (sectoral) employment growth in Slovenia.

A.3 Coefficient of Variation

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

Table 11: Evolution of the coefficient of variation of sectoral employment, sectoral employment shares and (sectoral) employment growth for Bulgaria.

Variable	1991	1992	1993	1994	1995	1996	1997	1998	1999	2000
Total reg. empl.	90.3	93.6	93.8	92.9	92.3	92.6	93.3	93.9	94.5	95.5
Sector										
Agriculture	85.9	98.5	103.2	102.9	101.3	98.5	97.7	98.0	99.2	99.6
Industry	102.8	111.9	113.6	113.5	113.6	114.3	114.6	115.0	115.2	115.6
Construction	78.9	76.4	73.6	71.3	70.3	70.3	70.6	71.9	72.6	74.2
Service	88.5	89.6	89.9	89.7	89.4	89.8	90.7	91.2	91.9	92.9
Share										
Agriculture	73.9	61.5	58.6	58.2	57.5	57.3	57.0	58.5	58.2	58.1
Industry	21.8	23.1	25.2	26.3	27.4	27.7	27.9	28.7	29.1	28.7
Construction	25.8	37.8	44.6	48.6	50.9	51.2	51.0	48.3	46.5	44.5
Service	12.7	9.7	9.1	8.8	8.9	8.6	8.5	8.5	8.2	8.1
Growth										
Total reg. empl.		-188.6	-49.7	403.7	306.5	-144.0	-170.8	172.4	113.6	216.3
Agriculture		-110.8	-74.8	-40.9	-118.2	-46.5	-561.8	482.7	-222.2	1245.9
Industry		-127.4	-54.8	-44.3	-59.9	-49.2	-64.8	-508.5	-143.6	-559.3
Construction		110.3	136.1	107.9	215.4	-52.5	-50.0	-107.3	-103.3	-127.7
Service		225.2	166.7	71.4	85.4	72.8	236.5	68.9	50.0	91.2

Table 12: Evolution of the coefficient of variation of sectoral employment, sectoral employment shares and (sectoral) employment growth for Germany.

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

Table 13: Evolution of the coefficient of variation for Hungary.

Variable	1992	1993	1994	1995	1996	1997	1998
Total regional employment	76.05	78.57	79.73	79.64	78.13	78.05	78.24
Sectors							
Agriculture	49.55	42.28	49.55	42.28	51.57	51.42	51.80
Industry	126.82	128.69	126.82	128.69	117.84	115.62	111.57
Service	93.52	105.36	106.14	109.68	104.87	104.48	107.40
Shares							
Agriculture	46.24	43.10	46.75	41.91	47.99	48.64	48.95
Industry	32.31	30.68	32.35	32.58	29.21	27.88	27.34
Service	20.44	30.21	23.90	27.22	25.37	25.28	25.57
Growth							
Total regional employment		-94.42	580.41	512.86	75.49	87.39	-1986.13
Agriculture		91.68	-77.24	91.68	-173.02	276.10	-103.83
Industry		61.39	-58.26	61.39	65.12	169.94	-227.03
Service		-81.75	125.55	-98.59	270.37	77.15	395.97

Table 14: Evolution of the coefficient of variation of sectoral employment, sectoral employment shares and (sectoral) employment growth for Poland.

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

Table 15: Evolution of the coefficient of variation for Romania.

Variable	1992	1993	1994	1995	1996
Total regional employment	128.8	74.7	76.6	77.6	143.6
Sectors					
Agriculture	45.7	39.8	42.0	41.8	43.2
Industry	69.1	59.3	59.0	59.4	88.8
Service	199.0	111.9	114.3	114.3	207.6
Shares					
Agriculture	65.5	50.7	50.7	50.5	55.6
Industry	28.0	24.9	24.4	23.4	26.6
Service	24.6	16.3	16.4	16.2	20.4
Growth					
Total regional employment		274.6	-58.0	-255.4	-146.7
Agriculture		397.8	-61.4	-172.8	1112.8
Industry		1171.5	-98.0	1036.0	-189.3
Service		250.0	-124.0	-1849.3	-129.0

Table 16: Evolution of the coefficient of variation of sectoral employment, sectoral employment shares and (sectoral) employment growth for Slovakia.

Variable	1992	1993	1994	1995	1996
Total regional employment	93.2	93.1	93.5	94.9	96.7
Sectors					
Agriculture	75.7	76.5	77.8	79.1	77.0
Industry	73.3	72.8	72.0	72.0	72.1
Service	116.3	114.3	115.2	117.3	119.1
Shares					
Agriculture	59.6	57.3	62.9	69.9	69.0
Industry	23.1	23.5	23.4	23.9	24.7
Service	24.1	22.2	21.4	21.3	20.8
Growth					
Total regional employment		-36.4	-63.4	-70.4	-60.7
Agriculture		-38.9	-120.2	-86.0	-30.5
Industry		493.6	-530.7	-209.1	517.2
Service		-36.4	-63.4	-70.4	-60.7

Table 17: Evolution of the coefficient of variation of sectoral employment, sectoral employment shares and (sectoral) employment growth for Slovenia.

A.4 Sectoral Shares

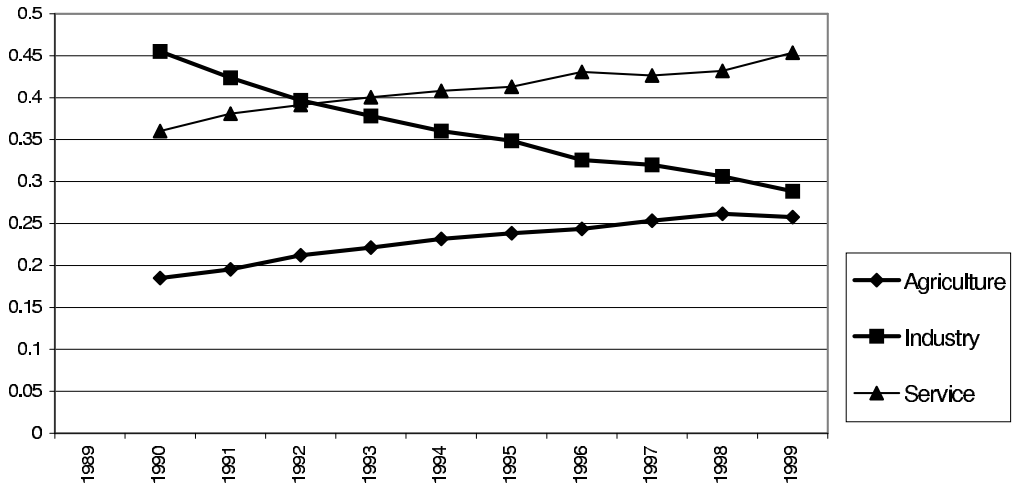

Figure 15: Sectoral shares in total employment in Bulgaria.

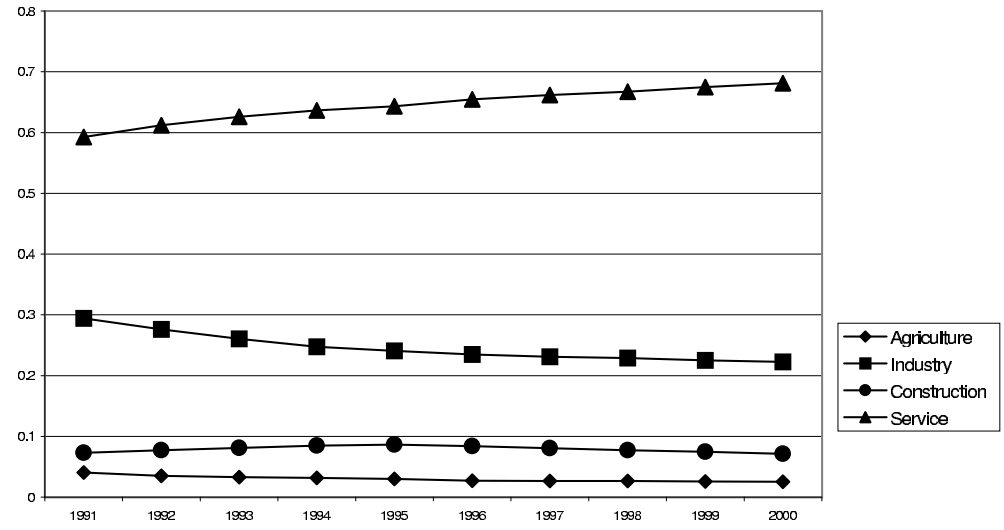

Figure 16: Sectoral shares in total employment in Germany.

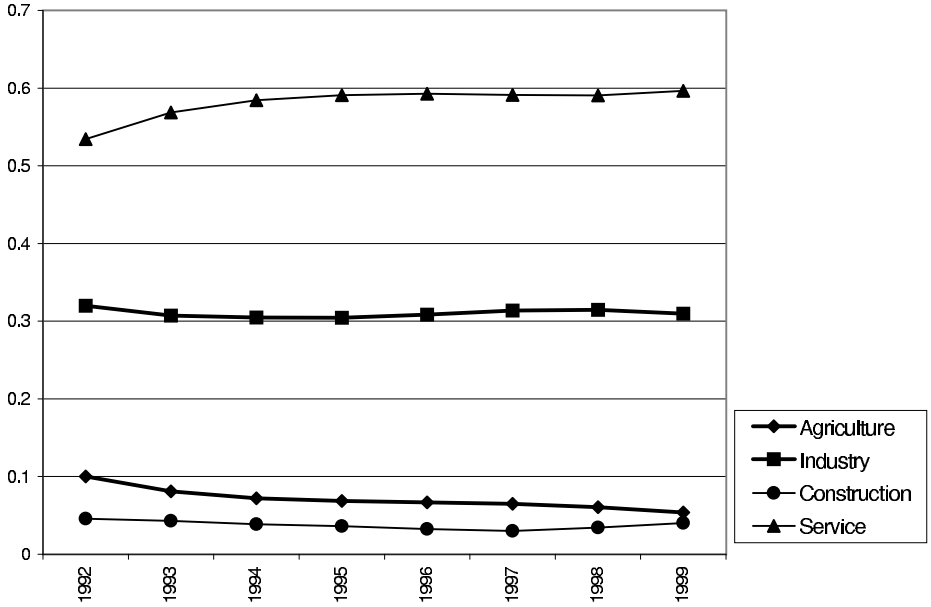

Figure 17: Sectoral shares in employment in Hungary.

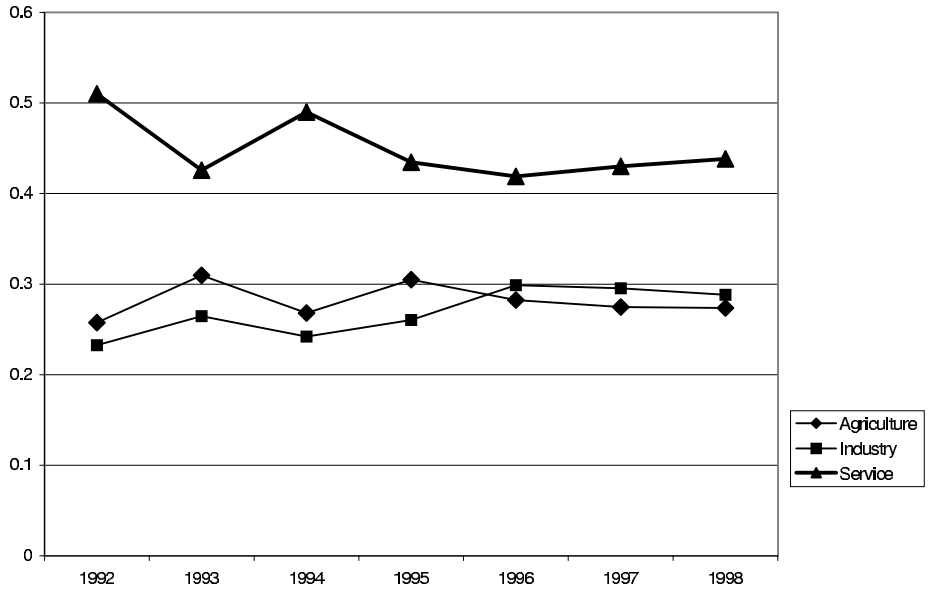

Figure 18: Sectoral shares in total employment in Poland.

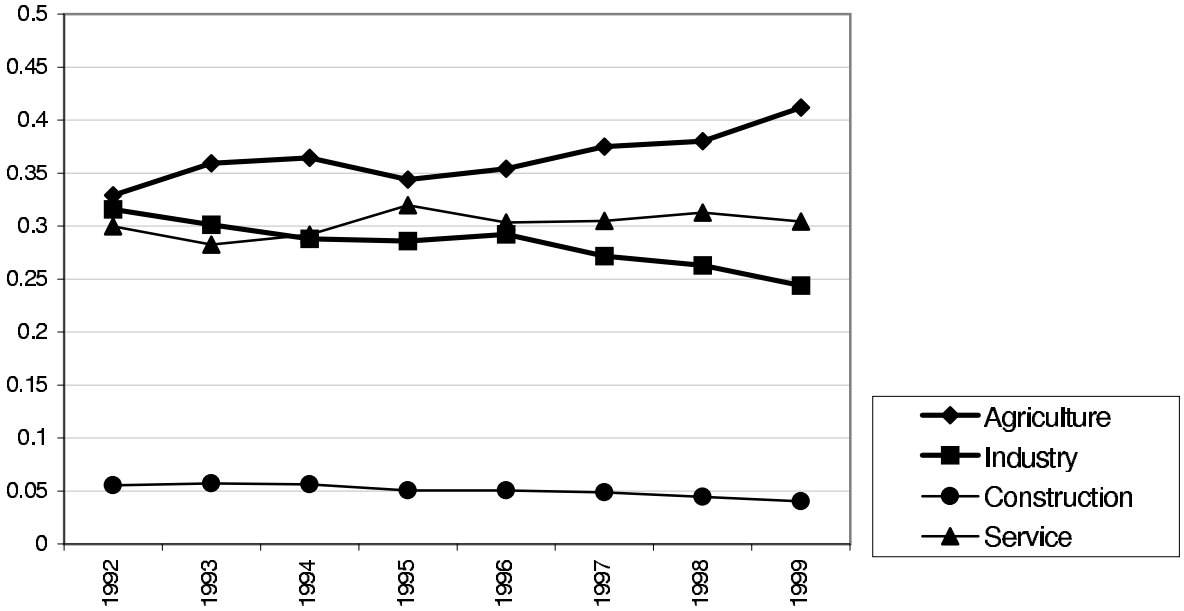

Figure 19: Sectoral shares in employment in Romania.

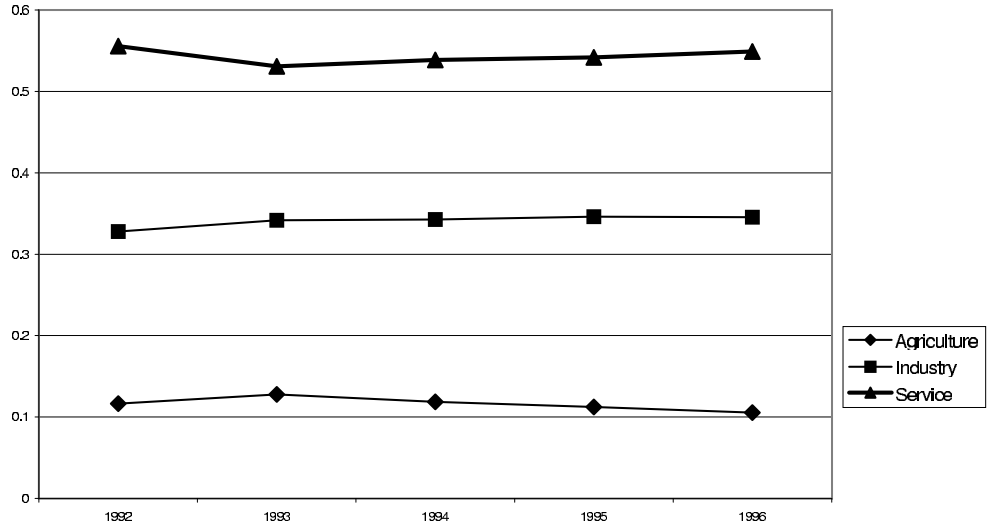

Figure 20: Sectoral shares in total employment in Slovakia.

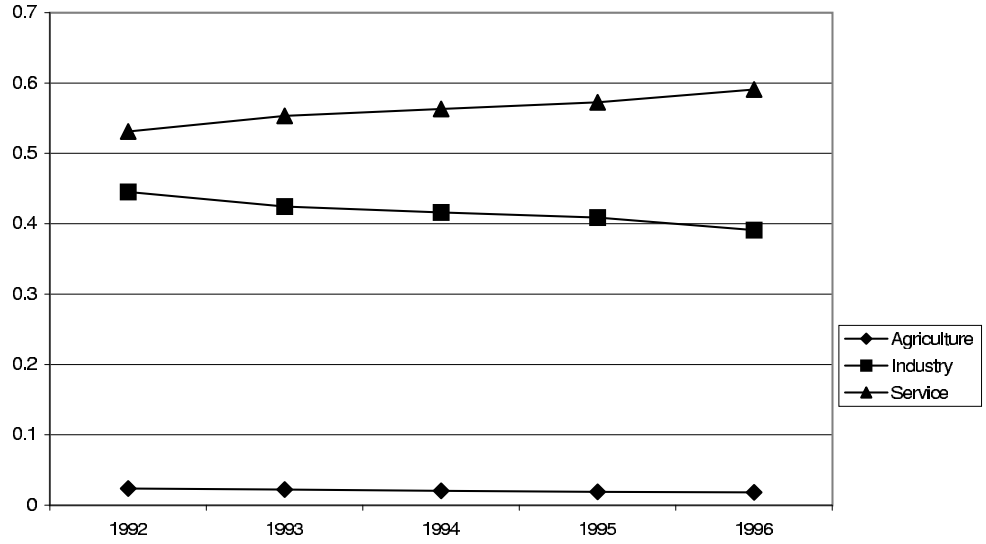

Figure 21: Sectoral shares in total employment in Slovenia.

A.5 Value Added Shares

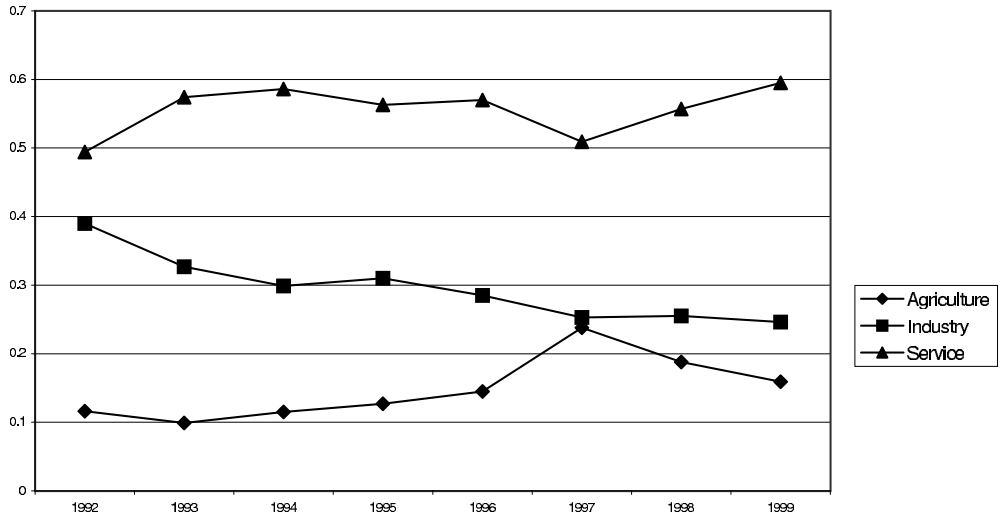

Figure 22: Sectoral shares in value added in Bulgaria.

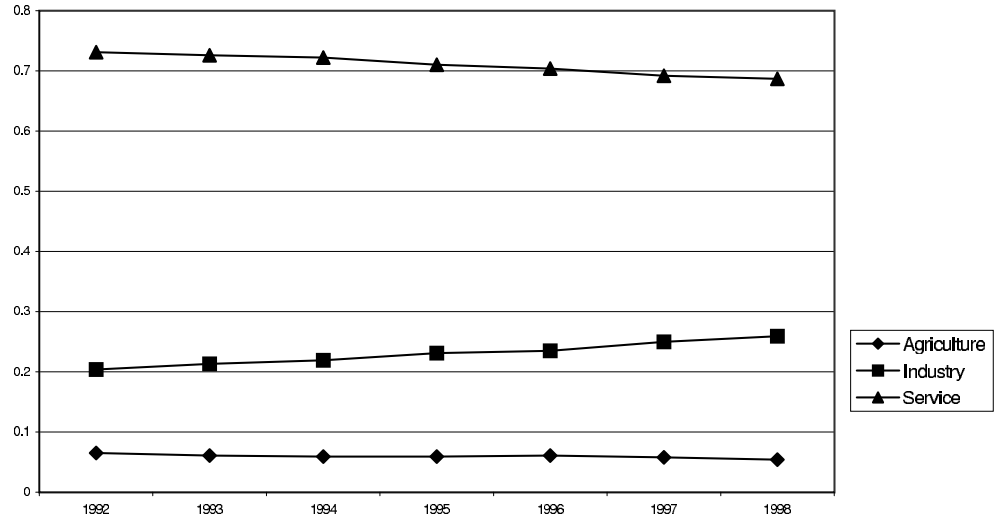

Figure 23: Sectoral shares in value added in Hungary.

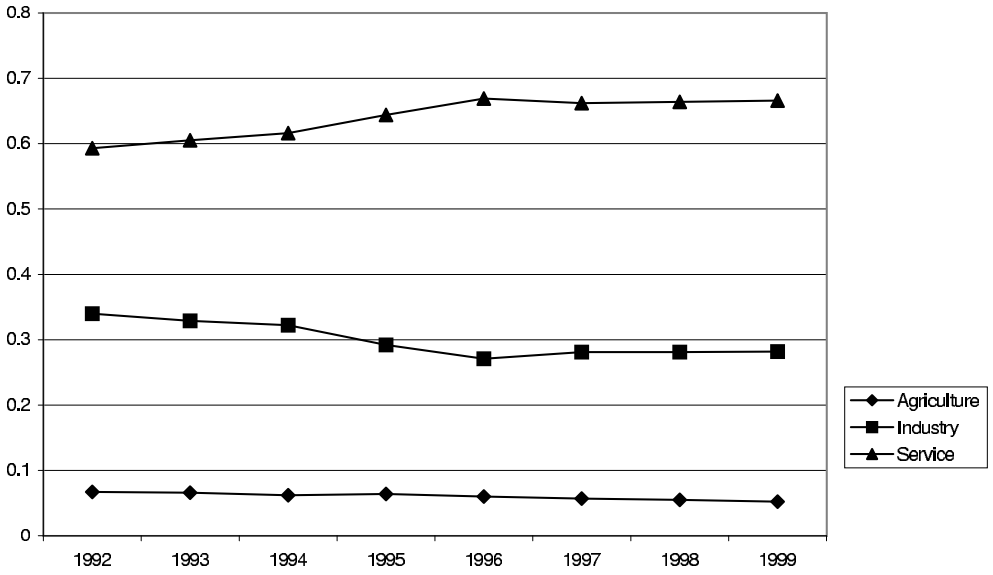

Figure 24: Sectoral shares in value added in Poland.

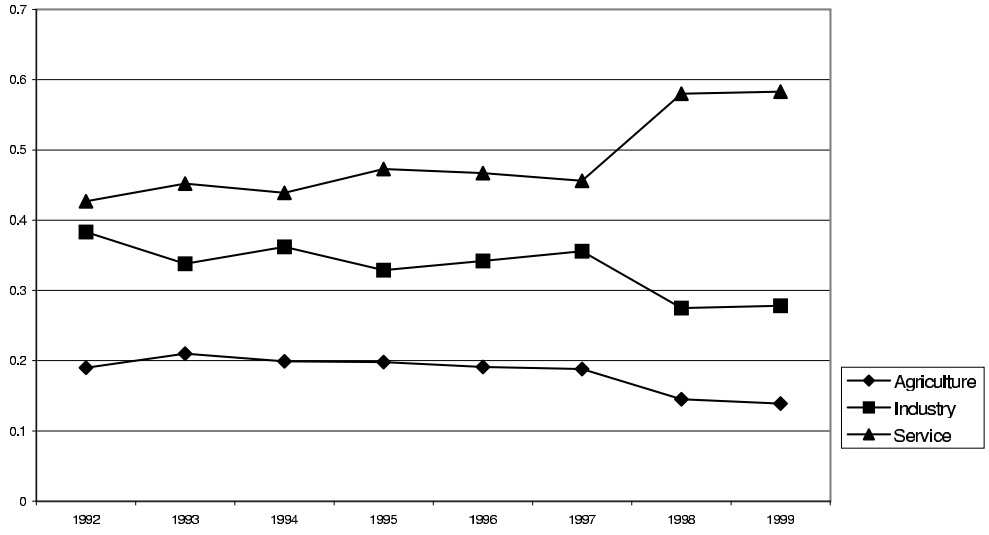

Figure 25: Sectoral shares in value added in Romania.

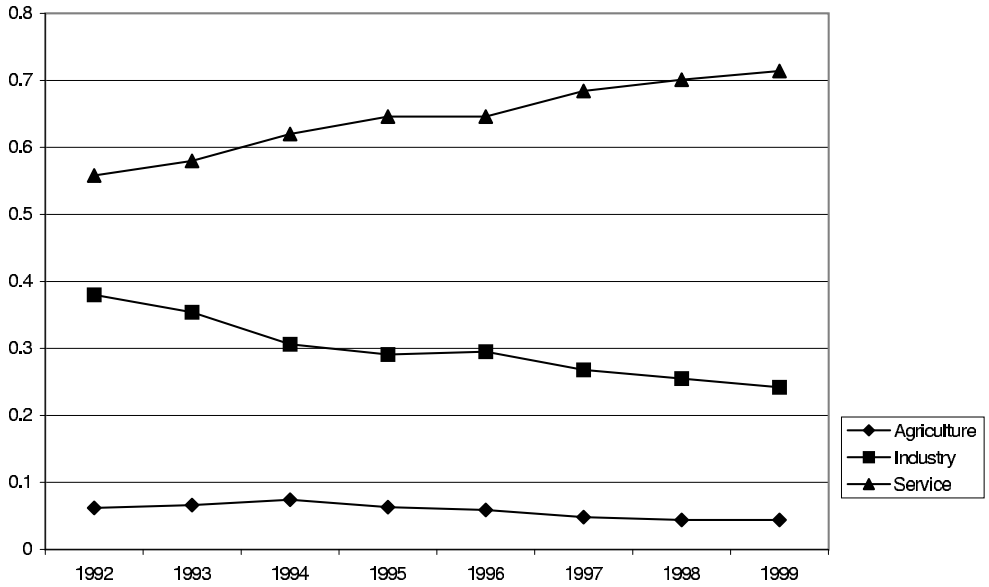

Figure 26: Sectoral shares in value added in Slovakia.

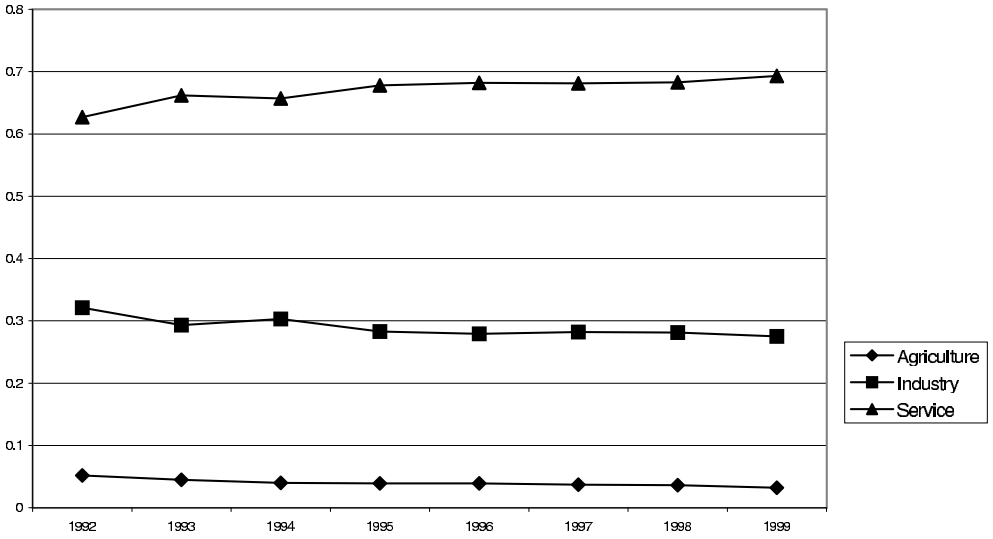

Figure 27: Sectoral shares in value added in Slovenia.

A.6 Sectoral Growth Rates

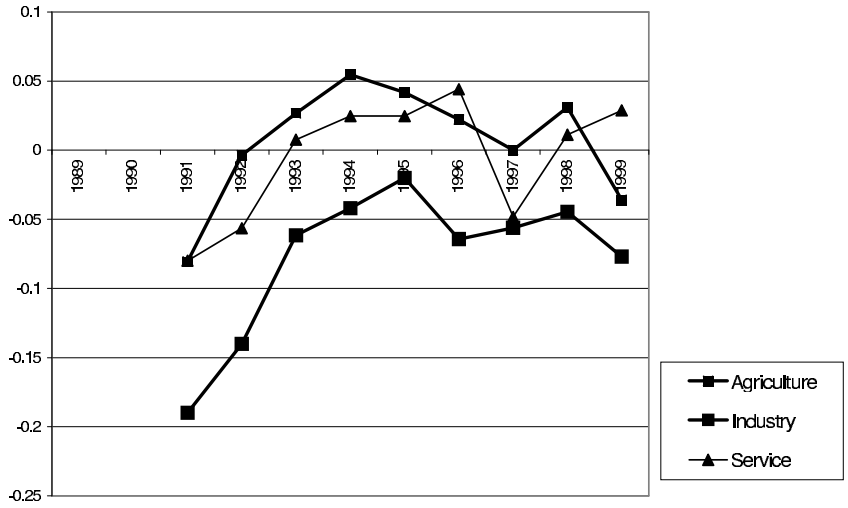

Figure 28: Sectoral employment growth in Bulgaria.

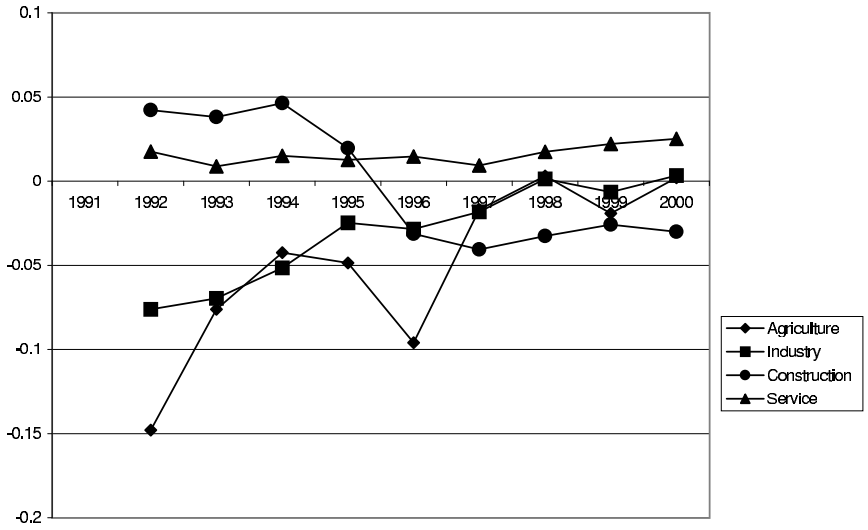

Figure 29: Sectoral employment growth in Germany.

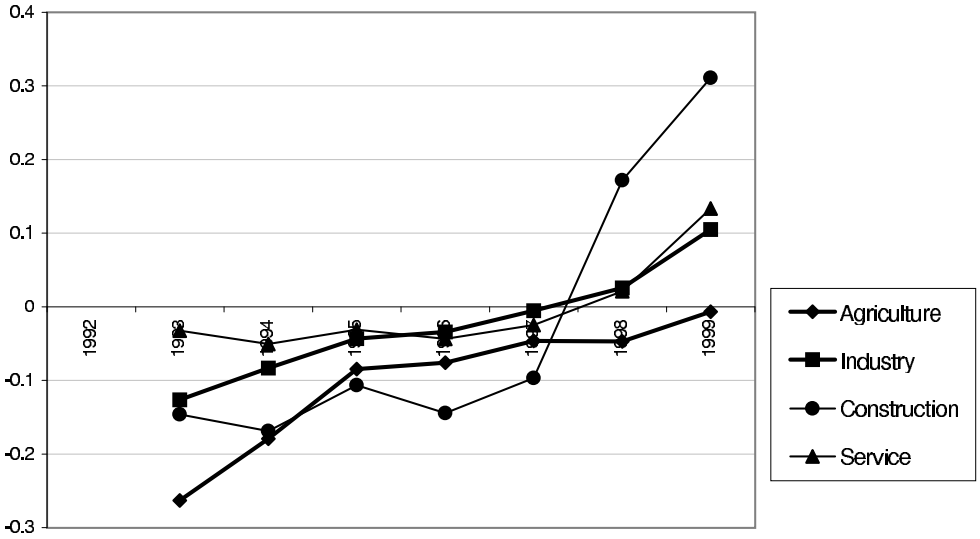

Figure 30: Sectoral employment growth in Hungary.

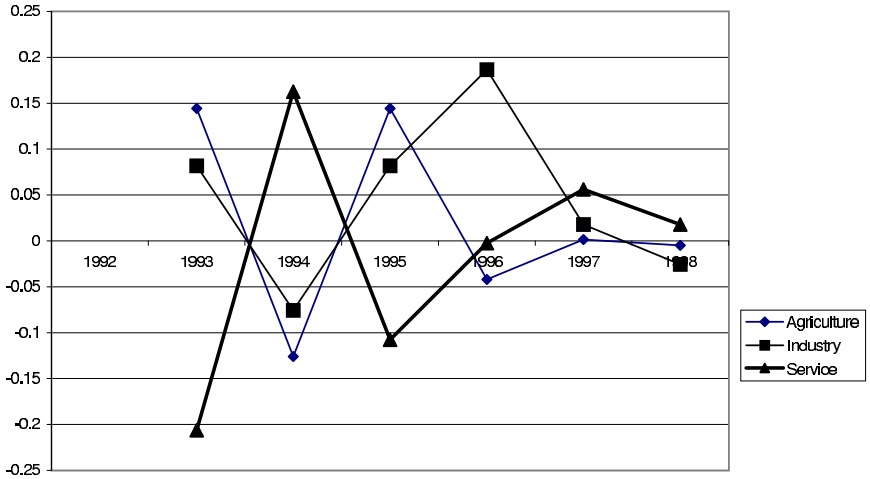

Figure 31: Sectoral employment growth in Poland.

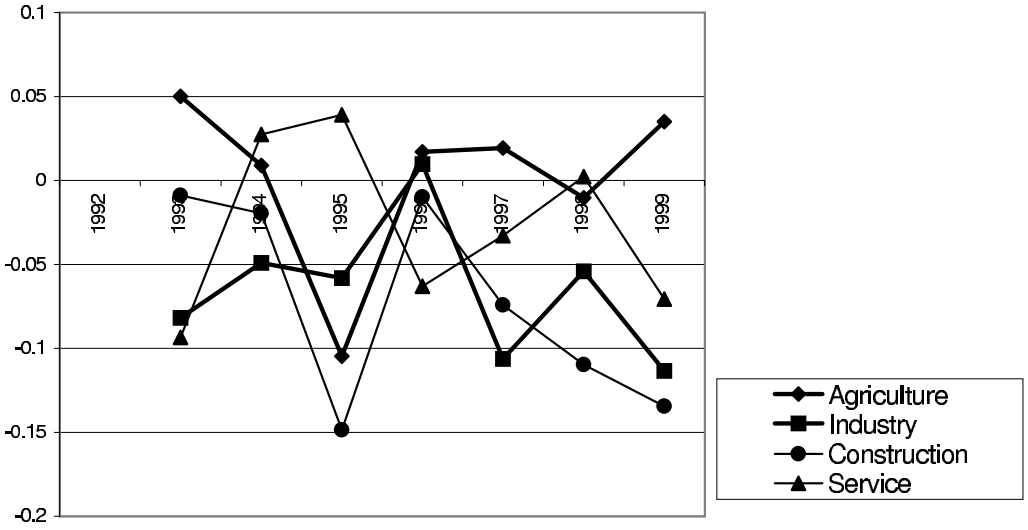

Figure 32: Sectoral employment growth in Romania.

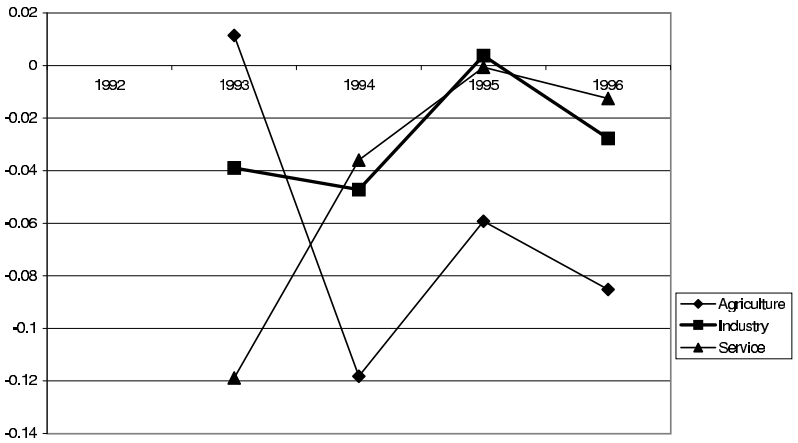

Figure 33: Sectoral employment growth in Slovakia.

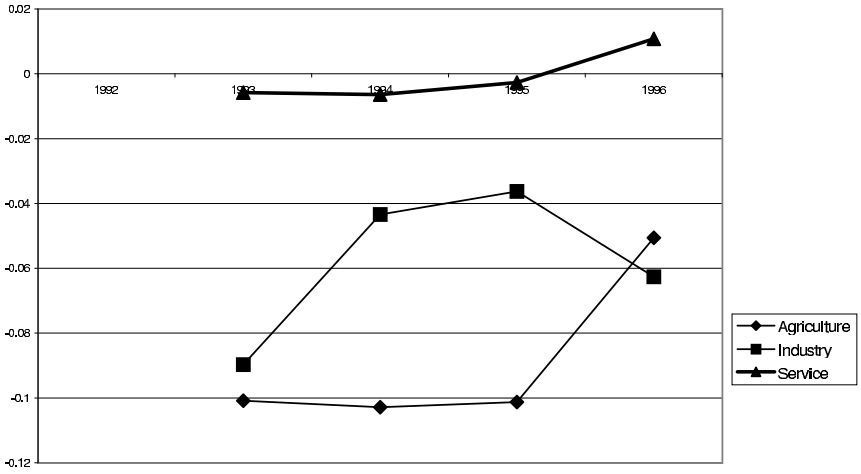

Figure 34: Sectoral employment growth in Slovenia.

A.7 Shift-Share Results

A.7.1 Manufacturing Sector

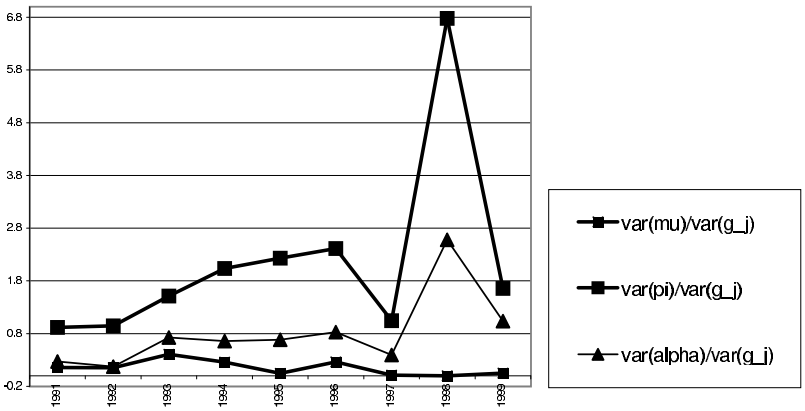

Figure 35: The evolution of variance shares over time in Bulgaria for the manufacturing sector.

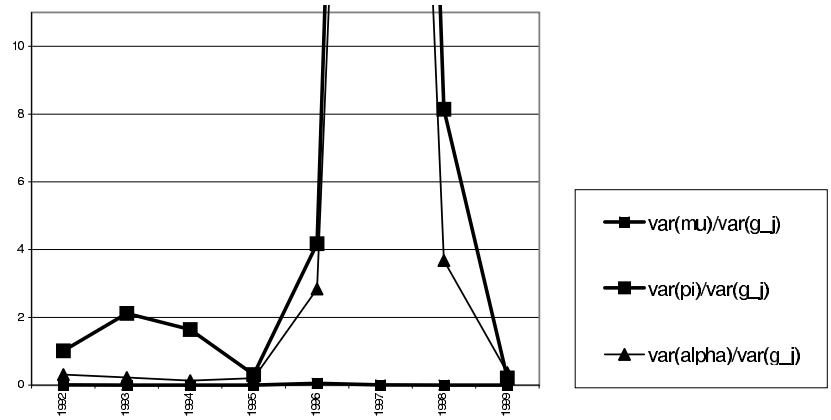

Figure 36: The evolution of variance shares over time in Romania for the manufacturing sector.

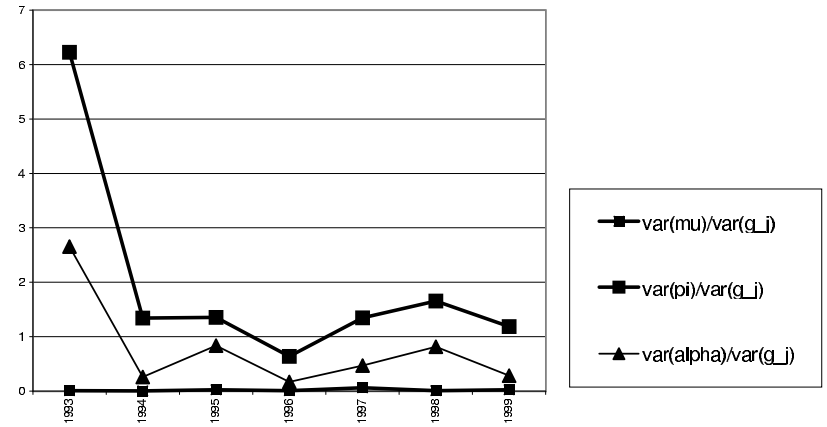

Figure 37: The evolution of variance shares over time in Hungary for the manufacturing sector.

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

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

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

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

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

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

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

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

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

Table 18: Regression results of g_j on the respective variable, t-values in parenthesis: Bulgaria.

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

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

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

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

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

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

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

Table 19: Regression results of g_j on the respective variable, t-values in parenthesis: Hungary.

1993	const.	variable	R
mue	0.027	0.020	0.0012
	(0.24)	(3.87)	
pi	0.120	0.021	0.0763
	(1.97)	(4.49)	
alpha	0.159	0.020	0.0505
	(1.58)	(4.05)	
1994	const.	variable	R
mue	0.072	0.029	0.0006
	(0.17)	(1.95)	
pi	0.648	0.005	0.8656
	(17.39)	(1.01)	
alpha	-1.227	0.034	0.4215
	(-5.85)	(3.22)	
1995	const.	variable	R
mue	0.318	0.010	0.0662
	(1.83)	(1.77)	
pi	0.286	0.012	0.1978
	(3.40)	(2.48)	
alpha	0.101	0.014	0.0101
	(0.69)	(2.68)	
1996	const.	variable	R
mue	-0.508	0.015	0.0995
	(-2.28)	(3.03)	
pi	0.464	0.011	0.5241
	(7.19)	(3.25)	
alpha	0.123	0.012	0.0082
	(0.62)	(3.30)	
1997	const.	variable	R
mue	1.817	0.003	0.2189
	(3.63)	(0.92)	
pi	0.944	-0.002	0.8937
	(19.88)	(-1.50)	
alpha	-1.198	-0.001	0.0811
	(-2.04)	(-0.12)	
1998	const.	variable	R
mue	3.644	0.001	0.0526
	(1.62)	(0.34)	
pi	0.915	0.001	0.9429
	(27.85)	(0.57)	
alpha	-0.800	0.001	0.0357
	(-1.32)	(0.23)	

Table 20: Regression results of g_j on the respective variable, t-values in parenthesis: Poland.

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

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

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

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

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

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

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

Table 21: Regression results of g_j on the respective variable, t-values in parenthesis: Romania.

1993	const.	variable	R
mue	13.697	0.0979	0.2271
	(3.25)	(2.23)	
pi	0.852	-0.001	0.9661
	(32.03)	(-0.07)	
alpha	-2.303	0.089	0.3451
	(-4.36)	(2.25)	
1994	const.	variable	R
mue	1.718	-0.002	0.0947
	(1.94)	(-0.42)	
pi	0.912	-0.002	0.9197
	(20.30)	(-1.39)	
alpha	-1.109	-0.006	0.0705
	(-1.65)	(-1.15)	
1995	const.	variable	R
mue	2.125	0.001	0.1070
	(2.08)	(0.11)	
pi	0.897	-0.004	0.9105
	(19.14)	(-2.76)	
alpha	-0.627	-0.005	0.0410
	(-1.24)	(-1.00)	

Table 22: Regression results of g_j on the respective variable, t-values in parenthesis: Slovakia.

1993	const.	variable	R
mue	-0.217	0.004	0.0148
	(-0.39)	(0.79)	
pi	0.609	-0.001	0.7422
	(5.37)	(-0.49)	
alpha	-0.629	0.004	0.0947
	(-1.02)	(0.86)	
1994	const.	variable	R
mue	1.72	0.004	0.2353
	(1.75)	(0.96)	
pi	0.7623	-0.002	0.8655
	(8.02)	(-0.90)	
alpha	-0.923	0.001	0.2513
	(-1.83)	(0.15)	
1995	const.	variable	R
mue	1.736	-0.001	0.1742
	(1.45)	(-0.24)	
pi	1.084	0.001	0.8656
	(8.03)	(0.12)	
alpha	0.768	-0.006	0.078
	(0.92)	(-1.18)	

Table 23: Regression results of g_j on the respective variable, t-values in parenthesis: Slovenia.

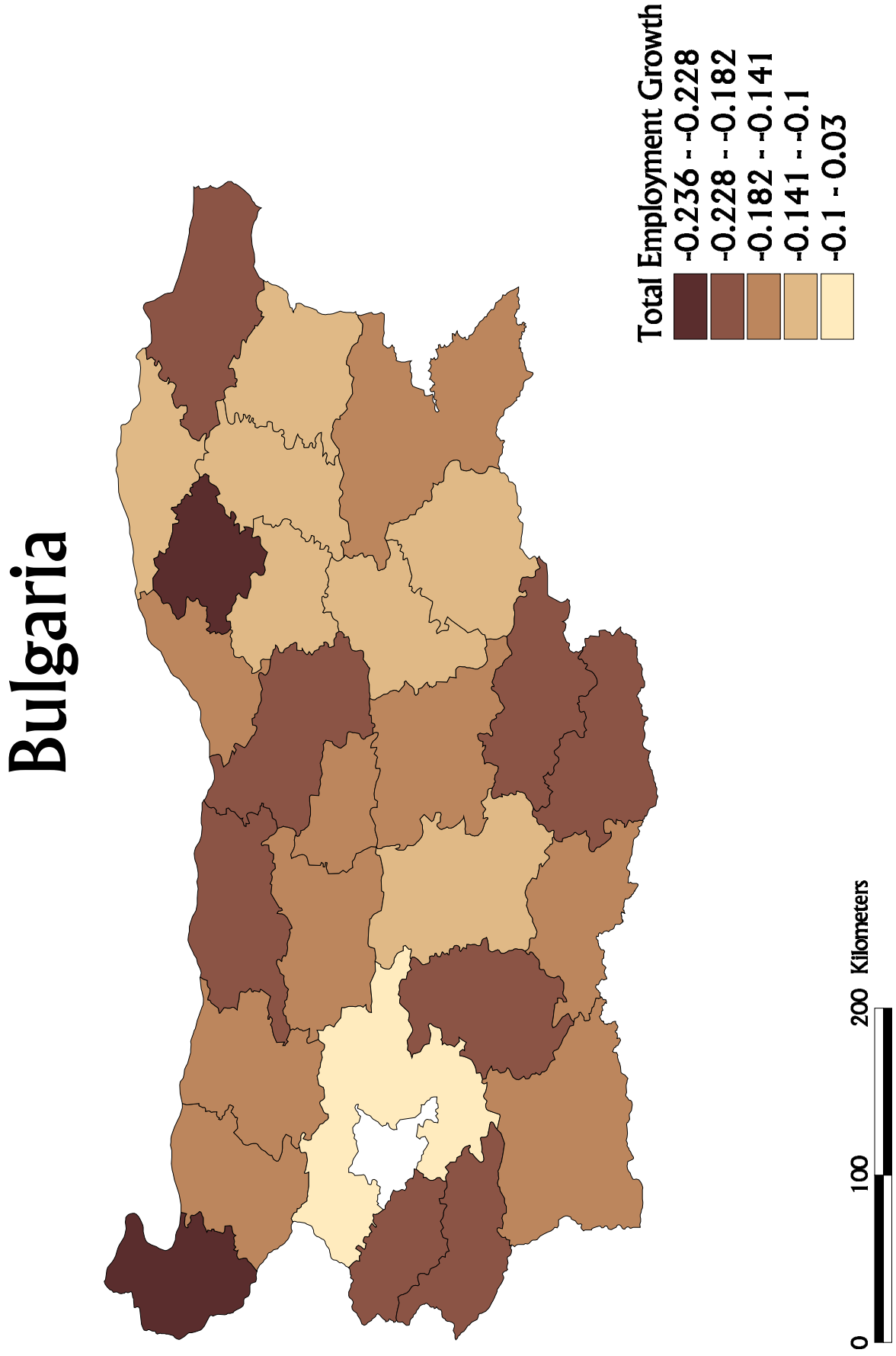

Figure 38: Regional employment growth over the entire period investigated, 1990-1999. Negative values indicate employment losses.

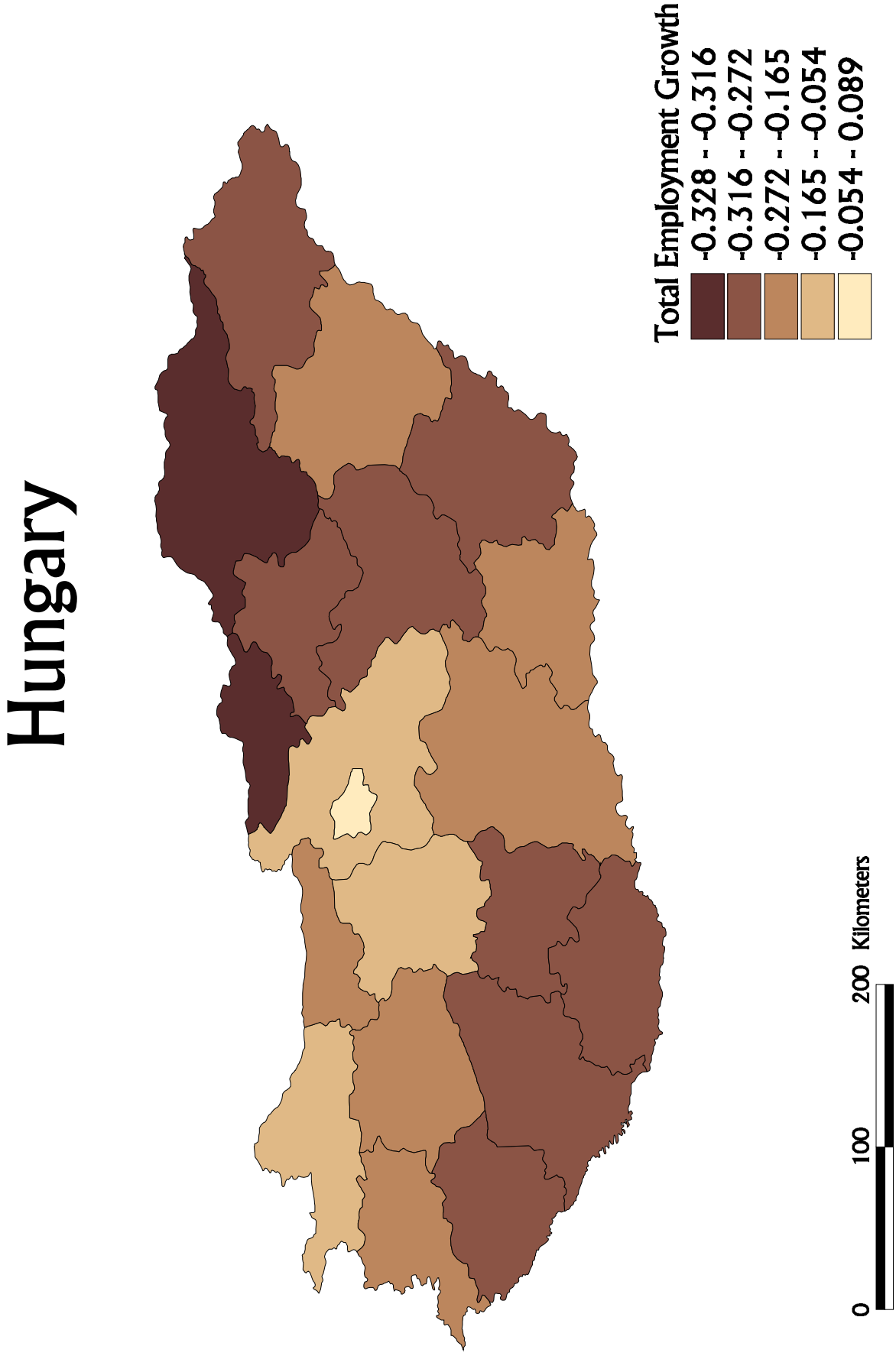

Figure 39: Regional employment growth over the entire period investigated, 1992-1999. Negative values indicate employment losses.

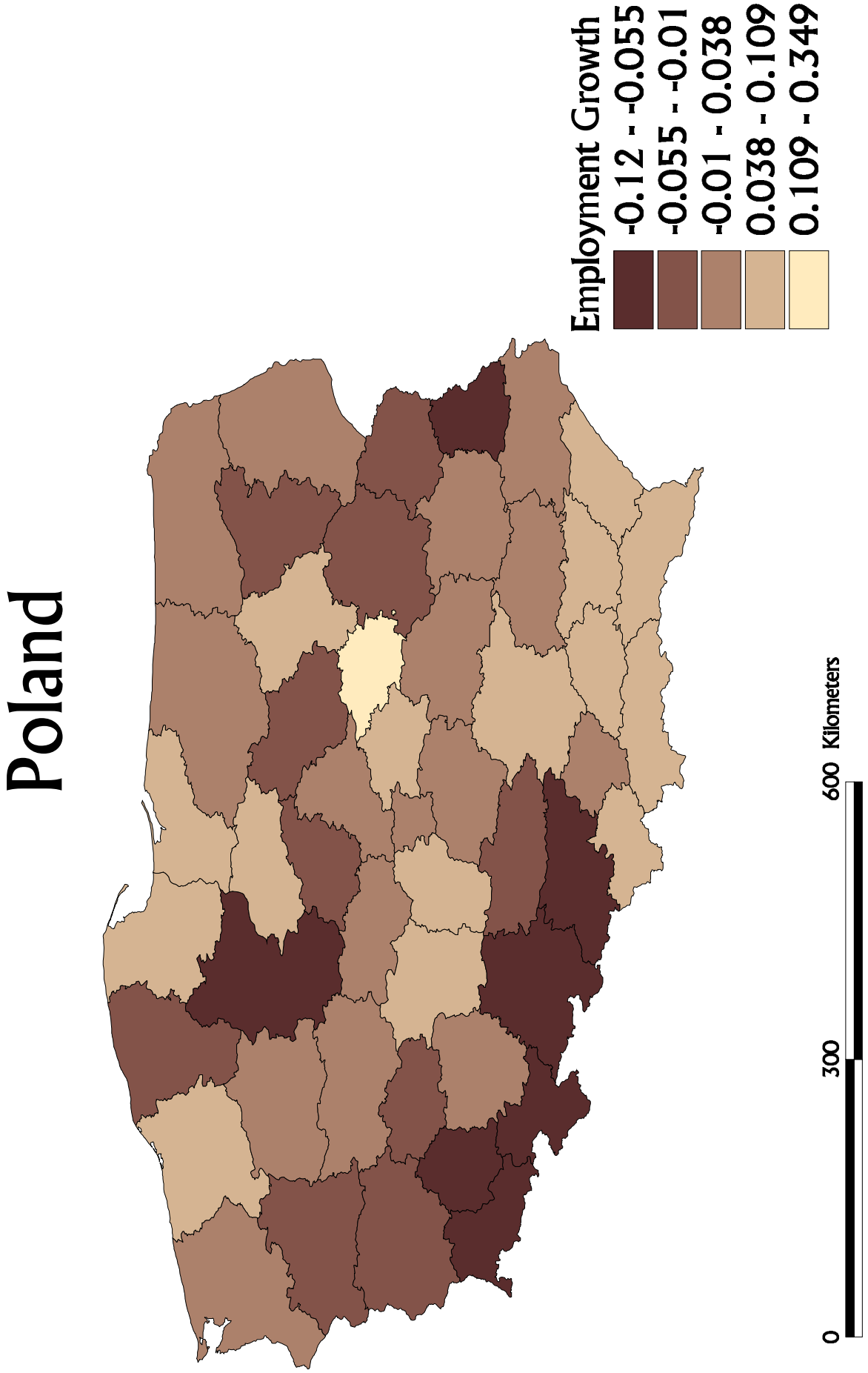

Figure 40: Regional employment growth over the entire period investigated, 1992-1998. Negative values indicate employment losses.

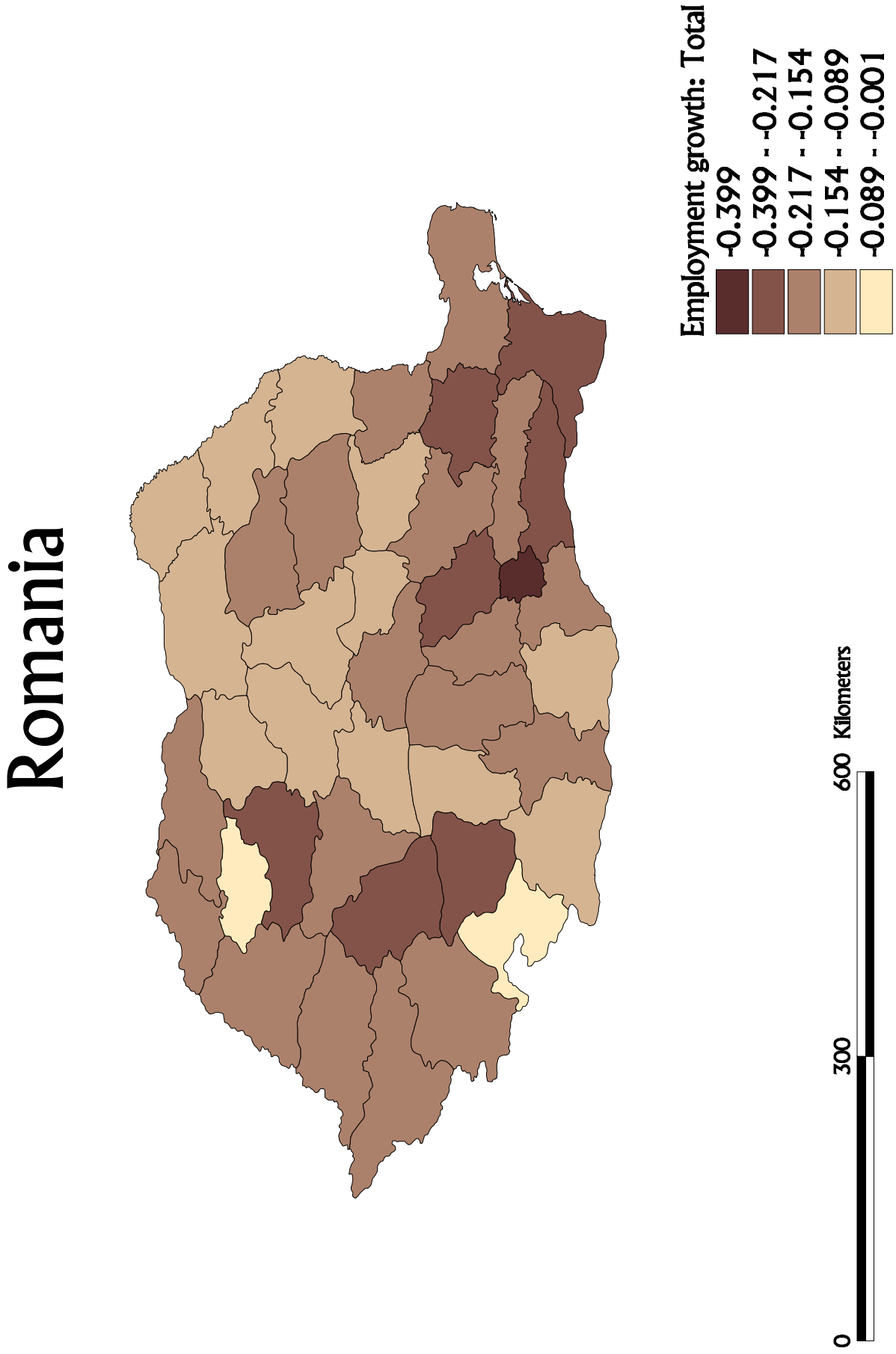

Figure 41: Regional employment growth over the entire period investigated, 1992-1999. Negative values indicate employment losses.

Intra-national Labour Market Adjustment in the Candidate Countries

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Abstract

This paper analyses the evolution of regional unemployment rates, wages, participation rates, migration and employment in seven candidate countries in the 1990's and compares them to a set of EU member states. I find persistent regional disparities in both regions. Persistence of unemployment rates is, however, lower in first round candidate countries than in member states. Furthermore, in both first and second round candidate countries persistence in participation rates is lower. Migration seems to be an ineffective labour market adjustment mechanism. Wages react more strongly to regional unemployment developments in first round candidate countries than in member states, but are slightly less responsive to national unemployment.

Key Words: Regional Labour Market Adjustment, Transition, EU - Accession
JEL – Classification: E24, R11, P25

1. Introduction

Membership in the European Union will put the candidate countries before a number of challenges. They will have to adopt the EU's acquis, will become eligible for support from structural funds and will ultimately benefit from freedom of movement of goods, services, labour and capital guaranteed in the common market. Each of these changes will have regionally asymmetric implications. For instance transfers from CAP will primarily benefit agricultural regions and the effects of the adoption of the acquis in the fields of competition and environmental policy are likely to be harder felt in regions where incompetitive and sheltered industries or environmentally hazardous productions are located. Similarly, the freedom of movement of labour and services will impact more strongly on border regions due to commuting possibilities and the limited transportability of many services.

This paper investigates the adjustment of regional labour markets of candidate countries to asymmetric shocks. It thus extends the literature on labour market adjustment in the United States (e.g. Blanchard and Katz, 1992) and the European Union (e.g. Decressin and Fatas, 1995, Fatas, 2000, Jimeno and Bentolila, 1998) to a region, which until very recently has been characterised by different institutions than those in established market economies. Thus the paper adds to the existing literature in two ways. First, it provides evidence on the labour market adjustment and shows to what extent these countries can already be considered market economies. Second, by analysing different forms of regional labour market adjustment it provides an empirical background against which the effects of enlargement on regional labour markets can be discussed.

Analysing labour market adjustments is particularly relevant with respect to EMU membership of candidate countries because one of the effects of a monetary union is that the joining country loses the autonomy over exchange rate policy. This increases the chances that permanent shocks have to be adjusted through labour market mechanisms. 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 this represents one of the risks of joining the monetary Union. Furthermore, to the extent that these forms of labour market adjustments differ amongst each other in

their social (or political) desirability the exact form of labour market adjustment will bear relevance to these "risks".

The starting point of the analysis thus is that any adverse region-specific shock, for example to labour demand, which is not accommodated by regional transfers or borrowing from other regions, has to be absorbed through wages adjusting to new equilibrium levels, increased unemployment or reduced labour supply in the region. The last form of adjustment in turn can be achieved either by emigration from the region or lower participation of residents. In consequence, 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 labour markets by analysing the persistence of region specific shocks to participation rates, unemployment as well as wage and employment growth. Section four then considers the reaction of inter-regional migration to unemployment rate and wage disparities and sections five looks at wage adjustments. Section six concludes.

2. Data

I analyse seven accession candidate countries (Bulgaria, Czech Republic, Estonia, Hungary, Poland, Romania and Slovenia). Regional data for the period from 1992 to 1998 of these countries were taken from regional statistical yearbooks.[2] Similar data have been used in a number of studies on labour markets in accession candidate countries (see: Burda and Lubyova, 1995, Svejnar et al 1994, Boeri and Scarpetta 1996 and Traistru, Nijkamp and Resmini, 2002). From these countries I form two subgroups: those which have completed negotiations (i.e. the Czech Republic, Estonia, Hungary, Poland and Slovenia) and those that are still negotiating with the EU (Romania and Bulgaria). I refer to these two groups as first and second round countries, respectively. As a „benchmark“ I use 5 EU member states. These are the Netherlands, Germany (excluding East Germany), Spain, Portugal and Italy. This choice was guided by data availability and a concern to include highly developed EU countries as well as poorer member states, whose labour markets are considered less flexible. EU data were taken exclusively from the Eurostat Cronos database. As wage indicator the salaries paid to employees divided by the number of employees in a region was used.

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[b]	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[a]	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[c]	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)

Note: Table reports unweighted averages (standard deviations) of variables. Values in brackets are standard deviations Population is measured in thousand inhabitants, area in square kilometres all other variables in percent. a) German data for employment and wage growth, as well as participation rates ends in 1994 this is reported in the column headed 1995. b) Hungarian data for 1998 was excluded from the analysis due to changes in methodology 1997 values are reported in the table. c) Portugal excluding overseas territories (i.e. Acores and Madeira).(see also the data description in the appendix)

The regions of these countries differ in terms of size, wealth and labour market outcomes (see table 1). In general the candidate countries' regions are substantially smaller than member states' both in terms of population and area. Although unemployment rates were at the upper end of the distribution within the European Union in all candidate countries but the Czech Republic throughout transition, they never exceeded the levels of Spain and approached Italian levels by 1998. Similarly, participation rates (measured in % of population) in Poland, Bulgaria and Romania exceeded the levels found in most EU countries. Employment growth rates, starting from very low levels in 1992 rapidly increased during transition. These findings are broadly consistent with a number of recent contributions, which suggest that the differences in labour market performance between candidate and EU countries may be overrated in the light of both recent macroeconomic and institutional developments.[3] There

is, however, also substantial heterogeneity among candidate countries. In particular the Czech Republic is an outlier because of its low unemployment rates (see: Boeri and Burda, 1996) and Hungary has experienced substantial declines in participation rates (see Kertesi and Köllö, 2001).

The primary concern of this paper, however, is with regional developments. There the large regional disparities which emerged during transition have been repeatedly stressed in the literature (see: Boeri and Scarpetta, 1996 and Petrakos, 1995) and a number of authors have established lines along which these disparities develop: Large cities have exhibited the lowest unemployment rates and highest wages throughout transition; border regions in the Western parts of their countries, have developed better than non-border regions, and mono-industrial regions faced considerable labour market problems, as have agricultural regions (see: Gorzelak, 1996, Smith 1998). Furthermore, regional disparities have increased in most candidate countries. Egger, Huber and Pfaffermayr (2002) find divergence in wage levels in most candidate countries. Furthermore Huber and Palme (2001) show that unemployment rates diverged in Poland and Hungary. This evidence is also reflected in table 1. By 1998 unemployment rate disparities (as measured by the standard deviation) exceeded those in most EU countries (except for Italy) and disparities in participation rates were of comparable magnitude as in the EU. Standard deviations of unemployment rates have also increased in all candidate countries but Poland and participation rates disparities increased in Hungary and Poland.

Table 2: Inter temporal Correlation of Selected Labour 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[b)]	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[a)]	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 [c)]	0.78**	0.88**	0.88**	0.02
Spain	0.78**	0.82***	0.86***	0.25

Notes: Table reports intertemporal correlation of the indicator between the years indicated a) German data for employment and wage growth, as well as participation rates correlation between 1989-1994. b) Hungarian data for 1998 was excluded from the analysis due to changes in methodology the table reports correlations between 1992 and 1997 values. c) Portugal excluding overseas territories (i.e. Acores and Madeira) *** (**) (*)coefficients are significantly different from zero at the 1% (***), 5% (**) and 10% (*) level.

A number of authors (e.g. Profit, 1999) also notice that despite rising regional disparities, the rank distribution of regions has remained stable. Table 2 confirms this by reporting correlation coefficients of unemployment rates, participation rates, employment growth and wages at the beginning of my observation period with the levels prevailing at the end. Despite some heterogeneity among countries, coefficients of correlation are high and significant for all indicators but employment growth. They are, however, slightly lower in the candidate countries, which suggests smaller persistence than in Western Europe. Correlation coefficients for employment growth by contrast are in general insignificant for both candidate countries and European member states.

3. Short run dynamics

These features suggest that neither the EU's nor the candidate countries' regional labour markets adjust to shocks rapidly. Regional disparities are high and rising in most of the candidate countries and persistent in both regions. This, however, cannot give answer to whether regional disparities are due to differences in long run equilibrium levels or to the incapability to absorb shocks specific to regions.[4] To disentangle these differences region specific developments have to be identified. In the literature various methods have been used to achieve this. 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 form_[5]

$$Y_{it} = \gamma + \gamma_1 Y_{at} + \eta_{it} \tag{1}$$

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

Since results of estimating equation (1) suggest substantial heterogeneity in candidate countries and the choice between methods in part depends on how closely regional developments follow national trends, [6] I follow Decressin and Fatas, (1995) and estimate the following equation:

$$\bar{\eta}_{it} = \alpha_i + \delta_1 \bar{\eta}_{it-1} + \xi_{it} \tag{2}$$

where $\bar{\eta}_{it}$ is the estimated residual of equation (1), α_i is a region specific fixed effect, while δ_1 is a measure of the persistence of the indicator[7].

Table 3: Persistence of regional 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

Note: Results report the coefficient of regression (2), values in brackets are standard errors of the estimate, a) indicates that the null of second order auto-correlation as suggested by Arellano – Bond cannot be rejected at the 5% level *** (**) (*) 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 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 periods, N= number of cross sectional units.

In accordance with the literature on EU member states (see Fatas, 2000, Decressin and Fatas, 1995) I find low persistence of employment growth rates in the EU, but high levels of persistence for both unemployment and participation rates (see: table 3). For candidate countries by contrast, I find comparable persistence in unemployment rates but significantly lower persistence of participation rates and higher persistence of wage growth.[8] These findings, however, vary substantially across countries and subgroups of countries. In particular, although some country results are based on few observations, heterogeneity among candidate countries seems of similar magnitude as among member states.

When estimating equation (2) separately for country groups unemployment rate shocks in the first round candidate countries are substantially less persistent than in the EU that persistence in wage growth is comparable to that in the EU. In the second round candidate countries by contrast unemployment rates are as persistent as in the EU but wages are slightly less persistent. In both first and second round candidate countries employment growth is more persistent and participation rates are less persistent. This suggests that in candidate countries' regions' unemployment and participation rates return to their long run levels more quickly than in member states.

4. Spatial Mobility

In theory the low persistence in participation rates could be due to higher migration or to the labour supply behaviour of residents. The limited evidence on regional mobility in candidate countries, however, suggests that internal mobility is unlikely to be an effective labour market adjustment mechanism of labour supply. Fidrmuc (2001) finds lower mobility in the candidate countries than the EU. Related to this, spatial mismatch has remained high throughout the transition period (see: Boeri and Scarpetta, 1996). This can be explained through low migration as well as high transport costs, which impinge on the possibility of commuting.[9]

Migration rates have also fallen despite increasing regional disparities throughout the last decade. Huber and Fidrmuc (2002) report that in the Czech Republic the dispersion of wage levels (as measured by the coefficient of variation) increased from 1992 to 1998 while migration dropped by 15% in the same time period. Similar developments are reported for the Poland and Slovakia. Migration rates increased slightly in the face of increasing regional wage disparities in Slovenia, only. Huber (2002) 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) and that substantial parts of migration (around 90% of total flows) are accounted for by people moving in and out of the same region. This suggests, that migration reflects structural rather than aggregate differences between regions[10] and is associated either with a very protracted adjustment to permanent shocks or differences in the steady state growth rather than short run adjustment.

Finally, Fidrmuc (2001) relating net migration to wage and unemployment differentials between regions finds that migration is ineffective in reducing regional disparities in the candidate countries: coefficients in general are

small and in some instances insignificant. These results can be extended by estimating place to place models of migration. I hypothesise that the number of migrants from sending region j to the receiving region i at time t (m_{ijt}) can be written as (see: Fields,1983, Lundborg 1991):

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

with, w_{it} and w_{jt} wages, u_{it}, u_{jt} measures of labour market tightness and p_{it} and p_{jt} the population (included to control for differences in region size) in the receiving and sending region, respectively. Since I expect migration to occur from low wage to high wage and from high unemployment to low unemployment regions, I expect α_0 to be positive and α_1 to be negative when using unemployment rates as proxies for labour market tightness. Furthermore, α_2 and α_3 should both be positive. The a_{ij} are a set of dummy variables for each sending – receiving region pair, to control for all aspects of moving costs between two regions, such as the distance to be covered, contingency effects, differences in relationships between urban and suburban regions and potential cultural differences within regions of countries, which may increase psychological moving costs. y_k finally is a set of dummy variables for the year of observation, which is used to proxy for macro-economic influences on migration behaviour such changes in the social welfare system or changes in the level of unemployment rates (see Decressin 1994).

For some countries – in particular Slovenia – migratory moves between regions are small in absolute number. Thus estimating equation (3) by OLS would result in biased and inefficient results. For this reason I resort to standard methods used for analysing count data by estimating equation (3) by maximum likelihood under the assumption of a negative binomial distribution (see Cameron and Trivedi, 1986). Furthermore, a number of authors have suggested different measures of labour market tightness in specification (3). For instance, Jackman and Savouri (1992) use vacancy rates in addition to unemployment rates, while Juarez (2000) use employment growth or employment rates and Fields (1979) favours unemployment rates. I thus experimented with alternative measures of labour market tightness, by using both unemployment rates and employment rates (employment as a share of resident population).

Table 4: Determinants of Gross Migration Flows baseline Regressions (Dependent variable Number of Migrants)

	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 reviving 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 Obs	37793	37793	375	244	396	396	4902	5200	3695	3666
Log Likelyhood	-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

Note: Negative binomial estimates. 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 estimates. *** (**) (*) coefficients are significantly different from zero at the 1% (***), 5% (**) and 10% (*) level.

Migration in candidate countries seems to be slightly less responsive to regional wage, unemployment and employment disparities than in the EU (see table 4). [11] Employment rate differences significantly increase regional migration in all EU countries – although in Italy employment rates are only marginally significant – while in candidate countries employment rate disparities are insignificant throughout. The only significant result for candidate countries are unemployment rates in the Czech Republic, but here marginal effects are small too (see Table 4). Wage differentials between sending and receiving finally tend to be significant only for member states, while in Slovenia wage differentials are insignificant and have the wrong sign in the Czech Republic

5. Regional Wage Flexibility

The conclusion from analysing migration and time series properties above is that, aside from lower migration rates, the first round candidate countries differ from current EU member states primarily through a lower persistence in unemployment and participation rates. In second round candidate countries by contrast regions specific participation rate developments are less persistent than in the EU. The question thus arises how these differences and in particular lower persistence in unemployment can be explained despite lacking migration. One explanation could be that wages react more strongly to regional labour market conditions in first round candidate countries.

Indeed the evidence concerning the relationship between wages and regional unemployment in candidate countries is mixed. Boeri and Scarpetta (1996) finds correctly (negatively) signed but insignificant parameters when estimating equations relating regional wage growth to unemployment rate changes or levels and Commader and McHale (1995) report ambiguous results for the Visegrad countries. By contrast Kertesi and Köllö (1995) using smaller regional units for Hungary find a significant negative impact of unemployment rate levels on regional wage levels and present evidence that the elasticity has increased in the course of transition. Kallai and Traistaru (2001) report a significant impact of unemployment rates on wage levels in a wide variety of specifications for Romania.[12] The literature comparing wage setting institutions in the candidate countries to those of the EU (e.g. Vaugham and Whitehead, 1998 Boeri and Terrell, 2002), however, suggest a somewhat less centralised bargaining structure, which may lead one to expect more lee way for regional differentiation in wage leves.

I explore the relationship between regional wages and unemployment by estimating equations in which wage changes are related to regional unemployment rate changes. The specification following Büttner (1999) thus is:

$$\Delta w_{j,t} = \eta_i + \phi_1 u_{i,t} + \phi_2 u_{i,t-1} + \phi_3 X_{it} + \varsigma_{ij,t} \tag{4}$$

where w_{it} is the wage rate of region i at time t, η_i is a region specific fixed effect intended to control for region specific factors such as productivity shocks and $u_{i,t}$ is the unemployment rate in region i at time t and X_{it} are further control variables in the equation such as the (log of the) share of agricultural and manufacturing employment (to control for differences in regional structure). As pointed out by Büttner (1999) this specification nests both the standard Phillips curve relationship and the wage curve specification. If $\phi_2=0$ this gives as a relationship between wage growth and the unemployment rate (which resembles the Phillips curve as an adjustment process), while if $\phi_1=-\phi_2$, a relationship between the growth rate of wages and the change in unemployment rates, as would be suggested by the standard wage curve as an equilibrium relationship between wages and unemployment, is obtained.

Equation (4), however, ignores that there may be substantial interaction between regional labour markets through for instance migration and capital in some countries and that wages are negotiated on a national rather than regional level in many European countries. Both these factors may cause national unemployment rates to be

more important for wage growth than regional unemployment rates. Thus I included the national unemployment rate as an additional explanatory variable (see: Jimeno and Bentolila, 1998) and correct for the bias in t-statistics which results from using data from different regional levels of aggregation (i.e. national and regions see eg. Blien, 1996).

Table 5: Results of basic wage regressions including National Unemployment Rates

	National unemployment rate	Unemployment rate	Lagged unemployment rate	Ln(Aggriculture share)	Ln(Industrial employment share)	R2 (NOBS)	Test a1=-a2
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

Note: values in brackets report heteroscedasticity robust standard errors. *** (**) (*) implies that coefficients are significantly different from zero at the 1% (***), 5% (**) and 10% (*) level after correcting for the downward bias in standard errors in regressions. EU including German wages and employment growth and participation rate 1989 – 1994 and excluding Portuguese overseas territories (Acores and Madeira).

Results suggest that regional real wage growth is more responsive to regional unemployment rates in first round candidate countries than in the EU, but not so in second round candidate countries. In first round candidate countries a 1 percentage point increase in the regional unemployment rate reduces regional wage growth by around –0.4% in the first year and by -0.3% in the long run, while in the second round candidate countries and the EU Member states there is no significant correlation between regional wage growth and unemployment. National unemployment rates are more important determinants of wage growth in member states, however. In the member states a 1-percentage point increase in the national unemployment rate reduces wage growth by -2.6%, while there is no significant impact in the candidate countries.[13] The results also weakly favour the wage curve interpretation for the first round candidate countries, since the hypothesis $\phi_1=-\phi_2$ cannot be rejected but the

hypothesis $\phi_2=0$ can - at least at the 10% level. Results for the EU as well as second round candidate countries by contrast do not lend much support to either of these hypotheses, since neither $\phi_2=0$ nor $\phi_1=-\phi_2$ can be rejected.

6. Conclusions

In this paper I analyse the evolution of regional unemployment rates, wages, participation rates, migration and employment in 7 candidate countries in the period from 1992 to 1998 and compare it with regional labour market adjustment in EU member states. The evidence collected suggests that in both candidate countries as well as member states there are persistent regional disparities in unemployment rates, employment rates, participation rates and wages. However, despite variations among countries, the results in general suggest that in the first-round candidate countries persistence of unemployment rate disparities is lower than in the current member states. Furthermore, in both first and second round candidate countries the persistence in participation is lower than in member states. Also migration rates in candidate countries are low and highly persistent, a substantial part of migration is accounted for by churning flows and the correlation of migration flows with regional disparities seem to be small. Thus migration is not an effective adjustment mechanism in candidate countries. Finally, I find some evidence that wages react more strongly to regional unemployment developments than in current member states, but are slightly less responsive with respect to national unemployment rates.

The results pertain to the experience of candidate countries in the 1990's and integration may itself change the institutions and thus adjustment mechanisms of these countries. But, while low levels of internal migration require substantial further research, there is little empirical support to an argument that the candidate countries regional labour markets are currently substantially less flexible in adjusting to regional asymmetric shocks than current EU member states. Furthermore the evidence suggests that the candidate countries adjusting to regionally asymmetric shocks mainly through higher wage flexibility with respect to regional conditions than in the EU, which in turn leads to lower persistence in unemployment and participation rates.

Interpreting results from the perspective of EMU integration, suggests, that from point of view of "adjustment mechanisms" on the labour market, candidate countries may be deemed equally suited for monetary Union as current EMU member states. In particular the higher responsiveness of wages to regional labour market conditions suggests, that candidate countries may find it easier to adjust to asymmetric shocks. This conclusion,

however, rests on the assumption that a) shocks to candidate countries are equally asymetric and equally persistent as are shocks in the member states and b) that labour market adjustment mechanisms are not endogenous to the integration into the EMU.

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Appendix: Data Description & Sources

Data Definitions

Data for the Czech Republic, Slovenia, Hungary and Poland were taken from national sources (regional and national statistical yearbooks). Data for Bulgaria, Romania and Estonia was taken from the Regspec database (see: Traistaru and Iara, 2002 for a description). Despite their substantial use in regional labour market analysis

of candidate countries, data are not always comparable, due to differences in national statistical systems. The following indicators were used:

Unemployment Rates: Registered unemployment rates are measured at the end of the year (31.12.) for the Czech Republic, Poland, Hungary and Slovakia. In Bulgaria, Romania they are annual averages. In Poland these data are in % of the active age civilian population (after 1997 including working pensioners). In all other countries in % of the labour force. In Estonia I only have LFS data available.

Population: Refers to the average population for all countries

Participation Rates: Are measured in % of total population and were calculated appropriately from employment figures and unemployment rates in all countries.

Wages: Refer to average monthly wages. In the Czech Republic, Slovakia, Poland, Hungary and Romania these are gross wages. In Slovenia and Bulgaria they are based on net earnings. All wage data was deflated using national CPI's.

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

Table A.1: Availability of Regional Data for Candidate Countries and Member States

Country	Unemployment Rate	Wages	Employment	Participation Rate	Place to Place Migration
Poland (Voivodships – 49)	1992 - 1998	1992 - 1998	1992 - 1998	1992 - 1998	
Hungary (Komitat – 20)	1992 – 1998	1992 – 1998	1992 – 1998	1992 – 1998	
Czech Republic (okresy – 76)	1992 – 1998	1992 – 1998	1992 - 1998	1992 – 1998	1992 – 1998
Slovenia (stat. regions – 12)	1997 - 1998	1992 – 1998	1992 – 1998	1997 – 1998	1996 – 1998
Bulgaria (NUTS III – 28)	1992 - 1998	1995 - 1998	1992 – 1998	1992 – 1998	
Estonia (NUTS III – 5)	1995 - 1998	1992 – 1998	1992 – 1998	1995 – 1998	
Romania (Nuts III – 41)	1992-1998	1992 - 1998	1992 - 1998	1992 – 1998	
Netherlands (NUTS II – 12)	1991 – 1997	1989-1994	1989-1995	1992 – 1995	1990 – 1995
Germany (NUTS I – 11)	1991 – 1997	1989 – 1994	1989 – 1994	1992 –1994	1991 – 1993
Portugal (NUTS II – 5)**	1991 – 1997	1989 – 1994	1989 – 1995	1992 - 1995	
Italy (NUTS II – 21)	1991 –1997	1989 – 1995	1989 – 1995	1992 – 1995	1990 – 1995
Spain (NUTS II – 18)	1991 – 1994	1989 – 1994	1989 – 1995	1992 - 1995	1991 – 1994

*Excluding East Germany after 1991, ** Excluding overseas territories (Acores and Madeira) due to missing data problems

Place to Place Migration Data: Data for the Czech Republic was provided by Jan Fidrmuc (see: Fidrmuc and Huber, 2003 for a description) and Slovene data was taken from national statistical yearbooks. Data are from the registry of residents and report population moves (in Slovenia only moves of nationals).

National Indicators : I 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 needed to be overcome: In the Czech Republic the minimal size of reporting enterprises in the private sector to measure employment changed 3 times from 1992 to 1998, (1992 - enterprises with 100 employees or more, 1993 to 1994 with 25 or more employees. 95 – 96 with 100 employees or more in manufacturing and 25 or more employees in services and agricultural enterprises with more than 1000 hectares. 97-98 with 20 employees or more in manufacturing and services). Since these substantial changes could have had effects on adjustment of the employment growth even after removing the national developments (through equation 1), if small enterprises are overrepresented in some regions, I estimated equation (2) for employment growth excluding the Czech Republic. This did not change results. Thus I did not omit Czech employment data in the main text.

Furthermore, in the Czech Republic in 1996 the district of Jesenik was formed from the territories of Sumperk and Bruntal. Thus for Czech data 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 establishment level statistics are provided. Due to these changes 1998 data were omitted.

In Slovenia data at the level of statistical regions was reported from 1997 onwards only. Before this data are reported on the level of 192 communities.. This data can be aggregated exactly to the level of statistical regions using the „bridge“ provided in the national statistical yearbooks. This leaves me with comparable data on employment and wages for the period from 1992 – 1998.

For Romania gross wages were calculated as the mean of average monthly gross earnings of the counties which build each region for the complete time period.

Data Sources

Czech Republic - Cesky Statisticke Urad (CSU): Okresy Ceske Republiky (Okresy of the Czech Republic), years 1992 - 1998

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

Slovenia -Slovene Statistical Office, Statistcal Yearbook, 1992 - 1998

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

Bulgaria, Estonia, Romania – Respec database (REGSTAT) see Iara and Traisturu (2002) for descriptions

National CPI Data - OECD Main economic indicators (all items)

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 data description is provided in the appendix.

[3] Burda (1998) finds that most candidate countries took over a continental European mode of labour market regulations, Svejnar (1999) in a literature summary concludes that "firms in all CEE economies started adjusting employment to output changes and the estimated elasticities rapidly rose to levels that are by and large comparable to those estimated in western economies" and Knogler (2001) finds that for many labour market indicators candidate countries do not differ strongly from the EU – average. Similarly, evidence suggests that labour market policy is equally efficient and workers react similarly to incentives in candidate countries and the EU (see: Boeri and Burda, 1996, Lubyova and van Ours, 1999, Puhani, 2000).

[4] There are a number of reasons to believe that equilibrium levels of wages, unemployment rates and participation rates may differ among regions: Both equilibrium wage levels as well as unemployment rates may vary due to sectoral specialisation of regions. Long run "natural" unemployment rates could be influenced by differences in matching technologies or due to skill mismatch at the regional level and participation rates may differ if regions are characterised by different demographic compositions.

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

[6] A further influence on this choice is whether the resulting series are stationary. Conducting panel unit root tests I find that some original series are integrated, the residuals of equation (1) are, however, stationary. Results both of estimating equation (1) as well as unit root tests are available from the author.

[7] Estimating dynamic panels as in (2) by least squares (LSDV) techniques will result in biased estimates since dependent variables are correlated with the residuals. Thus (2) was estimated using the consistent GMM estimator suggested by Arellano and Bond (1991). In simulation studies (see Kiviet, 1995 and Judson and Owen, 1999) this outperforms the LSDV estimator for data sets of this size. To check for robustness, however, Equation (2) was also estimated using the LSDV estimator as well following Blanchard and Katz (1992) and including two lags (rather than one). None of this changes the qualitative results, concerning persistence relative to the EU.

[8] Note that for variables estimated in first differences such as wage and employment growth a significant negative coefficient indicates a stationary series in levels. The higher the absolute value of these negative coefficients the lower are persistence levels.

[9] Boeri, Burda and Köllö (1998) present evidence that in Hungary an average commuting distance of 15 kilometres will cause transport costs equivalent to the minimum wage and that costs for distances in excess of 50 kilometres could equal an average salary. The extent of commuting as labour market "adjustment mechanism" thus seems limited.

[10] In part this high share of churning flows could be associated with the process of transition. Since transition induced structural change at the regional level may have led to higher shares of such migration.

[11] In the context of migration, the 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. The results confirm the finding of a low responsiveness of migration to regional disparities in candidate countries. I also omitted bilateral fixed effects and included only sending and receiving region fixed effects. This, however, reduced the fit of the equation substantially.

[12] Results of "wage curve" or "Phillips curve" estimates are, however, also ambiguous for EU member states (see. Winter – Ebmer, 1993).

[13] These results are robust to a number of changes in this specification. In particular excluding national unemployment rates and including population to correct for potential biases which may result from the different sizes of regions reconfirms higher responsiveness of wage growth to regional unemployment rates in the first

round candidate countries. I was also concerned that the use of regional rather than national price data may influence results. For this reason I estimated equation (4) with data for the two years (1993 and 1994) where I have regional price data available. Deflating by regional prices increases the marginal effect of regional unemployment rates. Thus this change tends to reinforce the picture of higher responsiveness to regional unemployment rates in candidate countries.

Quantity Adjustments in Candidate Countries Regional Labour Markets

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Abstract

This paper analysis the adjustment of regional labour markets of candidate countries to asymmetric shocks. We find, that idiosyncratic region specific developments of unemployment rates are of a smaller importance in first round candidate countries. We also find that candidate countries are typical European labour markets in the sense that a substantial part of the adjustment to changes in employment is carried by participation decisions and migration plays a small role only in regional adjustment. The differences between candidate countries and member states is that the former have experienced larger region specific shocks to labour demand, and that these shocks lead to a higher long run change in employment. Typologies based on sectoral specialisation indicate that urban regions have experienced a substantially more favourable and industrial and peripheral regions less favourable labour market developments throughout transition. Furthermore, we find evidence that high regional unemployment can in part be explained by the low capability of high unemployment regions to absorb region specific shocks, through mechanisms other than increasing unemployment.

Key Words: Regional Labour Market Adjustment, Transition, EU - Accession

JEL – Classification: E24, R11, P25

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Introduction

In the years from 1990 to 1998 employment population ratios in the Central and Eastern European accession candidate countries declined by between 6 and 20 percentage points, participation rates fell by over 5 percentage points and unemployment rates increased from zero to close to double digit levels in many countries. These rapid changes, however, mask the substantial variation in regional labour market developments. Regional labour market disparities in candidate countries increased throughout the 1990's (see Pertrakos 1995, Boeri and Scarpetta, 1996) and reached levels comparable to those of western Europe by the end of the decade (see chapter 1 of this report).

In this paper we are interested in whether the substantial heterogeneity in regional labour market conditions in the candidate countries is associated with differences in the capability of regions to absorb region specific shocks. This is not only interesting from the point of view of explaining historic experiences, but is also highly relevant in the context of enlargement of the European Union (EU). The capability of candidate countries to adjust to regional shocks is an important determinant for a number of important policy decisions to be taken in the phase of integration following accession. It will influence the optimal point in time for the candidate countries to join EMU, and determines the particular policy needs of candidate countries with respect to the reforms of structural funds.

This paper thus extends the literature on regional labour market dynamics in candidate countries (see for instance the last chapter of this study) by moving the level of analysis from a univariate setting to the application of a multi-variate model that has become the "work horse" model of the regional evolution literature (see Blanchard and Katz, 1992 and Decressin and Fatas, 1995) and by focusing on potential differences in labour market adjustment between region types. We find first, that idiosyncratic region specific developments in unemployment are of a smaller importance in first round candidate countries, while concerning other labour market indicators few differences to the EU can be found. In second round candidate countries, by contrast region specific developments in participation rates are more important than in member states. Second, that in contrast to EU member states, candidate countries have experienced larger region specific shocks to labour demand, and that these shocks tend to be more persistent than in member states. Third, we find that candidate

countries are typical European labour markets in the sense that a substantial part of the adjustment to changes in employment is carried by participation decisions and migration plays a small role only in regional adjustment. The differences between candidate countries and member states is that the former have experienced larger region specific shocks to labour demand, and that these shocks lead to a higher long run change in employment. Typologies based on sectoral specialisation indicate that urban regions have experienced a substantially more favourable and industrial and peripheral regions less favourable labour market developments throughout transition. Furthermore, we find evidence that high regional unemployment can in part be explained by the low capability of high unemployment regions to absorb region specific shocks, through mechanisms other than increasing unemployment.

The paper is structured as follows. The next section describes the theoretical model underlying our analysis, and section three discusses data issues. In section four we focus on the importance of region specific developments in candidate countries and in section five on the nature of regional shocks in candidate countries. Section six clears some of the econometric problems that have to be dealt with before estimation while sections six, seven and eight present results concerning labour market adjustment in candidate countries with respect to univariate processes, the multivariate model and the regional differentiation, respectively. Section nine concludes.

A model of Labour Market Adjustment

To analyse regional labour market dynamics of the candidate countries we use the "workhorse" model in the "regional evolutions" literature due to Blanchard and Katz, 1992. The starting point of this model is that region specific labour demand is given by:

(1) $$l_{it} = -\alpha_1 w_{it} + z_{it}$$

with l_{it} employment in region i at time t, w_{it} the wage rate in the region and z_{it} a shift parameter for labour demand. In this model all variables are in log deviations from national developments. The motivation for including this shift parameter (z_{it}) is to allow for the possibility of capital mobility. As in Blanchard and Katz (1992) we assume that the location decision of a firm is driven by the aim to locate in regions with the lowest costs i.e.

(2) $\Delta z_{it} = \rho_{0i} + \rho_1 w_{it} + \zeta^D{}_{it}$.

with $\rho_1<0$. Regional labour supply is driven by migration and participation decision of the residents. Thus the labour supply (n_{it}) in region i at time t satisfies the identity $n_{it} = pop_{it} + p_{it}$ with pop_{it} the population and p_{it} the participation rate in region i at time t . We assume that the participation rate is influenced by unemployment rates and wage levels (see also Hojvat-Gallin, 1999). Thus:

(3) $p_{it} = \lambda_{0i} + \lambda_1 u_{it} + \lambda_2 w_{it} + \zeta^S_{it}$

where λ_{0i} is a region specific constant to capture long run differences in participation rates between regions as may arise from differences in demographics (i.e. higher share of female or young population) as well as differences in the internal characteristics of region and u_{it} is the unemployment rate in region i (measured as the ratio between unemployment and employment in the region).

Changes in working age population of a region, relative to national changes, by contrast can be due either to differences in demographic developments or to migration. We assume that demographic trends can be described by a region fixed effect (γ_{0i}) i.e. are time invariant, while net migration is determined by differences in expected lifetime income in the region relative to the rest of the country. Thus changes in population can be modelled by:

(4) $\Delta pop_{it} = \gamma_{0i} + \gamma_1 u_{it} + \gamma_2 w_{it} + \zeta^M_{it}$

This equation follows from standard migration theory (see e.g. Harris and Todaro, 1970) which postulates that economic migrants should move from low wage, high unemployment regions to high wage and low unemployment regions.

Finally, to close the model we use the standard approximation of the unemployment rate $u_{it} \approx n_{it} - l_{it}$ and assume that wages are set according to:

(5) $w_{it} = \chi_{i0} - \chi_1 u_{it-1}$

As pointed out by Bean (1995) this formulation of the wage equation is compatible to a number of theoretical approaches to wage setting such as trade union or efficiency wage theory.

In this model there are two mechanisms by which regional disparities arising from region specific shocks can be evened out among regions. First capital mobility (equation (2)) and job creation (equation (1)) in the region may work to countervail a negative shock. This mode of adjustment, relies on wage flexibility and the reaction of

firms to such wages. Only if in the face of an adverse region specific shock to labour demand wages fall sufficiently to make job creation in the region attractive to firms, will this mechanism work. Second, migration may be an alternative mode of adjustment.[1]

The adjustment processes triggered by these two modes of adjustment will differ. If migration is the predominant mode of adjustment then jobs lost or won in regions will be highly persistent. If by contrast capital mobility or region endogenous job creation after a reduction in wages is the primary adjustment mode then jobs lost in a region should in the long run re-emerge and employment losses should be little persistent (see: Fatas, 2000).

Data

The regional data for this paper were taken from regional statistical yearbooks. They encompass the period from 1992 to 1998 for the regions of five accession candidate countries (Bulgaria, Czech Republic, Hungary, Poland and Romania).[2] Similar data has been used in a number of studies on labour markets in accession candidate countries (see: Boeri and Scarpetta 1996 and Traistaru, Nijkamp and Resmini, 2002). From these countries we form two subgroups: those which have completed negotiations (i.e. the Czech Republic, Hungary and Poland) and those that are still negotiating with the EU (Romania and Bulgaria). We refer to these two groups as first and second round countries, respectively.

As a „benchmark“ we use data on the regions of five EU member states. These are the Netherlands, Germany, Spain, Portugal and Italy for the period from 1989 to 1995. This choice was guided by data availability and a concern to include highly developed EU countries as well as poorer member states, whose labour markets are considered less flexible. EU data were taken exclusively from the Eurostat Regio database.

The regions of these countries differ in terms of size, wealth and labour market outcomes (see table 1). In general the candidate countries' regions are substantially smaller than member states' both in terms of population and area. This may have implications on the findings of this paper with respect to migration. Since migration is

[1] In the absence of either of these adjustment mechanisms a permanent reduction in labour demand in the region will increase unemployment rates and/ or reduce participation rates in the long run.

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

distance dependent, migration across regional borders is more likely in smaller regions. One may thus expect to find higher migration in candidate countries. Furthermore, to the extent that regionally asymmetric shocks reflect sectoral shocks in specialised regions one should also find higher shock asymmetry in smaller regions.

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

	Population		Area	Unemployment Rate		Participation Rate		Employment growth	
	1992	1998		1992	1998	1992	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)
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)
Hungary[b]	516.9 (393.2)	506.8 (367.3)	4,651 (1790)	8.2 (3.2)	9.1 (3.8)	32.6 (4.3)	25.7 (6.65)	-9.8 (2.4)	-2.0 (2.2)
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)
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)
	1989	1995		1989	1995	1989	1995	1989	1995
Germany[a]	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)
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)
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)
Portugal[c]	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)
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)

Note: Table reports unweighted averages (standard deviations) of variables. Values in brackets are standard deviations Population is measured in thousand inhabitants, area in square kilometres all other variables in percent. a) German data for employment and wage growth, as well as participation rates ends in 1994 this is reported in the column headed 1995. b) Hungarian data for 1998 was excluded from the analysis due to changes in methodology thus 1997 values are reported in the table. c) Portugal excluding overseas territories (i.e. Acores and Madeira).(see also the data description in the appendix)

The primary concern of this paper, however, is with regional developments. The large regional disparities which emerged during transition have been repeatedly stressed (see: Boeri and Scarpetta, 1996 and Petrakos, 1995) and a number of authors have established lines along which they develop: Large cities have exhibited the lowest unemployment rates and highest wages throughout transition; border regions to the west have developed better than non-border regions and mono-industrial regions faced considerable labour market problems (see: Gorzelak, 1996, Smith 1998). To assess how different region types react to asymmetric shocks candidate countries we employ a taxonomy of the candidate countries regions' developed by Scarpetta and Huber (1995) which has been widely in regional labour market analysis in candidate countries (see: Burda and Profit, 1996, Boeri and

Scarpetta, 1996, Boeri and Terrel, 2002). This taxonomy divides the regional units of the countries analysed into industrial, agricultural and diverse regions. In a further step, regions of each type were divided into perspective and other regions. From this further step we use only the subdivision of diverse regions into urban regions and other diverse regions.

Table 2: Regional Indicators relative to National Average by region Types

	Participation Rates		Unemployment Rates		Number of Regions
	1992	1998	1992	1998	
Agricultural	0.90	0.95	0.93	1.03	71
Regions	(0.16)	(0.14)	(0.27)	(0.39)	
Industrial	0.97	0.98	0.99	1.11	61
Regions	(0.14)	(0.12)	(0.39)	(0.38)	
Urban Regions	1.10	1.04	0.67	0.73	26
	(0.30)	(0.19)	(0.31)	(0.33)	
Other Regions	0.96	0.96	1.20	1.18	56
	(0.10)	(0.09)	(0.30)	(0.29)	

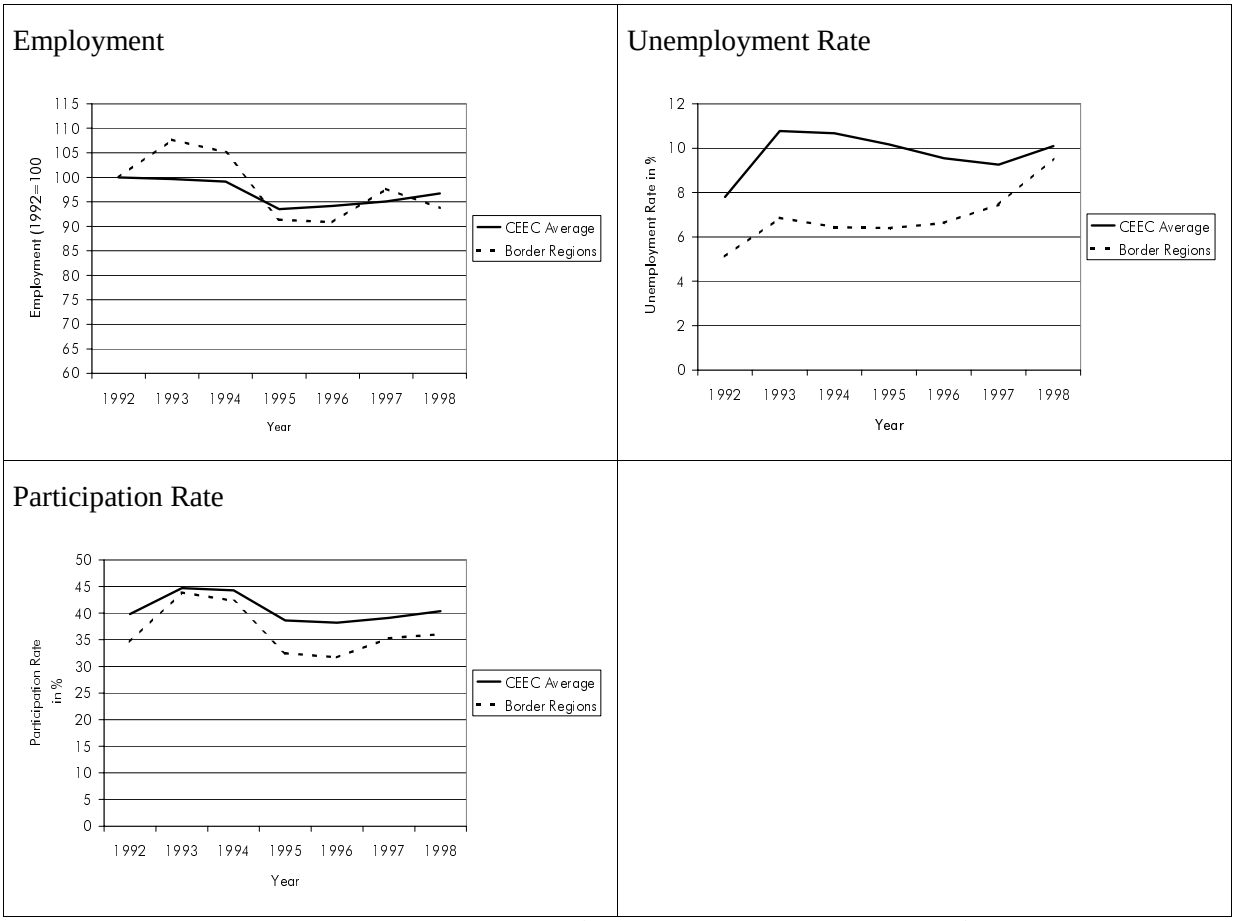
Note: Table reports unweighted averages (standard deviations) of variables normalised by national averages for candidate countries' regions only. Values in brackets are standard deviations Hungarian data for 1998 is included in the calculations

In all our results for regions types we exclude all EU regions and focus only on the regions of the candidate countries. Thus table 2 reports average participation rates and unemployment rates relative to the national average in 1992 and 1998 in the respective regions of the candidate countries. A value larger than one indicates that the average region of this type has shown a value higher than the national average, while a value smaller than one indicates a lower value than the national average in candidate countries. Urban regions have shown substantially smaller unemployment rates and slightly higher participation rates throughout transition, while the other diverse regions have been characterised by substantially higher unemployment rates and both slightly lower participation rates and wages. Industrial regions by contrast had substantially higher unemployment rates in 1998, only - a fact that reflects industrial restructuring in many of the regions. Agricultural regions have performed according to the national average.

A further category of regions we use are EU border regions. These are (Czech, Polish and Hungarian) regions directly bordering Germany or Austria. These regions were characterised by substantially lower unemployment rates, higher employment growth and lower participation rates in the early phases in transition, but have since converged to the overall levels of candidate countries (see Figure 1) concerning all indicators but participation rates. This markedly better development of border regions in early transition has been attributed to the better

economic situation as well as the importance of cross border commuting and a higher activity rate in the hidden economy (see Lacko, 2000, Svejnar, 1999)).

Figure 1: Evolution of employment, unemployment rates and labour force participation in EU border regions and the CEE average, 1992-1998



Note: Figure reports unweighted averages (standard deviations) of variables normalised by national averages for candidate countries' border and non border regions only. Hungarian data for 1998 is included in the calculations

Common and Region Specific Developments

These features suggest that there has been a considerable differentiation of labour market conditions in the candidate countries during the last decade. This raises the issue whether these differences have been mainly due to idiosyncratic shocks to regions or rather to different reactions of individual regions to national shocks. To

disentangle these two influences a number of authors (e.g. Vinals and Jimeno, 1996, Delaigle and Lohest, 1999) have suggested running bivariate vector autoregressions of national and regional indicators. We follow this approach using annual data from the regions in our sample. We thus estimate vector auto-regressions of the form:[3]

(6) $$Y_{At} = \beta_0 + \beta_1 Y_{At-1} + \xi_t^A$$

(7) $$Y_{it} = \delta_0 + \delta_1 Y_{it-1} + \delta_2 Y_{At} + \delta_3 Y_{At-1} + \xi_{it}$$

with Y_{it} the indicator in region i at time t and Y_{at} the same indicator for the national level, and calculate the share of the national shock in the three-year ahead prediction error.[4]

The results suggest that the importance of national developments of unemployment is somewhat larger in the first round candidate than in EU member states. Around 70% of the three year ahead forecast error of the system in equations 6 and 7, results from innovations in national unemployment development, only 30% of the forecast for region specific innovations. In the EU member states 40% of the forecast error in unemployment rates are due to national factors 60% are due to regional influences. The importance of national developments in participation rates as well as employment growth in first round candidate countries , by contrast, are comparable to member states. In second round candidate countries, region specific developments are slightly more important concerning participation rates and unemployment rates, while differences to both the EU and first round candidate countries concerning other indicators are small.

Similarly, differences among region types are small and arise primarily with respect to unemployment and participation rates. In urban regions the unemployment rate development was characterised by substantial idiosyncratic developments, while in other diverse regions national factors seem to have played a more important role. In agricultural regions participation rate developments have shown above average idiosyncraticity while industrial regions follow national developments more closely. Finally, in agricultural regions employment growth has followed national developments slightly more closely than in other regions. In border regions

[3] These are estimated by single equation estimation using the GMM estimator proposed by Arellano – Bond (1991) see below

[4] Three year ahead forecast errors were used to mimic „medium term" adjustment, results are robust to using two or four year ahead forecast errors.

national developments in participation rates are less important than in non-border regions. This may be attributed to the higher impact of emigration and cross-border commuting in these regions.

Table 3: Share of three year ahead forecast error of national shocks in regional series

	Participation rate	Unemployment rate	employment growth	wage growth
Member States[b)]	0.427	0.395	0.544	0.472
Candidate Countries[a)]	0.456	0.601	0.531	0.490
First Round[a)]	0.494	0.681	0.509	0.487
Second Round	0.314	0.467	0.511	0.498
Border Regions[a)]	0.371	0.583	0.539	0.487
Non-Border Regions[a)]	0.528	0.629	0.482	0.548
Agricultural Regions [a)]	0.436	0.444	0.562	0.517
Industrial Regions [a)]	0.611	0.511	0.444	0.544
Urban Regions [a)]	0.500	0.433	0.477	0.557
Other Diverse regions [a)]	0.486	0.568	0.497	0.563
High Unemployment Regions [a)]	0.377	0.313	0.391	0.539
Low Unemployment Regions [a)]	0.551	0.498	0.545	0.533

Notes: high unemployment rate regions = regions with unemployment rates in excess of 10% in 1998; Low unemployment rate regions = regions with unemployment rates lower than 7% in 1998. Regional typology for candidate countries according to Scarpetta and Huber a) Hungarian data from 1992 to 1997 b) employment growth and participation rate for Germany 1989 – 1994 Excluding overseas territories (Acores and Madeira), Results for region types refer to candidate countries regions only.

The important difference, in region specific developments lies in the important role of region specific shocks in high unemployment regions relative to the smaller role in low unemployment regions. Regional idiosyncratic developments in unemployment and participation rates as well as employment growth have been more important in high unemployment regions of the candidate countries. This suggests that high unemployment rates (and low participation rates) in the high unemployment regions are due to region specific problems to a larger degree than in low unemployment rate regions.

Demand or Supply Shocks

A second issue arising from the model presented in equations (1) to (5) is whether shocks to labour demand or labour supply have been more important in explaining regional labour market development in candidate countries. This too can be addressed at the hands of descriptive statistics. In particular, if average unemployment

rates and employment growth rates are positively correlated, this implies that employment growth is primarily driven by labour supply shocks. If by contrast employment growth is driven by labour demand shocks the two variables will be negatively correlated. We thus estimate a regression of the unemployment rate on employment growth for the time period 1992-1998. The results (see table 4) suggest a significant positive and correlation between annual employment change and average unemployment. The R^2 of this regression, however, is small and the relationship seems to be unstable over time. When looking at shorter time periods (1992-1994 and 1995-1998), a negative relationship between average unemployment and employment growth in the first time period and a positive relationship between the two variables in the second time period can be observed. That is while between 1992 and 1994 reductions in employment growth were associated with simultaneous increases in the unemployment rate. The regression results indicate a „labour supply-driven" change in employment for the period 1995-1998.

Table 4: Relationship between average unemployment and average annual employment growth (in logs) in the Candidate Countries

	1992-1998	1992-1994	1995-1998
Constant	0.103***	0.095***	0.126***
	(0.002)	(0.002)	(0.001)
Ln (Employment Growth)	0.189***	-0.601***	0.807***
	(0.06)	(0.034)	(0.032)
Number of Observations			
Adjusted R^2	0.006	0.318	0.4163

Values in brackets indicate standard errors. ***, ** and * correspond to significance at the 1%, 5% and 10%, respectively.

Econometric Issues

Direct estimation of the Model in equations (1) to (5) is made difficult by the fact that the migration equation (4) and the participation rate equation (3) are difficult to identify separately unless one makes strong assumptions about the relative speed with which migration and participation react to changes in wages and unemployment. Since these assumptions in turn would prejudice findings concerning the speed with which migration adjusts Blanchard and Katz (1992) suggest running trivariate vector autoregressions of the form:

(8) $$\Delta l_t = \varphi_{0i} + \varphi_1(L)\Delta l_{t-1} + \varphi_2(L) er_{t-1} + \varphi_3(L)\, pr_{t-1} + \xi_t^D$$

(9) $$er_t = \phi_{0i} + \phi_1(L)\Delta l_t + \phi_2(L)er_{t-1} + \phi_3(L)pr_t + \xi_t^D$$

(10) $$pr_t = \theta_{0i} + \theta_1(L)\Delta l_t + \theta_2(L)er_{t-1} + \theta_3(L)pr_{t-1} + \xi_t^D$$

with l_t, er_t and pr_t the log of employment, the employment rate (i.e. the negative unemployment rate) and pr_t the participation rate relative to the national at time t. The identifying assumption made in this analysis is that contemporaneous shocks to labour demand affect neither the employment nor the participation rate immediately and that the employment rate does not affect participation contemporaneously. While these assumptions may seem strong, by estimating this model migration can be implicitly calculated from the identity $l_t = er_t + pr_t + pop_t$ (see Fatas, 2000).

There are a number of issues that have to be dealt with in the estimation of the system represented in equations (8) to (10). First, the fact that the system consists of a dynamic panel specification renders the standard least squares dummy variable (LSDV) estimator biased, due to the fact that the error terms are correlated with the right hand side variables (see e.g. Baltagi, 1995). For this reason we estimate the system by single equation estimation using the GMM estimator proposed by Arellano and Bond, (1991).[5] Since the model in (8) to (10) is triangular, given that the error terms (shocks) in (8) to (10) are not autocorrelated and that the variables included in the VAR are not integrated this will lead to consistent estimates of the system (see e.g. Greene, 2000)

Second, the model in (8) to (10) is formulated in region specific variables. In the literature two methods have been proposed to define this region specific variable. Decressin and Fatas (1995) run regressions of the form

(11) $$Y_{it} = \gamma + \gamma_1 Y_{at} + \eta_{it}$$

for each and every region and interpret the residuals of this regression as region specific development, while Blanchard and Katz (1992) use differences between regional and national indicators. In part the choice between

[5]) In simulation studies (see Kiviet, 1995 and Judson and Owen, 1996) this estimator outperforms the LSDV estimator for data sets of our size. To check for robustness, however, the model in (8) to (10) was also estimated using the LSDV estimator and including two lags (rather than one). None of this changes the qualitative results, reported below. Furthermore, results are robust to using two-step rather than one-step estimates. Gacs (2003) uses differences to candidate countries rather than residuals for a subset of countries considered in this study. Her results are comparable to ours (see Appendix).

these methods depends on how closely regional developments follow national trends. For this reason we ran regressions of the regional indicator on the national indicator as in Decressin and Fatas (1992). We find that in these regressions the average γ_1 is close to one in average and R^2 values are high for all countries considered (see table 5). Thus differences between the approaches of Decressin and Fatas (1995) and Blanchard and Katz (1992) should be small, since regional indicators follow national dynamics closely.

Table 5: Results of Specification Tests

	Regression Results*						P-Value of Unit Root test**		
	Employment Rate		Participation Rate		Employment Growth		Employment Rate	Participation Rate	Employment Growth
	γ_1	R^2	γ_1	R^2	γ_1	R^2			
Member States	0.95	0.76	1.16	0.52	1.01	0.97	0.00	0.00	0.00
Candidate Countries	0.99	0.80	0.93	0.62	0.98	0.99	0.00	0.00	0.00
First Round	0.97	0.87	0.91	0.65	0.98	0.98	0.00	0.00	0.00
Second Round	1.01	0.66	0.96	0.57	0.99	1.00	0.00	0.00	0.00
Border regions	0.96	0.70	0.90	0.60	0.88	0.70	0.15	0.00	0.00
Non-border regions	0.93	0.80	0.96	0.65	0.79	0.83	0.00	0.00	0.00
Agricultural Regions	0.89	0.75	0.87	0.59	0.99	1.00	0.00	0.00	0.00
Industrial regions	1.05	0.85	0.99	0.67	0.99	1.00	0.00	0.00	0.00
Urban Regions	0.90	0.81	0.82	0.56	1.01	1.00	0.00	0.00	0.00
Other Diverse	1.10	0.83	0.99	0.66	0.98	0.98	0.00	0.00	0.00
High Unemployment	1.12	0.74	0.89	0.49	0.97	0.99	0.00	0.00	0.00
Low Unemployment	0.77	0.86	1.00	0.80	1.02	1.00	0.00	0.00	0.00

* Columns labelled γ_1 report the average coefficient of a regression of the regional indicator on the national indicator and columns labelled R^2 the average R^2 value of this regressions ** Columns report the P-value of the Im, Persaran and Shin (1997) test for Unit roots of the series of residuals in equation (11). high unemployment rate regions = regions with unemployment rates in excess of 10% in 1998; Low unemployment rate regions = regions with unemployment rates lower than 7% in 1998. Regional typology for candidate countries according to Scarpetta and Huber Hungarian data from 1992 to 1997 employment growth and participation rate for Germany 1989 – 1994 Excluding overseas territories (Acores and Madeira), Results for region types refer to candidate countries regions only.

A further influence on the choice is whether the resulting series are stationary. Fatas (2000) shows that implicitly these procedures represent a detrending method, and the choice of method may have implications for findings. He finds that operating with differences between regional and national indicators yields results intermediate to using the raw indicators and the method used by Decressin and Fatas (1995). We thus conducted Im, Persaran and Shin (1997) panel unit root tests on the residuals of equation (11). Starting from a specification as:

(12) $$\Delta y_{it} = \alpha_i + \rho_i y_{it-1} + \xi_{it}$$

With y_i the residual of (11). This test 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 , and $\rho_i = 0$ for all i=N_1+1, ..., N (see Banerjee, 1999, Maddala and Wu, 1999 for comparisons of panel unit root tests). Results reported in table 5 suggest that for the transformed series the null (of a unit root) can be rejected for all series at the national level and almost all series regionally. Thus for the remainder of the paper we follow the approach of Decressin and Fatas (1995).

Third, the lag length of the lag polynomials of (8) to (10) has to be determined. To decide on this we performed a number of specification tests using lag lengths from one to three for all lag polynomials. In general models using lags of length one performed best in terms of parameter significance of included lags, tests for autocorrelations of the residuals and when conducting tests of instrument exogeneity for the Arellano Bond estimates. Thus below we report results for models using a lag of one.

Table 6: Persistence of regional Development

	participation rate		unemployment rate		employment growth	
First Round 1992-1998	0.231** (0.023)	T=7 [a)] N=143	0.168 (0.070)	T=7 N=143	-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	-0.053 (0.063)	T=6 [a)] N=74
EU 1992-1998	0.693*** (0.132)	T=5 N=68	0.390*** (0.107)	T=5 [a)] N=68	-0.392** (0.155)	T=4 N=68
Border Regions	0.229*** (0.066)	N=25	0.286** (0.126)	N=25	-0.269*** (0.080)	N=25
Non- Border Regions	0.213*** (0.032)	N=185	0.486*** (0.032)	N=185	-0.159*** (0.032)	N=185
Agricultural Regions	0.172*** (0.022)	N=71	0.407*** (0.075)	N=71	-0.191*** (0.041)	N=71 T=
Industrial Regions	0.210*** (0.024)	N=61	0.650*** (0.155)	N=61	-0.162*** (0.024)	N=61
Urban Regions	0.235** (0.082)	N=26	0.276*** (0.092)	N=26	-0.210*** (0.054)	N=26
Other Diverse Regions	0.119** (0.047)	N=50	0.456*** (0.140)	N=50	-0.170** (0.081)	N=50
high unemployment	0.220** (0.028)	N=96	0.491*** (0.079)	N=96	-0.172*** (0.042)	N=107
low unemployment	0.195** (0.017)	N=55	0.430*** (0.054)	N=55	-0.130*** (0.032)	N=60

Note: Results report the coefficient of regression (2), values in brackets are standard errors of the estimate, a) indicates that the null of second order auto-correlation as suggested by Arellano – Bond cannot be rejected at the 5% level *** (**) (*)coefficients are significantly different from zero at the 1% (***), 5% (**) and 10% (*) level. German employment growth and participation rate 1989 – 1994, excluding Portuguese overseas territories (Acores and Madeira) Hungarian data from 1992 to 1997 ..high unemployment rate regions = regions with unemployment rates in excess of 10% in 1998; Low unemployment rate regions = regions with unemployment rates lower than 7% in

1998. Regional typology for candidate countries according to Scarpetta and Huber. Results for region types refer to candidate countries regions only. T= maximum number of time periods, N= number of cross sectional units.

Univariate Processes

Before estimating the model presented in equations (8) to (10) we also estimated univariate processes of the form:

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

where $\bar{\eta}_{it}$ is the estimated residual of equation (11) for each of the indicators entered in our regression, α_i is a region specific fixed effect, while δ_1 is a measure of the persistence of the indicator.

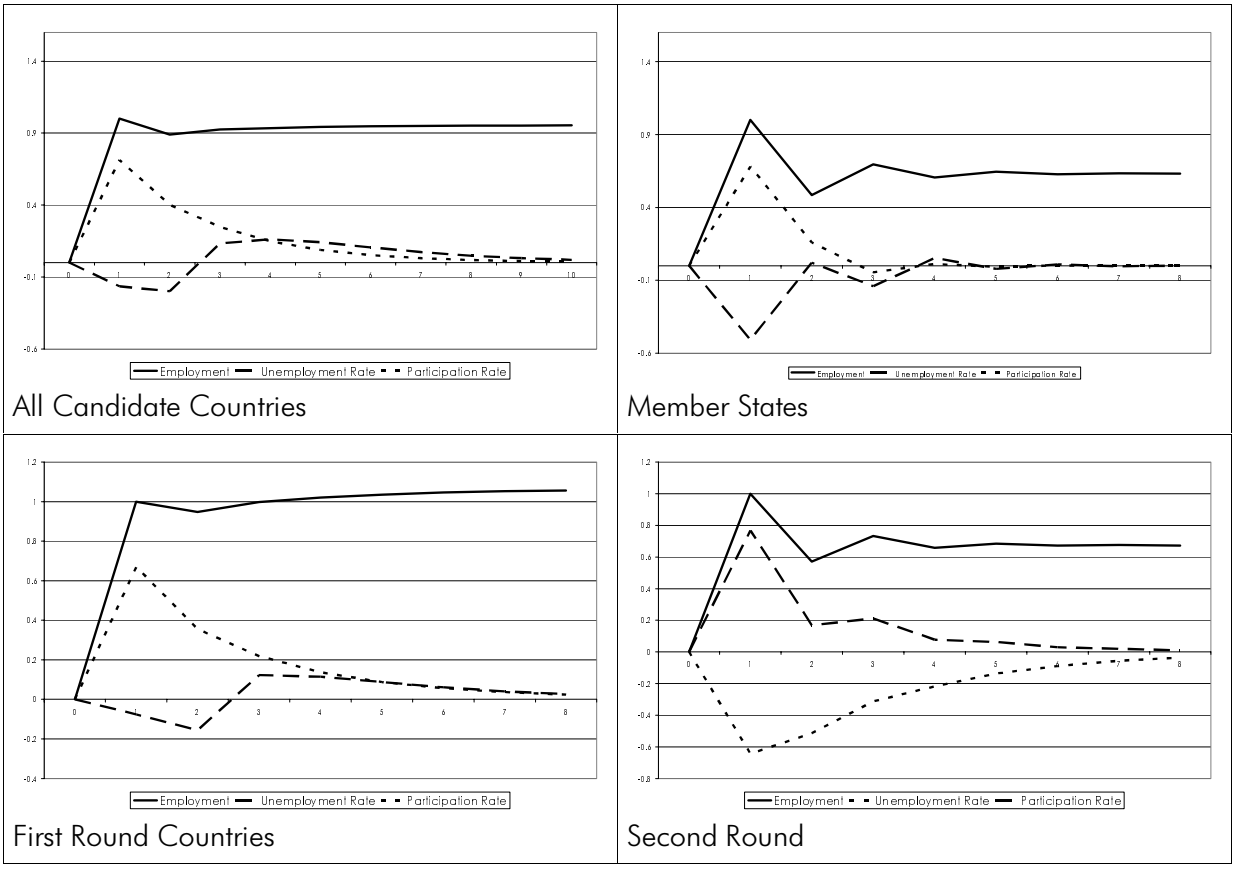
In accordance with the literature on EU member states (see Fatas, 2000, Decressin and Fatas, 1995) we find low persistence of employment growth rates in the EU, but high levels of persistence for both unemployment and participation rates (see: table 6). For first round candidate countries by contrast, we find comparable persistence in employment growth rates but significantly lower persistence of unemployment and participation rates. In the second round candidate countries unemployment rates are as persistent as in the EU. Differences among region types seem to be small, however. Except for unemployment being less persistent in urban regions and more persistent in industrial regions there are no significant differences between region types. High unemployment regions have a slightly higher persistence in unemployment and participation rates and in non – border regions persistence in unemployment rates is also higher than in non-border regions.

Multivariate Results

Figure 2 displays the estimated impulse response functions of the model considered in equations (8) to (10). This figure shows the reaction of relative employment, relative unemployment rates and relative participation rates in a „typical“ CEE region to a unit relative labour demand shock. An increase relative in employment in period t=1 has a large and persistent impact. While in the first year after the shock (t=2) 89 percent of the initial increase is present, by the third year (t=4) this amounts to 94 percent. In member states unemployment is slightly less persistent. After three years 69.3% of the original shock persists. This finding is not surprising when considering the substantial employment decline in Central and Eastern European regions in the years of transition. The

increase in relative employment is primarily accommodated by relative participation rates, while relative unemployment rate dynamics play a smaller role in the reaction. Adjustment via labour force participation and employment rate peak after one year and then steadily decline to their long run level in all country groups. In candidate countries this return takes 4 years and in member states the process ends after 3 years. Differences between first and second round candidate countries are particularly pronounced with respect to the persistence of the employment change, which is more persistent in first round countries, and the reaction of unemployment rates, which are more persistent in second round candidate countries.

Figure 2: Impulse Response of relative employment, relative employment rate and relative participation rate to a unit shock in relative employment



The calculations are based on single equation robust Arellano-Bond estimations of log relative employment, log relative participation rate (participation rate defined as labour force to total regional population) and log relative employment rate where relative refers to relative to the CEEC average. Hungarian data from 1992 to 1997 employment growth and participation rate for Germany 1989 – 1994 Excluding overseas territories (Acores and Madeira),

These differences, however, should be interpreted in the light of results in the literature. In table 7 we thus report the share of the first year shock accommodated by changes in the unemployment rate, participation rate and migration within one year, reported in estimates in the literature. This table suggests that the results for EU member states are comparable to those of other studies of the European Union. The only counterintuitive result is that a negative demand shock on the region leads to a slight immigration rather than emigration in member states. This is, however, not uncommon in the literature. In particular Fatas (2000) reports similar dynamics for Germany (one of the countries in our study) and the UK. These results can be attributed to the fact that in times of low labour demand commuters, who have previously worked in other region will register unemployed at their place of residence. Thus increasing measured labour supply in the home region in bad times. Thus we conclude that even though our observation period is relatively short, we are capable to capture the major features of labour market adjustment in the EU.

Results for second round candidate countries by contrast are somewhat implausible. As shown in Table 7 we find that a unit shock to labour demand leads to an immigration of half of the original shock. Thus the unemployment rate increases by 76% of the original shock and participation accommodates for another 54%. One explanation for these strange results could be the substantial differences in national reporting systems of registered unemployed in some of the second round candidate countries.[6]

With respect to the first round candidate countries our results indicate that adjustment is well within the realms of the parameters usually found in the European Union. In particular, unemployment rate reactions accommodate 10% of the initial shock. A figure that is comparable to Sweden, the Netherlands, Germany and the U.K. and migration accounts for 21% of the shock which seems relatively large, but is plausible in the context of the smaller region size in candidate countries and comparable to Spain, Sweden and Belgium. With respect to the non-European OECD member states listed in table seven, however, candidate countries appear to be typical

[6]) Since in Romania persons with land ownership in excess of one hectare are not considered unemployed and restitution has given many persons such ownership this may distort results. A further reason could be that there are only few cross sectional units in the second round candidate countries, which may impinge on the quality of estimates.

European countries. As in most of the EU participation rate adjustments carry the largest part of the adjustments and in contrast to the US and Australia unemployment rate and migration are of relatively minor importance.

Thus although the candidate countries appear to be comparable to many member states the difference between the two regions seems to lie a in the size of past shocks and the persistence of employment gains. The standard deviation of the residual of equation (8) which can be interpreted as the size of the regions specific labour demand shock is substantially higher in candidate countries (both first and second round) than in member states. Also changes in employment are substantially more persistent in the candidate countries. The adjustment to the shock in employment ends at a level of around 90% the original in the candidate countries but at 69% in the member states (see Table 8).

Table 7: Comparison of Shares of Shock Accommodated by Alternative Variables in the Literature

	Employment Rate	Participation Rate	Net Migration
Europe (1975 – 1987, 51 Regions)	22	75	4
Spain* (1976 – 1994, 17 regions)	36	23	41
Sweden (1966 – 1993, 24 regions)	8	26	66
Finland (1976 – 2000, 11 regions)	27	65	8
Netherlands* (1993 – 1999, 18 regions)**	14	74	12
Belgium (1970 – 1995, 3 Regions)[a)]	-4 to 22	3 to 33	45 to 99
Germany (8 regions, 27 years)	12	93	-5
Italy (11 regions, 27 years)	37	62	1
UK (11 regions, 27 years)	12	91	-3
US (1978 – 1990, 51 States)	34	26	40
Australia (1978 – 1997, 7 States)	20	40	40
This Paper			
Member States	35	68	-3
Candidate Countries overall (200 regions)	16	71	12
First Round (1992 – 1998, 141 regions)	10	69	21
Second Round (1992 – 1998, 69 regions)	54	76	-41

Sources: Decressin and Fatas (1995) for Europe, Jimeno and Bentolila (1998) for Spain, Fredrickson (1998) for Sweden, Pekkala and Kangasharju (2002) for Finland, Boersma and van Dijk (2002) for the Netherlands, Deglaigle and Lohest (1999) for Belgium, Blachard and Katz (1992) for US and Debelle and Vickery (1998) for Australia Fatas (2000) for Germany, Italy, UK (approximate figures estimated from graphs)* Quarterly Data, ** First quarter a) separate for each of three regions. Own results are based on single equation robust Arellano-Bond estimations of log relative employment, log relative participation rate (participation rate defined as labour force to total regional population) and log relative employment rate where relative refers to relative to the CEEC average. Hungarian data from 1992 to 1997 employment growth and participation rate for Germany 1989 – 1994 Excluding overseas territories (Acores and Madeira),

Table 8: Dynamic Behaviour of Employment by Country Groups

	Size of Shock	% of shock remaining after One year t=2	% of shock remaining after three years t=4
Member States	0.021	68.5	69.5
Candidate Countries	0.055	89.5	93.4
First Round	0.056	94.7	102.0
Second Round	0.046	57.0	65.9

The calculations are based on single equation robust Arellano-Bond estimations of log relative employment, log relative participation rate (participation rate defined as labour force to total regional population) and log relative employment rate where relative refers to relative to the CEEC average. Hungarian data from 1992 to 1997 employment growth and participation rate for Germany 1989 – 1994 Excluding overseas territories (Acores and Madeira),

Regional Differences

We also estimated model (8) to (10) for the region types in the Scarpetta and Huber (1995) taxonomy, border and non border regions as well as for high and low unemployment rate regions (see Table 10 and Figures in the Appendix). In a number of cases these results are highly unreliable due to the low number of regions. This is the case for urban and diverse regions in the case of the Scarpetta and Huber taxonomy and for border regions. In all these cases the number of cross-sectional observations is smaller or equal to fifty. Thus we focus on results of non-border regions only and merge urban and other diverse regions into one category.[7]

Table 9: Dynamic Behaviour of Employment and first year Adjustment by Region types

				Share of shock accommodated in the first year by...		
	Size of Shock	% of shock remaining after One year t=2	% of shock remaining after three years t=4	Employment Rate	Participation Rate	Net Migration
Non Border Regions	0.056	90	94	19	72	9
Agricultural Regions	0.057	62	64	46	71	-19
Industrial Regions	0.052	78	79	28	74	-2
Diverse Regions	0.053	100	100	7	68	25
Low unemployment regions	0.049	68	69	24	74	2
High unemployment regions	0.062	81	79	45	75	-20

Note: German employment growth and participation rate 1989 – 1994, excluding Portuguese overseas territories (Acores and Madeira) Hungarian data from 1992 to 1997 ..high unemployment rate regions = regions with unemployment rates in excess of 10% in 1998; Low unemployment rate regions = regions with unemployment rates lower than 7% in 1998. Regional typology for candidate countries according to Scarpetta and Huber. Results for region types refer to candidate countries regions only.

In general results indicate that differences among region types are driven by the persistence of the employment shock and the relative importance unemployment rates and migration in the adjustment. While in border regions persistence in relative employment and the share of the shock accommodated in the first year by the

unemployment rate and migration resemble that of candidate countries overall, there is some heterogeneity when considering region types according to the Scarpetta and Huber Taxonomy. In particular agricultural regions are characterized by low persistence of employment shocks and a high reaction of unemployment rates, while in diverse regions the opposite is the case. In these regions employment shocks are highly persistent and migration plays an important role in adjustment.[8]

Finally, high unemployment regions differ from low unemployment regions by the fact that high unemployment regions have been subjected to larger asymmetric shocks, a higher persistence of employment changes (which were mostly employment declines in these regions), and a higher importance of adjustment through unemployment rates.

Conclusions

This paper analysis the adjustment of regional labour markets of candidate countries to asymmetric shocks. We find that idiosyncratic region specific developments in unemployment are of a smaller importance in first round candidate countries, while concerning other labour market indicators few differences can be found to the EU. In second round candidate countries region specific developments in participation rates are more important than in member states. Furthermore, in contrast to EU member states, candidate countries have experienced larger region specific shocks to labour demand, and that these shocks tend to be more persistent than in member states. Otherwise member states regions are typical European regions in many respects. In particular as in the EU and in contrast to non-European OECD member states adjustments in the participation rate play a large role and adjustments in migration a small role.

We also find that regional typologies based on sectoral specialisation indicate that urban regions have experienced a substantially more favourable and industrial and peripheral regions a less favourable labour market development throughout transition. Some of these differences as well as the differences between high and

[7] Impulse responses for region types are displayed in the Appendix

[8] This accords with the results of Gacs (2003), who finds relatively similar adjustments in using a slightly different typology and for border regions and non border regions

low unemployment rate regions may be attributable to differences in the adjustment of regions to shocks in labour demand. In particular high unemployment rate regions were characterised by larger (mostly negative) shocks to labour demand, a higher persistence of these shocks, and larger adjustment through unemployment rates rather than migration. This suggests that in particular in these high unemployment regions policy aimed at enhancing the mobility of labour could be particularly helpful in reducing unemployment.

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Appendix 1: Data Description & Sources

Data Definitions

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

Unemployment Rates: Registered unemployment rates are measured at the end of the year (31.12.) for the Czech Republic, Poland, Hungary and Slovakia. In Bulgaria, Romania they are annual averages.

Population: Refers to the average population for all countries

Participation Rates: Are measured in % of total population and were calculated appropriately from employment figures and unemployment rates in all countries.

Dealing with data Problems

Furthermore in some cases changes in reporting system and regional aggregation needed to be overcome: In the Czech Republic in 1996 the district of Jesenik was formed from the territories of Sumperk and Bruntal. Thus for Czech data 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 establishment level statistics are provided. Due to these changes 1998 data were omitted.

Data Sources

Czech Republic - Cesky Statisticke Urad (CSU): Okresy Ceske Republiky (Okresy of the Czech Republic), years 1992 - 1998

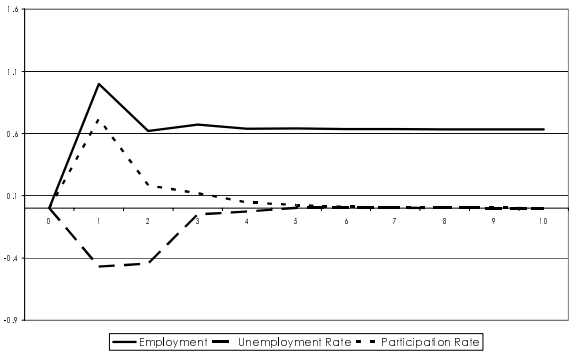
Poland - Glowny Urzad Statystyczny (Polish Statistical Office) Rocznik Statystyczny Wojewodztw, various issues, 1992 - 1999

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

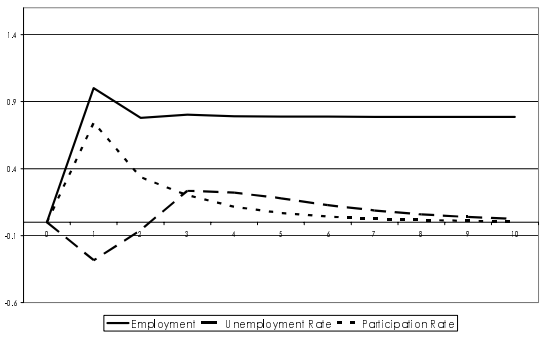
Bulgaria, Romania – Respec database (REGSTAT) see Iara and Traisturu (2002) for descriptions

APPENDIX 2: IMPULSE REPONSE FUNCTIONS BY REGION TYPES

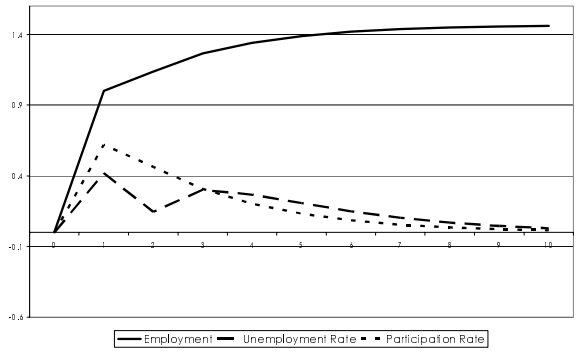
Agricultural Regions



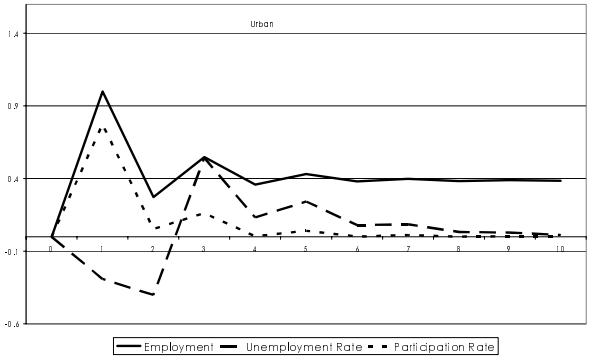
Heavily Industrialised Regions

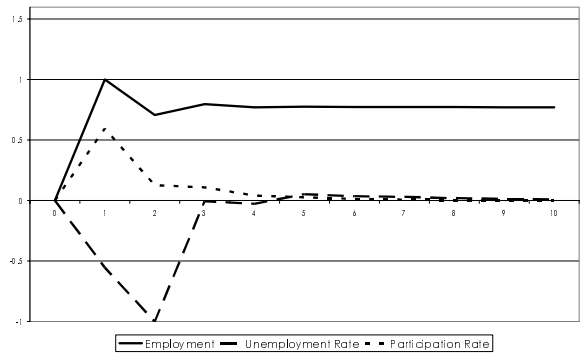


Diversified Regions

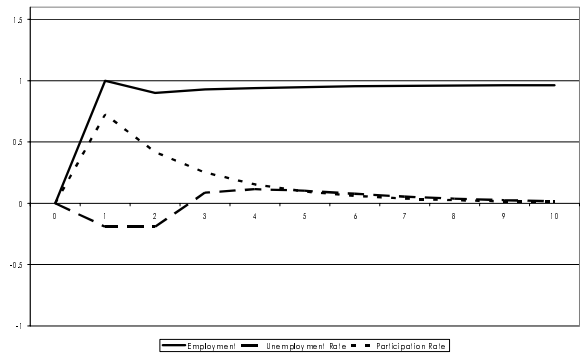


Urban Regions

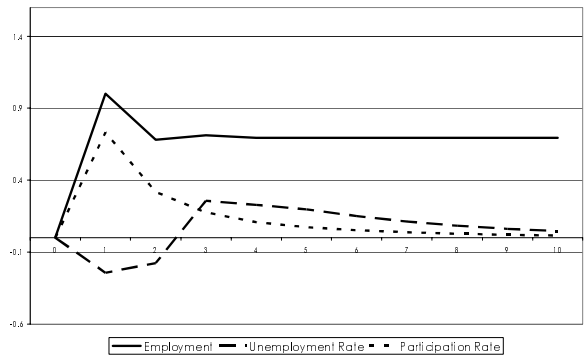




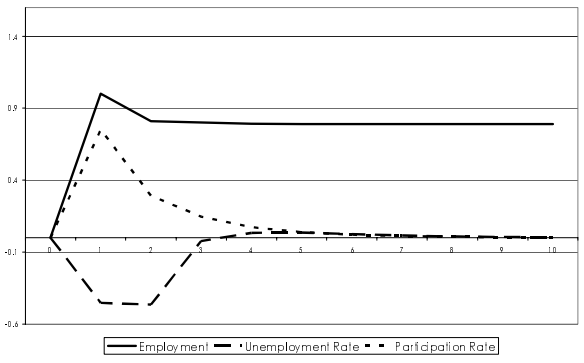
Border Regions



Non Border Regions



Low Unemployment Rate



High Unemployment Rate

Appendix 3: Robustness of Results

This Appendix presents results concerning the robustness of estimates. First, Table A3.1 and A3.2 compare our results to LSDV estimates and to estimates where the regions specific innovation is defined as the difference to the candidate countries average (in Gacs, 2003). Figure A3.1 reports overall Impulse responses using two lags rather than one and in the last section (Figures A3.2 to A3.4) impulse responses using Gacs' (2003) and LSDV estimation results are displayed.

Table A3.1: Comparison of Shares of Shock Accommodated by Methods

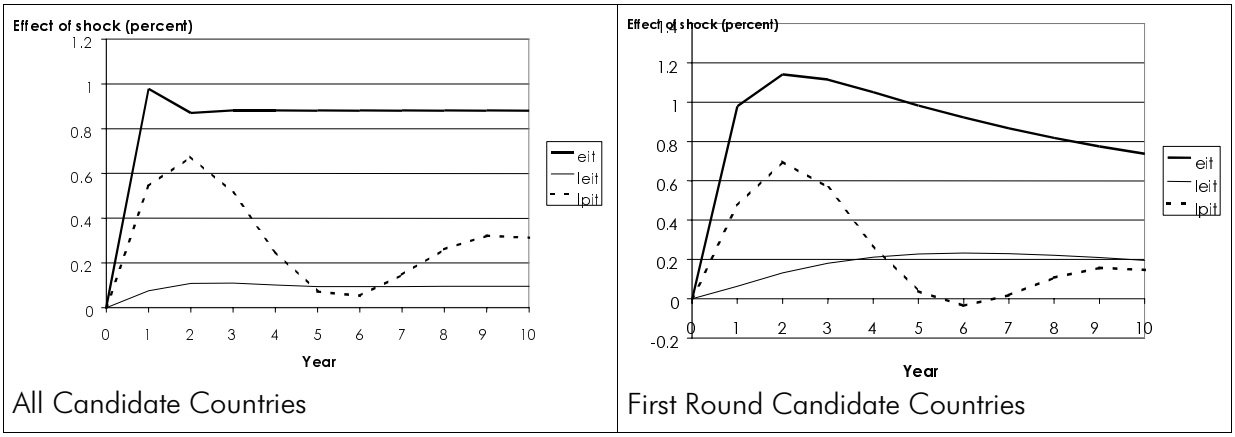
	Employment Rate	Participation Rate	Net Migration	Employment Rate	Participation Rate	Net Migration
	LSDV Estimation			Relative to CC average (Gacs 2003)		
Overall	54	60	-14	10	68	22
First Round	19	75	6	2	90	1
Second Round	90	62	-53			
MS	34	68	-2			
Aggr	46	64	-10	29	62	7
Ind	72	63	-35	11	55	33
Urban	18	63	55	4*	68	30
Other	7	31	76			
High un	12	58	30			
Low un	73	68	-31			
non border				15	62	23

Table A3.1: Comparison of Size and Persistence of Shocks by Methods

	Size of Shock	% of shock remaining after One year t=2	% of shock remaining after three years t=4	Size of Shock	% of shock remaining after One year t=2	% of shock remaining after three years t=4
	LSDV Estimation			Relative to CC average (Gacs 2003)		
Overall	0.019	0.6	0.6	0.15	0.5	0.5
First Round	0.018	0.6	0.6	0.18	0.8	0.6
Second Round	0.023	0.5	0.3			
MS	0.013	0,6	0.6			
Aggr	0.014	0.6	0.6	0.11	0.7	0.5
Ind	0.018	0.5	0.6	0.09	0.6	0.4
Urban	0.017	0.6	0.6	0.19	0.5	0.5
Other	0.022	0.7	0.7			
High un	0.016	0.6	0.6			
Low un	0.015	0.0	-0.1			
non border				0.15	0.5	0.5

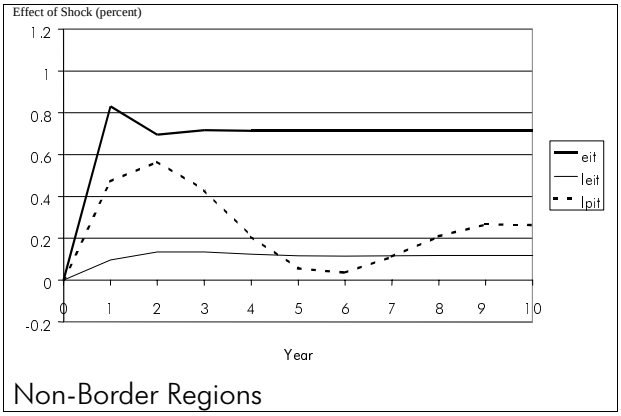
Figure A3.1 Impulse responses for Candidate Countries with lag length two

Figure A3.2: Impulse Response of relative employment, relative employment rate and relative participation rate to a shock of one standard deviation in relative employment



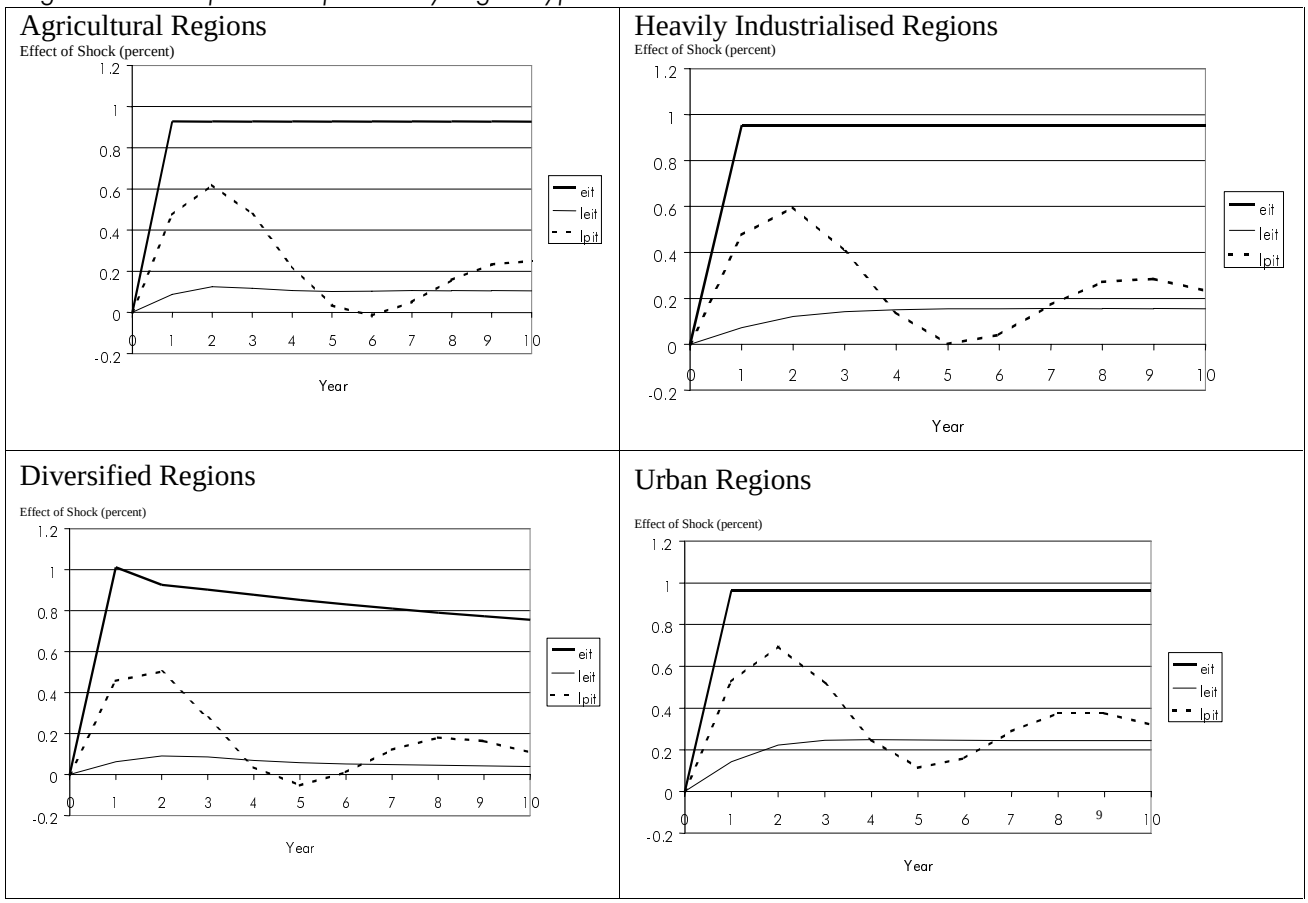
The calculations are based on single equation robust Arellano-Bond estimations of log relative employment, log relative participation rate (participation rate defined as labour force to total regional population) and log relative employment rate where relative refers to relative to the CEEC average

Figure A3.3: Non-border regions: Impulse Response of relative employment (in first differences), relative employment rate and participation rate to a positive unit labour demand shock



The calculations are based on single equation robust Arellano-Bond estimations of log relative employment growth, log relative participation rate (participation rate defined as labour force to total regional population) and log relative employment rate where relative refers to relative to the CEEC average

Figure A3.4: Impulse Responses by region type LSDV Estimator



Unemployment Disparities and Regional Wage Flexibility: Comparing EU Member States and Accession Countries

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April, 2003

Abstract: This paper provides empirical evidence on regional labor market flexibility in Europe and, in particular, in the accession countries. Whereas substantial disparities in unemployment are found both for EU member countries as well as for accession countries, the empirical results point to a lower persistence in accession countries. At the same time regional wage flexibility is found higher for accession countries. This suggests that in face of significant regional shocks arising from EU-integration, accession countries show a higher degree of adjustment capability of regional labor markets.

Keywords: Regional labor markets, Wage flexibility, Regional Disparities, EU-Enlargement, Accession countries

JEL Classification: R23, J3

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1 Introduction

The accession of several countries in Central and Eastern Europe to the EU raises the question as to what extent those countries as well as the EU member states are prepared for economic integration. Based on the experience of EU integration one would expect that the extent and speed of integration will be different across markets. Product markets will probably undergo a quick and deep integration process. Capital markets such as the market for equities will also be candidates for substantial integration although exchange rate risks and other uncertainties will tend to prevent unlimited mobility. At the labor markets, however, the experience in the EU suggests that differences in languages, cultural background, and institutional barriers impede a deep integration process. The resulting lack of flexibility in the labor market is often seen as the key problem undermining the gains from European economic integration. This is also the case with regard to the regional dimension of the labor market, since EU members show strong spatial segmentation in their labor markets as shocks to the regions differ and equilibrating flows across regional labor markets are small. As a consequence, EU members states are characterized by persistent regional disparities in their labor markets, in particular, by regional disparities in unemployment. These disparities are a sign of a lack of flexibility within and across labor markets and document insufficient adjustment capabilities. Moreover, as the regional incidence of unemployment differs these disparities create demands in the political domain for subsidies for downsized industries and regional transfers, which tend to suppress structural change. Thus, as the regional incidence of various consequences of economic integration differs, the flexibility of regional labor markets plays an important role in determining to what extent potential gains from economic integration can actually

be realized. This refers particularly to the accession countries where the integration into the common market of the EU constitutes a rather big challenge which is likely creating strong pressures on the spatial allocation of production. Given this background, this paper sheds light on the flexibility of regional labor markets in accession countries as compared to EU member states. As we will see below, in this respect the outlook on the challenge of EU enlargement is not so grim for accession countries as they display significantly higher regional labor market flexibility as compared to some of the current EU-members. This result is generally in accordance with Blanchflower (2002), who presents some micro-level wage-curve estimates for eastern and central European countries and also finds rather high elasticities.

To assess the extent of adjustment failure the following section analyzes the extent of regional disparities in unemployment across the considered countries. Section 3 then, focuses on regional wage flexibility. Section 4 provides the conclusions.

2 Variation and Persistence in Regional Unemployment

Even though some aspects of labor market performance could be analyzed more thoroughly using micro-level data which allow to control for individual characteristics this study uses annual data aggregated at the regional level as this yields a much broader coverage of regions, countries and years. To study the regional labor market performance this study has assembled a dataset for 343 regions in 13 countries over the years from 1989 to 1999. Table 1 displays the regional disaggregation for each country. The data cover regions in 5 EU-member states, as well as in 8 accession countries. Although,

Table 1: NUMBER OF REGIONS AND OBSERVATIONS BY COUNTRY

	Regions		Observations	
country name	Freq.	Percent	Freq.	Percent
Bulgaria	28	8.16	252	9.10
Czech Republic	77	22.45	677	24.45
Estonia	5	1.46	25	0.90
Germany	16	4.66	146	5.27
Hungary	20	5.83	140	5.06
Italy	20	5.83	200	7.22
Netherlands	12	3.50	120	4.33
Poland	49	14.29	392	14.16
Portugal	7	2.04	45	1.63
Romania	41	11.95	328	11.85
Slovakia	38	11.08	228	8.23
Slovenia	12	3.50	36	1.30
Spain	18	5.25	180	6.50
Total	343	100.00	2769	100.00

there are many missing values there is a total of 2769 nonzero wage and unemployment observations.

To get an impression of the magnitude of unemployment differentials Table 2 displays statistics for the unemployment rates in the data set. The first two columns report means and standard deviations across regions and time for the levels. Columns (3) to (5) refer to the difference between the regional unemployment rate and the time specific mean. Column (3) reports the mean, columns (4) and (5) report extreme values. We see that although some accession countries like Poland, Slovakia, and Bulgaria show a high standard deviation for the unemployment differential (above 4) the strongest variation is found for two member states (Italy and Spain). This indicates that regional disparities in unemployment are important not only in the accession countries.

Table 2: REGIONAL UNEMPLOYMENT DISPARITIES

		Unemployment Rate				
		levels		diff. to mean		
		(1)	(2)	(3)	(4)	(5)
country name	years	mean	std.dev	std.dev	min	max
Czech Republic	9	3.98	2.68	1.97	-6.18	7.83
Germany(West)	11	7.04	2.52	2.14	-3.35	5.84
Germany	9	9.92	4.80	4.52	-6.53	9.87
Italy	11	11.0	6.62	6.48	-9.12	16.4
Netherlands	11	6.25	1.89	1.19	-2.49	4.61
Poland	9	14.0	5.56	4.45	-11.4	12.1
Portugal	9	5.74	2.69	2.31	-3.63	6.54
Slovakia	6	14.6	5.02	4.62	-13.6	11.9
Slovenia	4	14.7	4.19	3.98	-6.04	9.29
Spain	11	18.5	5.98	5.39	-9.46	14.4
Hungary	8	11.0	3.78	3.60	-7.14	7.76
Bulgaria	9	14.1	5.10	4.32	-12.1	10.9
Estonia	5	5.84	1.73	1.58	-2.68	3.26
Romania	8	9.98	3.70	3.31	-7.42	12.8

Although Table 2 displays the extent of regional disparities, it, however, does not indicate whether a region deviating from the national average in a particular direction at a given period also does so in the next period. In other words, it does not reveal information concerning the persistence of the disparities. This is a crucial issue as it is the persistence of regional disparities in unemployment which makes regional unemployment a public concern.

In principle, the persistence of disparities could be explored by analyzing the time-series properties of regional unemployment rates. But, since the time-period of the data available for each region is in some cases extremely short, it seems difficult to apply a standard analysis of the stationary of regional differences using panel unit root statistics (*e.g.*, Im, Pesaran, and Shin, 2002). A more reasonable approach in the current context is to

Table 3: PERSISTENCE OF REGIONAL UNEMPLOYMENT DISPARITIES

	Dependent variable: $\ln \Delta u_{i,t}$				
	(1)	(2)	(3)	(4)	(5)
$\ln u_{i,t-1}$	-.173	-.241		-.076	
	(.011)	(.018)		(.014)	
$M_i \times \ln u_{i,t-1}$			.003		-.040
			(.022)		(.012)
$A_i \times \ln u_{i,t-1}$			-.312		-.089
			(.023)		(.019)
R^2	.449	.488	.514	.853	.854
Dataset	EU	EU	EU	EU	EU
Country Dummies	no	yes	yes	yes	yes
Time Dummies	yes	yes	yes	yes	yes
Interaction of Dummies	no	no	no	yes	yes

Pooled sample with 2593 0bservations.

check for the correlation in unemployment across time using a regression of the change in unemployment on the lagged level of unemployment. Table 3 displays corresponding results. Column (1) to (5) report results of a regression including the total sample. Column (1) shows that there is a common trend towards mean reversion in the European wide distribution of regio-temporal unemployment rates. Column (2) shows that the speed of this process is even higher if we condition on a given distribution of unemployment rates across countries, i.e. if we take as given that there are differences in unemployment between countries. Column (3) allows the speed of adjustment to be different for two groups of countries, the member states and the accession candidate countries. It turns out that the speed of adjustment is drastically different. Whereas for member states regional unemployment rates do not show a tendency of adjusting towards the long-run level specific to each country, there is quick adjustment in the accession countries. However, a part of this adjustment occurs from nationwide fluctuations in unemployment which -

due to the transition process - might be more important among the candidate countries. Therefore it seems reasonable to focus on the regional component of unemployment and to condition on the current national unemployment rate in each country by employing the full set of interaction terms between country and time dummies. The corresponding results presented in Column (4) are thus obtained by taking as given the current level of unemployment in each country. This specification is most appropriate if we want to discern the evolution of regional disparities within countries. Even though the adjustment is still significant it turns out that the adjustment speed is slower. The last two columns again test for differences in the adjustment speed of member states and accession candidate countries indicating that the adjustment speed is twice as large for candidate countries as compared to member states.

3 Exploring Wage Flexibility

There are a couple of possible explanations for differences in the persistence of regional unemployment disparities. Basically, explanations can be distinguished with respect to adjustment *across* and *within* regions. Adjustment across regions refers to the mobility in particular of labor and capital, *i.e.* to migration and investment flows. Adjustment within regions to labor demand shocks is shaped by wage flexibility.

To study the extent of regional wage flexibility there are basically two different approaches established in the literature. The traditional approach rests on a Phillips curve and relates wage growth and unemployment (*e.g.*, Hyclak and Johnes, 1989). The alternative approach rests on the wage curve (Blanchflower and Oswald, 1994), which aims at an

estimate of the correlation between individual wages and regional unemployment controlling for composition and regional effects. There has been some discussion about whether these two concepts show some overlap (*e.g.*, Card, 1995). In fact, the rational for the two concepts is remarkably different, the first pointing at a dynamic adjustment towards a labor market equilibrium the other dealing with the determinants of wages in labor market equilibrium. However, for the topic of regional adjustment the latter is more relevant since relocation of labor and capital in space involves sunk cost, and, thus, the expectation of local conditions in equilibrium is probably more important for regional adjustment than is the current state of disequilibrium. Therefore, the following analysis focuses on the concept of the wage curve. However, there is a second difference between the traditional analysis and the wage curve relating to the use of aggregate or individual level data. It can be argued that using aggregate data the dynamics are more important and that the estimate of the unemployment elasticity of pay might improve when embedded into a dynamic estimation approach (Buettner, 1999).

In a first step we simply measure the correlation between wages and unemployment in panel regressions with fixed country-specific time effects and fixed regional effects. Formally, for each country the following regression is estimated

$$\ln w_{r,t} \quad = \quad c_1 \ln u_{r,t} + a_r + d_t + \epsilon_{r,t}. \tag{1}$$

This yields rough indicators of what has been referred to as the unemployment elasticity of pay (Blanchflower and Oswald, 1994). Column (1) of Table 4 displays the results obtained for each individual country. In most cases the unemployment elasticity of pay is significantly negative. As compared to the member states the estimates for the accession

Table 4: REGIONAL UNEMPLOYMENT ELASTICITY BY COUNTRY

	(1)		(2)		(3)	
country name	Elas.	Rnk.	Elas.	Rnk.	Elas.	Rnk.
Bulgaria	-.081	2	-.089	1	-.098	1
	(.017)		(.018)		(.019)	
Czech Republic	-.023	7	-.008	7	-.021	6
	(.006)		(.006)		(.007)	
Estonia	.062	12	.052	10	.052	11
	(.090)		(.103)		(.103)	
Germany	.005	10	-.005	8	-.007	7
	(.019)		(.015)		(.015)	
Hungary	-.088	1	-.073	2	-.082	2
	(.025)		(.025)		(.026)	
Italy	-.011	8	-.005	8	-.005	8
	(.018)		(.019)		(.019)	
Netherlands	-.040	6	-.036	5	-.039	5
	(.016)		(.014)		(.015)	
Poland	-.058	4	-.064	3	-.064	3
	(.016)		(.016)		(.016)	
Portugal	-.048	5	-.039	4	-.039	5
	(.031)		(.029)		(.029)	
Romania	-.010	9	-.004	9	-.004	9
	(.010)		(.010)		(.010)	
Slovakia	-.060	3	-.036	5	-.061	4
	(.028)		(.021)		(.026)	
Slovenia	.011	11	-.012	6	.012	10
	(.025)		(.016)		(.016)	
Spain	.075	13	.080	11	.082	12
	(.025)		(.023)		(.023)	

All specifications report estimates from a simple regression of log wages on log unemployment using country-and-time-specific as well as region-specific fixed effects. Estimates reported in Columns (2) and (3) have been obtained using additional control variables reflecting the industry composition of employment. Estimates in Column (3), finally, use spatial window averages of unemployment (see text). For Germany, Italy, Netherlands, Slovakia, Spain, Hungary the spatial window averages are based on neighborhood definition with a radius of 100 km. For Czech Republic and Poland, the radius is 60 km. In the case of Romania the radius is 40km, Portugal, Estonia, and Slovenia use the local unemployment rate.

countries tend to show higher elasticities in absolute terms. This is also indicated by the ranking in terms of the unemployment elasticity of pay. Accordingly, Hungary, Bulgaria, and Slovakia show the strongest elasticities. On the other side of the spectrum there are countries like Spain, Germany, and Italy. Slovenia and Estonia are special cases as their smallness casts doubt on the appropriateness of an investigation approach focusing on relative regional labor market conditions. Of course, even in the accession countries, the unemployment elasticity is generally lower than the figure of -0.1 found by Blanchflower and Oswald for a number of countries. However, whereas the standard wage curve controls for individual differences in sex, age, and education, none of those additional control variables are present here, only regional and time fixed effects are included. Therefore, the raw correlation might suffer from composition effects and hence might underestimate the slope of the "wage curve". Now, it proved difficult, to get comprehensive and consistent information about the composition of the workforce at the regional level throughout Europe, in particular since we need to include the accession countries. But, at least some rudimentary control for composition effects is possible utilizing measures of the sectoral composition of employment. Column (2) provides estimates obtained from regression which include the employment shares of agriculture and services as control variables. Denoting the vector of control variables at region r as of period t with $x_{r,t}$ the corresponding equation is

$$\ln w_{r,t} = c_1 \ln u_{r,t} + c_2 x_{r,t} + a_r + d_t + \epsilon_{r,t}. \quad (2)$$

However, the results are more or less the same. At least the general impression of lower wage flexibility in the European Union members states is confirmed.

Another problem which is generally neglected in the literature is the difficulty to compare estimates of wage flexibility across countries due to the "modifiable areal unit problem" in spatial statistics (Anselin, 1988, 26). This refers to the differences across countries in the size and structure of administrative units, which, typically, also serve as observational units. Therefore, it is difficult to say whether those differences are affecting the observed correlation between local wages and unemployment. For instance, it seems possible that geographic units in the member states are large relative to the functional labor markets whereas units in the accession countries are more in line with the functional labor markets. Then, lower wage flexibility in the member states would simply reflect a less appropriate degree of spatial disaggregation. To overcome this kind of problems, spatial window averages of local unemployment rates and their figures in neighboring districts have been constructed based on the geographic distances between local units of observations.[3] In a first step, for each country a variety of different definitions of window averages (*e.g.*, positive weights up to 20, 30, 40, ...120 km of distance) have been used alternatively in the wage curve regressions including controls for the industry employment composition. In a second step, then, for each country that specific spatial window average has been selected which performed best in terms of the overall goodness of fit. The corresponding results are presented in column (3). As compared to column (2) the coefficients tend to be somewhat larger, however the difference in the ranking is rather small.

As the aim of the current analysis is the comparison of wage flexibility between member

[3]The window average of regional unemployment is defined as

$$\overline{u}_{r,t} = \frac{u_{r,t} + \sum_s w_{r,s} u_{s,t}}{1 + \sum_s w_{r,s}},$$

where $u_{r,t}$ is the unemployment rate of region r as of time t. $w_{r,s}$ is a weight attached to region s in relation to region r. If region s is located within the specified maximum distance to r $w_{r,s}$ is unity and zero otherwise.

states and accession countries, the separate estimation for each country is not tailored at the specific issue of a difference in the parameters between the two groups of countries. However, employing a more formal approach, differences in the parameters can be directly tested for within a joint estimation approach. Corresponding results are displayed in Table 5. Column (1) provides results for the pooled sample where country-specific time effects condition on the aggregate development in each country and region-specific effects control for time-invariant regional labor market characteristics, formally

$$\ln w_{r,c,t} = c_1 \ln u_{r,c,t} + a_{r,c} + d_{t,c} + \epsilon_{r,c,t}. \quad (3)$$

Even though the overall elasticity obtained is small as compared to the "representative" wage curve estimate of -.1, it is highly significant. Column (2) shows results of an estimation where, additionally, controls for the industry employment composition are included

$$\ln w_{r,c,t} = c_1 \ln u_{r,c,t} + c_2 x_{r,c,t} + a_{r,c} + d_{t,c} + \epsilon_{r,c,t}. \quad (4)$$

However, the results do not point to a higher unemployment elasticity. Column (3) reports results where the coefficient of unemployment is allowed to vary between member states and accession countries

$$\ln w_{r,c,t} = c_{1,M} \left(M_c \times \ln u_{r,c,t}\right) + c_{1,A} \left(A_c \times \ln u_{r,c,t}\right) + c_2 x_{r,c,t} + a_{r,c} + d_{t,c} + \epsilon_{r,c,t}. \quad (5)$$

$M_c \times \ln u_{r,c,t}$ is the local rate of unemployment interacted with a dummy for being a EU member. $A_c \times \ln U_{r,c,t}$ is the local rate of unemployment interacted with a dummy for not being a EU member. The results suggest that significant wage flexibility is present

Table 5: REGIONAL UNEMPLOYMENT ELASTICITY, POOLED SAMPLE

	Dependent variable: $\ln W_{i,t}$				
	(1)	(2)	(3)	(4)	(5)
$\ln u_{r,c,t}$	-.026 *	-.019 *			
	(.004)	(.005)			
$M_c \times \ln u_{r,c,t}$			.007	-.015	
			(.011)	(.010)	
$A_c \times \ln u_{r,c,t}$			-.025 *	-.025 *	
			(.005)	(.005)	
$M_c \times \ln \overline{u}_{r,c,t}$					-.015
					(.010)
$A_c \times \ln \overline{u}_{r,c,t}$					-.033 *
					(.006)
controls	no	yes	yes	yes	yes
sample	tot.	tot.	tot.	excl.Spain	excl.Spain
nobs	2769	2414	2414	2234	2234

Heteroskedasticity consistent standard errors in parentheses. Coefficients significant at 5 % level are marked with a star. All specifications report estimates using country-and-time-specific as well as region-specific fixed effects. Estimates reported in Columns (2) to (5) have been obtained using additional control variables reflecting the industry composition of employment. Estimates in Column (5), use spatial window averages of unemployment (see above, Table 5.).

only in the accession countries. As we have seen above, the results for the member states include a particularly strong positive effect of unemployment in the case of Spain. To make sure that the results are not driven by the inclusion of Spain, column (4) shows results excluding Spain from the sample. Yet, the results still point to the insignificance of the unemployment effect among the member states. Finally, a specification is included where the local unemployment rate is replaced by spatial window averages in order to make sure that the results are not driven by the differences in the design of the observational units. The results presented in column (5), however, point to even more significant differences in the local wage flexibility: whereas the regional unemployment elasticity of pay is insignificant for member states, the accession countries show a significant negative figure around 3.3 %.

Table 6: DYNAMIC WAGE FUNCTIONS, POOLED SAMPLE

	Dependent variable: $\ln W_{i,t}$		
	(1)	(2)	(3)
$\Delta \ln \overline{u}_{r,c,t}$	-.008	-.012	-.008
	(.006)	(.009)	(.007)
$\ln w_{r,c,t-1}$	-.418 *	-.159 *	-.546 *
	(.020)	(.033)	(.025)
$\ln \overline{u}_{r,c,t-1}$	-.010	.003	-.016 *
	(.005)	(.009)	(.006)
sample	excl.Spain	members excl.Spain	accession countries
nobs	2011	420	1419

Heteroskedasticity consistent standard errors in parentheses. Coefficients significant at 5 % level are marked with a star. All specification include regional as well as country-specific time fixed effects. In addition controls for the industry employment composition are included.

Of course, to estimate the unemployment elasticity of pay using data at the level of a region, is rather different methodologically than estimating this relationship from individual data, as is characteristic for the "wage curve" literature. In particular, aggregation might introduce autocorrelation in time. This suggests to employ a specification more close to the macro-economic literature on wage formation. For that purpose we follow Buettner (1999) and finally estimate an error-correction specification which nests both conventional Phillips curves as well as the "wage curve". More formally, wage flexibility can be ascertained from the following equation

$$\begin{aligned} \Delta \ln w_{r,c,t} &= b_1 \Delta \ln u_{r,c,t} + b_2 \Delta \ln x_{r,c,t} \\ &+ c_0 \ln w_{r,c,t-1} + c_1 \ln u_{r,c,t-1} + c_2 \ln x_{r,c,t-1} + a_{r,c} + d_{t,c} + \epsilon_{r,c,t}. \end{aligned} \tag{6}$$

The results for coefficients b_1, c_0, and c_1 are presented in Table 6. Column (1) presents results for the total sample (excluding Spain), column (2) shows results for the member

states only (excluding Spain), column (3) displays results for accession countries. While the speed of adjustment towards the wage curve as an equilibrium relationship is much lower for member states, the results point to a significant unemployment effect on wages only in the case of the accession countries. With a long run elasticity (c_1/c_0) of about 2.9 % the result in (3) is remarkably similar to the direct estimates as presented in Table 6 above.

4 Conclusions

An inspection of the regional labor markets across Europe has revealed the existence of significant regional disparities in unemployment in the member states as well as in the accession countries. However, the unemployment disparities tend to be less persistent in the accession countries, where the speed of reversion of regional unemployment rates towards the national mean is about twice as large as compared to the EU member states. The results obtained on regional wage flexibility suggest that the wage formation within regions is more sensitive to local unemployment in the accession countries. While the current paper has not given a complete account of possible explanations for the lower persistence in regional unemployment disparities in the accession countries, these results suggest that accession countries are in a more favorable position when it comes to deal with region-specific shocks.

Data Sources and Definitions

Basically the data are taken from the Eurostat REGIO database for the member countries and from the national statistical offices for the accession countries.

Regional Classification: The regional data for the member countries relate to the NUTS 2 level. In the case of the accession countries the regional level depends on data availability. For Bulgaria, the dataset consists of 28 counties (Oblast), for Czech Republic of 77 districts (Okres), for Estonia of 5 regions, for Hungary of 20 counties (Megye), for Romania of 41 districts (Judetul) and for Slovenia of 12 statistical regions (Staticsne Regije). For Poland, there are data 49 old districts (Wojewodztwo) for the period before the administrative reform as of 01.01.1999. For Slovakia, data distinguish 38 districts (Okres), based on the reform in 1996.

Wages: The wages for the member countries are defined as total income related to total employment in the region, based on the location of employer. The wages for the accession countries are average monthly gross earnings per employee at the location of the workplace. For Czech Republic, Estonia, Poland and Slovakia the data refer to the place of residence of worker.

Unemployment: For both groups of countries, the unemployment rate is defined as the annual percentage of registered unemployed in the active population.

Sectoral Employment Composition: For the member countries, the sectoral composition consists of three sectors: agricultural, fishery and forestry products (01), industry (06, 30 and 53) and services (68 and 86), based on the General Industrial

Classification of Economic Activities in the European Communities NACE CLIO R6. For the accession countries, the definition of sectors is country specific. The data sources for both groups of regions are the same as for the wages.

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How Flexible are Wages in EU Accession Countries?*

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Abstract

Increasing trade integration with the Western economies and the transition to a market economy in Central and Eastern European countries (CEECs) have resulted in increasing regional differentials in labour markets performance. Inter-regional labour mobility and flexibility of regional wages could act as equilibrating mechanisms. The functioning of these adjustment mechanisms will gain importance with the upcoming accession of CEECs to the European Union and later to the European Monetary Union. In this paper we use panel data for the 1990s and investigate the responsiveness of regional average earnings to local labour market conditions in four EU accession countries, namely, Bulgaria, Hungary, Poland and Romania. We estimate static and dynamic wage curve models and account also for spatial dependence. Our results suggest that, over the last decade, earnings have adjusted to local market conditions in Bulgaria, Hungary and Poland. The unemployment elasticity of pay was the highest in Bulgaria, -0.12, and around half the standard results for advanced economies in Hungary and Poland. Spatial effects were important in Hungary only. In this case, we found evidence on the wage curve only in the dynamic model specification with spatially filtered variables.

Keywords wage flexibility, panel data, accession countries

JEL classification: C23, J30, J60

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1 INTRODUCTION

Many economists agree that the lack of flexibility of labour markets is a problem in Europe. There have been frequent calls for policy actions to make labour markets more flexible (Calmfors and Driffil, 1998; OECD, 1999). A number of economists, however, seem to be less worried about this problem and point to the already existing or expected wage flexibility in the context of increased economic integration. Blanchflower and Oswald (1994) have argued that there seems to be high responsiveness of wages to local market conditions and moreover, countries have similar degrees of wage flexibility despite their different institutions. The underlying explanations of this result are based on non-competitive labour market models such as wage bargaining or efficiency wages. Furthermore, Burda (1999) points to the effects of increasing competition and capital mobility in integrated economies and argues that, in this context, one could expect wages to react more flexibly to local labour market conditions.

Clearly, more empirical research is needed on whether and to what extent wages adjust to labour demand shocks. This is also relevant in the case of EU accession countries.

Increasing trade integration with the Western economies and the transition to a market economy in Central and East European countries (CEECs) have resulted in significant labour demand changes across sectors and space and led to rising unemployment and falling employment and participation rates (EBRD, 2000). Furthermore, there is growing evidence about a strong regional dimension of the restructuring process with regional disparities increasing in most CEECs (Boeri and Scarpetta, 1996; Petrakos, 1996, 2000). In particular, there are increasing regional differentials in labour markets performance which raises the question about possible equilibrating mechanisms such as inter-regional labour mobility and

flexibility of regional wages. The functioning of these mechanisms will gain importance with the upcoming accession of CEECs to the EU and later to the Economic and Monetary Union. Without flexible nominal exchange rates and with low propensities to move across regions, wage flexibility could play an important role as adjustment mechanism to labour supply and demand shocks.

In this paper, we aim at assessing whether and to what extent regional wages represent an equilibrating mechanism in CEECs. In particular, we investigate the responsiveness of regional average earnings to local labour market conditions in Bulgaria, Hungary, Poland and Romania. These countries differ in size, their progress towards EU accession, degrees of employees' unionisation and wage bargaining institutions. Poland and Romania are relatively large, while Hungary and Bulgaria are smaller. Hungary and Poland are closer to the EU accession while Bulgaria and Romania are lagging behind. In Romania and Poland, in 2000 more than 50 percent of employees were union members, while in Hungary and Bulgaria, this was the case for only 40 percent. Finally, while in Bulgaria and Hungary the wage bargaining takes place at national levels only, in Poland it takes place sectorally only and in Romania at national, sectoral and enterprise levels (EBRD, 2000).

To uncover the responsiveness of wages to local labour market conditions we use panel data for these countries covering the last decade and estimate wage curve models suggested by the literature stimulated by Blanchflower and Oswald (1994). In addition to the standard static estimator with fixed regional and time effects, we estimate dynamic panel models using the GMM estimators suggested by Arellano and Bond (1991). Furthermore, we correct for spatial dependence using spatially filtered variables as proposed by Getis and Ord (1992). The choice of the dynamic specifications is based on the Sargan test of over-identifying restrictions and the Arellano-Bond tests of first and second-order autocorrelation in the residuals. We find empirical support for the wage curve in Bulgaria, Hungary and Poland. Unemployment

elasticity of pay was the highest in Bulgaria, -0.12, and around half the standard result for advanced economies in Hungary, -0.05, and Poland, -0.04. Spatial dependence was important in Hungary and had no effect in the other countries. In Hungary, the wage curve showed up only in the dynamic specification with spatially filtered variables.

This paper is organised as follows. Section 2 outlines our analytical framework including theoretical explanations of the wage curve model, empirical evidence from transition countries, and the methodological basis for our analysis. In section 3 we present our data followed by a brief discussion of summary statistics of regional unemployment rates and average earnings. The estimates for the regional earnings' responsiveness to local market conditions are discussed in section 4. Section 5 concludes.

2 ANALYTICAL FRAMEWORK

Neo-classic economic theory going back to Adam Smith underlines that regional wages are positively related to regional unemployment rates. This has been formalised by Harris and Todaro (1970). The main assumption of the Harris-Todaro model is the functioning of a compensating differentials mechanism. Regional labour market equilibrium - which is characterised by expected utililty being equal across regions and zero net migration - requires high (persistent) unemployment rates to coincide with high wages. As pointed out by Partridge and Rickman (1997) and Duffy and Walsh (2001), during the 1970s and 1980s empirical evidence supporting the Harris-Todaro model has been provided from both individual and aggregated regional data (Hall, 1970 and 1972; Reza, 1978; Adams, 1985; Marston, 1985).

The consensus on a positive relationship between regional wages and unemployment rates was challenged by empirical work uncovering a negative relationship between these variables in the late 1980s and the 1990s. The underlying difference to the previous studies has been the controlling for regional fixed effects in models including regional data with contributions by Blackaby and Manning (1987), Freeman (1988), and Card (1990). Blanchflower and Oswald (1994) called this negative relationship between regional wages and local unemployment rates a genuine “empirical law in economics”, the wage curve. They brought a considerable amount of empirical evidence from large numbers of individuals in the US, UK and other developed countries supporting not only the negative unemployment elasticity of pay but also that this elasticity is the same in all cases, around –0.10. This result implies that a doubling of the unemployment rate reduces contemporaneous regional wages by ten percent. The publication of their book, “The Wage Curve” in 1994, generated a large amount of research on the wage curve for different countries, including developing and transition economies. This literature is

reviewed by Huber et al. (2002). The results are ambiguous, however, and more empirical work is needed to shed light on the existence of the wage curve.

The Wage Curve Model

The so-called "wage curve" is a standard Mincerian wage equation where regional unemployment rates are included among the regressors. A modified version is obtained by aggregating the individual variables in each period by the units for which unemployment rates are available to 'cell means' to eliminate the effect of individual effects' correlation with the error term within the same region. This is necessary to avoid downward bias of the estimated unemployment rate coefficient's standard error resulting from positive correlations across error terms of individuals from one labour submarket. The basic specification of this 'meso level' wage curve is:

$$\log (w_{rt}) = \beta_0 + \beta_1 \log (u_{rt}) + \beta_2 X_{rt} + \beta_3 D_r + \beta_4 D_t + \varepsilon_{rt}, \quad (1)$$

i. e. average wages by region (or branch) and time period w_{rt} are explained by the relevant unemployment rates (u_{rt}), workers' individual characteristics X_{rt}, time-invariant regional characteristics, D_r, and region-invariant time-specific effects, D_t of the analysed labour markets (Blanchflower and Oswald 1995). Compared to conventional macroeconomic investigations, the focus on regional labour markets allows to substantially increase the number of observations. Starting from this model, Blanchflower and Oswald (1994) do an extensive estimation exercise with different specifications using data from industrialized and developing countries. They find wages to be convex and decreasing in unemployment and an elasticity of pay with respect to unemployment of around -0.10 to be fairly robust to specifications and stable over time and across countries.

Blanchflower and Oswald prefer two theoretical frameworks to underpin this empirical result. Specifically, these are (1) the union-employer bargaining theory, (2) the efficiency wage theory[1].

The bargaining approach is based on the idea that with higher unemployment, employees' alternative wages and, hence, bargaining powers of workers' associations are declining: Therefore, a negative wage-unemployment rate-relationship is predicted. Alternatively to the idea of unions' means of threat vanishing, Blanchflower and Oswald (1995) suggest trade unions to care about unemployed members as well, so that with high unemployment, they would shift demands away from high wages towards the preservation of jobs. As Blanchflower and Oswald (1995) admit, this explanation is not suitable for countries with low levels of unionisation or centralised wage bargaining.

According to the efficiency wage model, it is the punishment to shirking that is crucial for regional wage differentials accruing due to differences in unemployment rates. In this framework, expected utility of pay packages is assumed to be equal across regions. Employers are considered to pay wages exceeding the value of unemployment by a sufficient amount to keep employees away from shirking. In regions with higher unemployment, shirking is penalised more by the higher difficulty to find a new job. Therefore, in such regions a lower wage premium is sufficient to prevent workers from shirking.

Empirical Evidence from Transition Economies

Several papers tested the existence of a wage curve in transition countries using both micro and aggregated regional data. Tables 1a and 1b give summary information on this research. The studies using micro data find wage elasticities with respect to unemployment ranging

[1] A critical discussion of these models is given in Card (1995).

from –0.09 (for Hungary, 1992) to –0.53 (for Eastern Germany). The corresponding elasticities obtained using regional data are in the range of –0.09 (Hungary) to –0.8 (Poland). The standard estimator in these studies includes regional and time fixed effects and control variables similar to Blanchflower and Oswald (1994). Some studies take into account the possibility that the unemployment rate is correlated with the disturbance term and estimate models including instrumental variables. Elhorst, Blien and Wolf (2002), for Eastern Germany, take into account in addition the spatial relationship among regions and control for the downward effect of the national unemployment rate.

One may interpret the above results as evidence for increasing regional wage flexibility in transition economies. If we agree with Burda (1999), this is the result of increasing trade integration of CEECs with Western markets, and more flexibility could be expected given the prospects for capital mobility after EU enlargement.

How favourable are wage setting institutions to wage flexibility in EU accession countries? Table 2 shows the variety of wage bargaining in CEECs with negotiations at national level in Hungary, Latvia and Slovenia, at sectoral level in Poland, at enterprise level in Bulgaria, the Czech Republic, Estonia, Lithuania. Slovakia has wage bargaining at the sectoral and enterprise levels and Romania at national, sectoral and enterprise levels. The percentage of employees in trade unions is however low ranging from ten percent in Lithuania to 61 percent in Poland and the percentage of union workers involved in bargaining is between 20 and 40 percent in most countries except Lithuania where 90 percent of union workers are involved in bargaining.

We expect to find higher wage flexibility in countries where wages are negotiated at enterprise level (in our group of countries, in Romania). The reason is that, at enterprise level, workers are more likely to take into account competition pressures and accept wage flexibility

whereas workers participating in negotiations at sectoral and national levels are less directly exposed to competition and are likely to be less flexible on wages negotiations. For example, Büttner and Fitzenberger (2001) show that in Germany the wage curve is less elastic where wages are settled at national and sector levels and more elastic with enterprise based wage negotiations. On the other hand, unions negotiating wages nationally are more likely to take into account the impact of nominal wage increases on prices and be more inclined towards wage moderation compared with unions bargaining sectorally and at enterprise levels (Cadiou and Guichard, 1999).

3 THE DATA

The Dataset

In this paper we use data on regional labour market performance in Bulgaria, Hungary, Poland and Romania. This group of countries includes two advanced Central European transition countries which will become EU members in 2004, and two South-Eastern transition countries which will join the EU at a later time. The data are annual figures at NUTS 3 regional level.[2]

The average size of regions varies in the four countries as shown in Table 3.

The variables of interest for our research are regional average earnings[3] and unemployment rates. Earnings are in national currencies. For the estimations, we use average earnings in real terms in 1995 prices (using national-level CPIs). Unemployment rates are based on end-year numbers of registered unemployed. Cross-country comparability of the data is limited by different requirements for registration. Also, the data may reflect impacts of non-measured effects of unemployment benefit schemes.

Summary Statistics: Unemployment Rates

With the above-mentioned caveats on cross-country comparability, the main characteristics and trends of regional unemployment rates and average earnings in the countries we analyse[4] are described below (see Figure 1).

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[2] The respective spatial units in the countries considered are: oblast (Bulgaria), megye (Hungary), województwa (Poland), and judet (Romania).

[3] For data availability reasons, we use as dependent variables regional monthly average earnings per employee or person employed. Since we cannot account for the number of the hours worked using regional wages would not be appropriate.

With respect to official unemployment rates, during the 1990s, Poland and Bulgaria experienced rather high-level unemployment at the beginning of the transition period which decreased after 1993 but increased again at the end of the decade. Unemployment rates in Hungary and Romania were more moderate in the range of 6 to 11 percent. In Romania, the rise and decrease of the unemployment rates is similar to the developments in the aforementioned countries. In Hungary, the level of unemployment was more stable until 1997.

During the 1990s, variation of the unemployment rate within countries is present both across regions and in time (Table 4 and Figure 2). With coefficients of variation around 0.4 and below, regional unemployment disparities seem less pronounced in Bulgaria, Romania and Poland than in Hungary, where the coefficient of variation is highest, and substantially increasing towards the end of the decade.

In all countries investigated, the exceptional position of the capital region is mirrored by the unemployment rates as well. Especially in Hungary, the capital region has sizeable impact on the national unemployment rate and its regional variation. These figures taken without the capital region, the situation in Hungary is more comparable to the other countries.

Summary Statistics: Average Earnings

Using official exchange rates, one can note that in absolute terms, Romania and Bulgaria are the countries with the lowest level of labour income throughout the whole decade, with average monthly earnings amounting to approx. 120 USD in 1994.[5] In the same year, Poland has a level of pay of around a monthly 200-270 USD, while the pay for work in Hungary is still higher with approx. 350 USD (Figure 3).

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[4] The following refers to national-level means of regional official unemployment rates weighted by the numbers of economically active. These figures only slightly differ from officially reported national unemployment rates.

During the 1990s, Poland experienced a steady increase of average pay, whereas Romania and Bulgaria suffered from a sizeable drop real earnings. In the same period, earnings were declining in Hungary during 1995-1997 and increasing thereafter, reaching the 1994 level by 1998. For the period considered, Romania and Bulgaria encountered real earnings' decline of annually 3.4% and 10%, respectively, while earnings grew by 3.1% annually in Poland and 0.5% in Hungary on average.

In the four countries analysed, earnings levels vary regionally with coefficients of variation being lowest in Romania with 0.10-0.12 and highest in Hungary with 0.18-0.22 (Figure 4).[6] In all four countries, regional variation in earnings experiences a slow rise until 1996, when the coefficient of variation decreases for Bulgaria and Romania. For the countries under review, the increase of the coefficients of variation of regional earnings over the total time period considered is significant.

According to their eminent role in the countries' economies, figures of capital regions have sizeable impact on country averages. In 1992, average earnings in the non-capital regions are around 89-99% of the total country averages in the early nineties, the impact of the capital being especially large in Hungary. Towards the end of the 1990s, the gap between 'province' and total country earnings' averages is increasing in the countries under review.

[5] In fact, keeping in mind that for Romania gross earnings are reported while for Bulgaria, we have net figures, Romania has been the country with the lowest level of earnings among the countries under review.

[6] Since only national-level CPI could be used for deflating the nominal wage data, the coefficients of variation of the level of pay do not appropriately portray regional differences in the purchasing power of the average regional earnings.

4 ESTIMATION STRATEGY AND RESULTS

Estimation Issues

Most the previous studies estimated the unemployment elasticity of pay using a standard static panel model including regional and time fixed effects (LSDV estimator). However, the relationship between wages and unemployment is likely to be dynamic. As pointed out in the literature (Nickell, 1981; Kiviet, 1995), the LSDV estimator is biased and inconsistent in the case of dynamic panels[7]. The bias is a problem especially in small samples. For example, even when T=30, the bias could be around 20 per cent of the true value of the estimated coefficient (Judson and Owen, 1999). Another criticism to previous studies is that they do not account for spatial dependence. Recent studies (Büttner, 1999; Longhi, Nijkamp and Poot, 2002) found that neglecting spatial effects leads to an underestimation of the unemployment elasticity of pay.

In this paper, we estimate wage curves for Bulgaria, Hungary, Romania and Poland using a standard static fixed effects model and then a dynamic fixed effects model. We account for spatial dependence and re-estimate the dynamic panel model with spatially filtered variables.

The Static Fixed Effects Model

To allow comparability with previous studies and the assessment of the bias from neglecting the dynamic nature of the earnings-unemployment rate relationship, we first estimate the following static fixed effects model:

$$\log w_{rt} = \beta \log U_{rt} + \gamma X'_{rt} + \mu_r + \lambda_t + \varepsilon_{rt} \qquad (3)$$

[7] See Baltagi (2001) for a survey of dynamic panel data models.

where

w_{rt} is the monthly average of earnings from work in region r at time t,

deflated with national CPI,

$U_{rt\ is}$ the unemployment rate in region r at time t,

X'_{rt} is a vector of variables controlling for the regional economic structure[8],

μ_r is a time invariant region-specific effect, $\mu_r \sim$ i.i.d. $N(0, \sigma^2_\mu)$,

λ_t is a region-invariant time specific effect, $\lambda_t \sim$ i.i.d. $N(0, \sigma^2_\lambda)$,

ε_{rt} is the stochastic error term, $\varepsilon_{rt} \sim$ i.i.d. $N(0, \sigma^2_\varepsilon)$.

The results from the LSDV estimation with robust standard errors are presented in Table 5.

The Dynamic Panel Data Model

Next, we estimate a dynamic panel model with fixed effects as suggested by Arellano and Bond (1991). The estimated dynamic model has the following form:

$$\log w_{rt} = \Sigma_k \alpha_k \log w_{r,\,t-k} + \Sigma_l \beta_l \log U_{r,t-l} + \Sigma_m \gamma_m X'_{r,t-m} + \mu_r + \lambda_t + \varepsilon_{r,t} \quad . \qquad (4).$$

The Arellano-Bond GMM procedure includes the following steps. The model is first-differenced to remove fixed effects. The differenced equation is then estimated using instrumental variables. As instruments, for each year, all available lags of the variables in levels are used. Since these are correlated with differenced variables but uncorrelated with differenced error terms (unless the error terms in levels display serial correlation), they provide valid instruments. While first order autocorrelation in the first-differenced residuals

[8] As elements of X we employ the shares of employment in industry and services in the cases of Bulgaria, Poland and Romania, and the shares of employment in agriculture and industry in the case of Hungary. These are those two of the three shares of employment by economic sectors in these countries which are least correlated with each other.

complies with the consistency requirements, it is necessary that the differenced errors are free of second order correlation (Arellano and Bond, 1991).

The choice of the most appropriate specification of the dynamic wage curve model for each country is based on the following procedure. We start with a model specification where each variable is included with up to its third lag among the regressors.[9] When the third year lagged variables are not significant, we start with the two years lagged specification. Tables 9a-9d show the results of the GMM estimators. In model (1) the unemployment rate is assumed exogenous while in model (2) it is predetermined. For deciding whether the unemployment rate is predetermined, we use the Sargan test. Then, in the chosen model, we gradually drop insignificant lagged variables, ending up with model (3).

For each model we report the one-step GMM estimator with robust standard errors and the two-step GMM estimator[10]. Since the standard errors from the two-step GMM are frequently downward biased (Arellano and Bond 1991), for inference on variables' coefficients we rely on the one-step estimator.[11] For the choice between specifications however, we use the Sargan test of over-identifying restrictions after the corresponding two-step GMM estimator.[12] Since consistency of the estimator requires the absence of second-order autocorrelation in the differenced residuals, we consider only specifications fulfilling this criterion. This is checked by the respective tests developed by Arellano and Bond (1991).

[9] Due to the low number of time periods available for our data, more lags would substantially reduce the quality of statistical inference from our estimations: Therefore, we do not consider the possibility of further lags.

[10] While the weights matrix involved into the one-step GMM estimator is previously set to have a certain structure, in the two-step estimator it is obtained from the one-step residuals.

[11] Arellano and Bond (1991) recommend the one-step GMM estimator for inference on coefficients' significance, since according to their findings, standard errors from the two-step estimator tend to contain substantial downward bias in small samples.

[12] No robust Sargan test using one-step residuals is available.

Spatial Dependence

The fixed effects included in the wage curve models are likely to be spatially autocorrelated due to regional interaction and spillover effects (Longhi et al, 2002). Despite the growing spatial econometric literature following the work of Anselin (1988)[13], to date there are only few studies on wage curves accounting for spatial dependence. As shown in Büttner (1999), Longhi et al. (2002) and Elhorst et al. (2002), neglecting spatial dependence can bias the estimated coefficients. In our analysis, we correct for spatial autocorrelation. We first check for spatial autocorrelation using Lagrange multiplier (LM) statistics calculated on the basis of Moran's I statistics. These are calculated as follows:

$$I = [(x-\mu)' W (x-\mu)] / [(x-\mu)'(x-\mu)] \quad (5),$$

where x is the variable under scrutiny, μ is its mean, and W is a row-standardized weights matrix, the elements of which represent inverse distances between pairs of county capitals (in km on public roads). The LM statistics is asymptotically χ^2-distributed with one degree of freedom[14] and is obtained as follows:

$$LM = (N I)^2 / [tr (W'W + W^2)] \quad (6),$$

where N is the number of observations.

The LM statistics and corresponding p values are reported in Table 7. The LM test indicates the absence of spatial autocorrelation in the dependent variable for all four countries analyzed. For Hungary, unemployment rates are found spatially autocorrelated in 1994-98 while for Poland we find spatial autocorrelation in the first two years' unemployment rates and in the shares of employment in industry and the services sector for the whole period considered and

[13] See also Anselin and Florax (1995), Anselin and Bera (1998).

[14] For details on this methodology see Longhi et al. 2002.

all years but 1993 and 1995, respectively. For Romania, we find spatial autocorrelation in the unemployment rates for 1992 and over 1995-96, while for Bulgaria, we obtain that the variables are not spatially autocorrelated.

As pointed out by Badinger et al. (2002), an estimator for a dynamic panel model incorporating spatially lagged regressors or an error process with spatial autocorrelation is not yet available. Therefore, to control for spatial effects, they use a two-step procedure: first, spatial autocorrelation is removed from the variables by a filter suggested by Getis and Ord (1992). Then, the model is re-estimated with standard techniques using the filtered variables. The Getis-Ord filtering procedure is defined as follows:

$$x^F_i = x_i \, [\Sigma_j \, w_{ij} \, (\delta) \, / \, (N-1) \,] \, / \, G_i \, (\delta), \qquad (7)$$

with

$$G_i \, (\delta) = \Sigma_j \, w_{ij} \, (\delta) \, x_j \, / \, \Sigma_j \, x_j, \quad i \neq j \, . \qquad (8),$$

where w_{ij} are elements of the spatial weights matrix W, and δ is a distance parameter indicating the extent to which further distant observations are downweighted. Following the approach of Badinger et al. (2002), we repeat our estimation procedure with spatially filtered variables. We use the above mentioned spatial weights matrix without assigning over-proportionally decreasing importance to farther distant observations, i.e. we assume $w_{ij}(\delta)=(d_{ij})^{-\delta}$ with $\delta=1$, where d_{ij} denotes the road distance between county capitals. Results for models (1) to (3) are reported in Tables 11a-11d.

Empirical Results

Bulgaria

The results of the static fixed effect model (see Table 5) indicate a negative relationship between regional unemployment rates and the level of pay in Bulgaria in 1992-1999. The estimated unemployment elasticity of pay is –0.05. The estimations of the dynamic model without accounting for spatial dependence are shown in Table 6a. Model (1) including three lags showed highly significant second order error autocorrelation. We therefore start with including variables with two lags each. The Sargan test indicates that unemployment rates are predetermined.

After dropping insignificant variables, we end up with specification (3) showing regional levels of pay to be significantly determined by their own values lagged once and twice, with coefficients of 0.75 and -0.19, respectively. We find again that regional pay is negatively and significantly related to local unemployment rates with an unemployment elasticity of pay of –0.12 that is close to the standard results.

As Table 7 indicates, for Bulgaria, the LM test statistics do not reveal spatial autocorrelation in the variables. This is confirmed by the estimations with spatially filtered variables (Table 8a). The unemployment elasticity of pay does not change when we account for spatial autocorrelation.

In summary, for Bulgaria we find evidence that the level of regional pay has adjusted to local market conditions. The estimated unemployment elasticity of pay obtained with the static fixed effect model is –0.05 and –0.12 in the case of the GMM estimator. We find no evidence for spatial dependence in the variables.

Hungary

For Hungary, the results of the static fixed-effects model indicate no significant relationship between the regional average earnings and unemployment rate (Table 5). We next estimate dynamic wage curve models starting with a specification including three lags for each variable (Table 6b). On the basis of the Sargan test we treat the unemployment rate as predetermined.

After dropping regressors, we end up with a specification including two lags of the dependent variable, which we find significant with coefficients of 0.51 and 0.13, respectively. The unemployment rate coefficient is negative but insignificant. We find a positive and significant relationship between average earnings and the three years lagged unemployment rate.

When we check for spatial effects, we find spatial autocorrelation in the log unemployment rate for the years 1994-98 (Table 7). We re-estimate the dynamic wage curve models with spatially filtered variables (Table 8b). In the final model with spatially filtered variables, the dependent variable is significant only in the first lag, with a coefficient of 0.46. In contrast to the previous estimations with static and dynamic models without spatial effects, we find that regional average earnings are negatively and significantly related to the two years lagged unemployment rate. The unemployment elasticity of pay is –0.05.

In summary, for Hungary, we find no evidence of a wage curve when we use static and dynamic fixed effects models. We find that spatial dependence plays an important role in the adjustment of earnings to local market conditions. The estimation of a dynamic model with spatially filtered variables shows that regional average earnings were negatively and significantly related to the two-years lagged unemployment rate suggesting a slower adjustment than in Bulgaria. Now we find an unemployment elasticity of pay of –0.05.

Poland

The results of the static fixed effect model (Table 5) indicate a negative and significant relationship between regional average earnings and unemployment rates in Poland. The unemployment elasticity of pay is –0.06. The dynamic models (Table 6c) include two years lagged variables, since third year lagged variables were not significant. The Sargan tests in models (1) and (2) indicate to consider unemployment rates exogenous. After eliminating insignificant variables, we estimate model (3). Here, the one year lagged unemployment rate is negatively and significantly related to regional average earning and the unemployment elasticity of pay is -0.04.

Table 7 indicates that, for Poland, unemployment rates of 1992 and 1993 and shares of employment in industry (for all years) and the services sector (except for 1993 and 1995) are spatially autocorrelated. The results of the dynamic models with spatially filtered variables (Table 8c) are similar to those obtained with the dynamic models without spatial effects.

In summary, for Poland, the static fixed effects model finds a negative and significant relationship between regional average earnings and unemployment rates with an unemployment elasticity of pay of –0.06. The estimations obtained with the dynamic models confirm the existence of a wage curve but the unemployment elasticity of pay is lower, -0.04. We find that spatial dependence does not make a difference in the case of Poland.

Romania

As shown in Table 5, the results of the static fixed effects estimation for Romania indicate a negative but insignificant relationship between regional average earnings and unemployment rates. We neither find evidence of earnings adjustment to local labour market conditions when we estimate dynamic models (Tables 9d and 11d).

The dynamic model specifications for Romania include three years lagged variables. We find a significant negative coefficient for the unemployment rate in model (1) when unemployment rates are assumed exogenous. On the basis of the Sargan tests we take the unemployment rate as predetermined. In the final specification, model (3), we no longer find evidence for a wage curve.

We find spatial autocorrelation in the unemployment rates in certain years (Table 7). The results of the spatially filtered dynamic models (Table 8d) support the previous findings. In conclusion, we find no evidence about regional earnings adjustment to local labour market conditions in Romania. This is in line with the findings of Kallai and Traistaru (2001).

5 CONCLUSIONS

In this paper we used panel data for the 1990s and investigated the responsiveness of regional average earnings to regional labour market conditions in Bulgaria, Hungary, Poland and Romania. We estimated a standard static fixed effects model and then a number of dynamic wage curve models. We also corrected for spatial dependence.

We find evidence on the adjustment of regional average earnings over the past decade in Bulgaria, Hungary and Poland. The unemployment elasticity of pay was the highest in Bulgaria, -0.12, while in Hungary and Poland it was lower, -0.05 and –0.04, respectively. While in Bulgaria the regional earnings adjustment to local labour market conditions took place contemporaneously, in Hungary and Poland this adjustment took place with a two years and one year delay, respectively. The spatial effects played an important role in Hungary. For Romania, despite our predictions from the wage bargaining model, we find no evidence suggesting an adjustment of regional earnings to local labour market conditions.

Our results indicate that wage flexibility could act as adjustment mechanism in equilibrating regional labour markets in the forthcoming EU member states. This adjustment is likely to take place with delay which implies that labour market disequilibria might persist.

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Table 1a: Estimations of Unemployment Elasticity of Wages, Transition Economies Using Micro Data

	Country, Data	Estimated Models	Control Variables	Unemployment Elasticity of Pay	Observations
Elhorst, Blien, Wolf (2002)	Eastern Germany, district-level panel data 1993-98 (Landkreise /kreisfreie Städte)	simple and 2-stage panel data techniques with and without spatial auto-regression component	Age, age squared, gender, employment status, qualification, industry, occupation, establishment size	-0.112	Present a framework to test for the inclusion of time fixed effects into the wage curve estimations.
Duffy, Walsh (2001)	Poland, LFS micro data, 1994-96	double log: OLS, 2SLS	usual individual characteristics, job reallocation rate, occupation, region	-0.11	Include Heckman's lambda, but insignificant.
Pannenberg, Schwarze (1998)	Eastern Germany, labour market areas (Arbeitsamtbezirke), GSOEP data 1992-97	pooled OLS with fixed regional effects, FGLS, 2SLS	usual individual characteristics	-0.53	Add participants in labour market training programmes to numbers of unemployed to calculate job searcher rates as indicators of labour market slack.
Kertesi, Köllô (1997, 1998, 1999)	Hungary, 170 labour office areas, firm data from National Labour Centre's Wage Survey for 1989 and 1992-95 (1999: 1986 and 1996 as well)	year by year OLS, with industry and regional dummies	worker, job, firm characteristics, region dummies	-0.09 (1992) -0.11 (1995)	Further estimations: separate for labour market sub-groups; differentiating between short- and long-term unemployment; controlling for productivity; labour costs as dependent variable (1998); including settlement type and macro region dummies, differentiating according to firm size (1999).
Blanchflower, Oswald (1999)	23 transition countries, micro data 1990-1995 (ISSP)	OLS with Regional and time fixed effects	Age, age squared, gender	Between –0.04 and –0.09	
Blanchflower (2001)	23 countries from Eastern and Central Europe, micro data for 1990-1997 (ISSP, World Bank HEIDE Data Base, Russian Survey	OLS and FE		Between – 0.1 and – 0.3	

Table 1b: Estimations of Unemployment Elasticity of Wages, Transition Economies Using Aggregate Regional Data

	Country, Data	Estimated Models	Control Variables	Unemployment Elasticity of Pay	Observations
Duffy, Walsh (2001)	Poland, 1991-96, 49 regions	2SLS-GLS	year dummies, log job reallocation rate	-0.8 (2SLS)	instrument for u. rate/reallocation: rank of regions by inherited public infrastructure
Kallai, Traistaru (2001)	Romania, 1992-1999, 41 regions	OLS, FE, RE	Male, urban population, industrial employment, blue collar workers	Not significant 1992-94; 0.03-0.05 for 1995-99	With and without the capital city
Kertesi, Köllô (1997)	Hungary, 1989 and 1992-95, labour office areas	OLS, different specifications, year by year	individual, job, and firm characteristics, industry and region dummies	different (OLS for ln(u): -0.09 to -0.11); increasing in later years	year by year; separate for labour market groups too

Table 2 : Trade Unions and Wage Bargaining in CEECs

Country	Employees in trade unions (%)	Wage bargaining level National	Sectoral	Enterprise	Union workers involved in bargaining (%)
Bulgaria	40	+			Na
Czech Republic	35			+	20
Estonia	13			+	29
Hungary	40	+			40
Latvia	28	+			28
Lithuania	10			+	90
Poland	61		+		10
Romania	50	+	+	+	5/7/30
Slovak Republic	32		+	+	Na
Slovenia	42	+			Na

Source: EBRD (2000), p.99

Table 3: Data Set Characteristics

Country	*Regions*	*Avg. size, sqkm*	*Avg. population 1996, thousands* with capital region	without capital region	*Data available*	*No. of obs.*
Bulgaria	28	3965	298	265	1991-99	252
Hungary	20	4651	511	437	1992-99	160
Poland	49	6381	789	755	1992-98	343
Romania	41	5876	551	507	1992-99	328
TOTAL	**267**	**5411**	**382**	**351**	1992-98	1083

Figure 1: National Unemployment Rates in the Countries Investigated, 1991-99

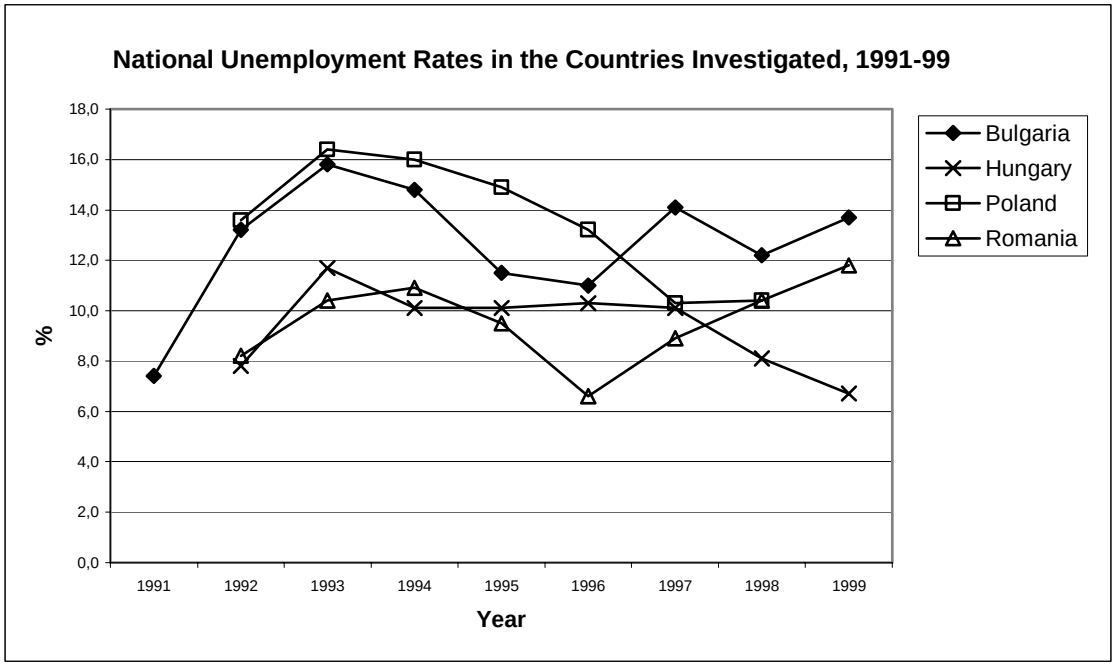

Table 4: Regional Unemployment Rates in EU Accession Countries: Averages and Variation

Country	*Including capital region*				*Without capital region*			
	avg. unempl. rate		*coeff. of variation*		*avg. unempl. rate*		*coeff. of variation*	
	1992	**1998**	**1992**	**1998**	**1992**	**1998**	**1992**	**1998**
Bulgaria	13.2	12.2	0.32	0.41	13.9	13.6	0.29	0.29
Hungary	7.8	8.1	0.51	0.58	9.6	10.5	0.31	0.39
Poland	13.6	10.4	0.34	0.43	14.0	11.0	0.31	0.36
Romania	8.2	10.4	0.36	0.35	8.6	11.0	0.33	0.30

Figure 2: Regional Unemployment Rates in the Countries Investigated, 1991-99: Coefficients of Variation

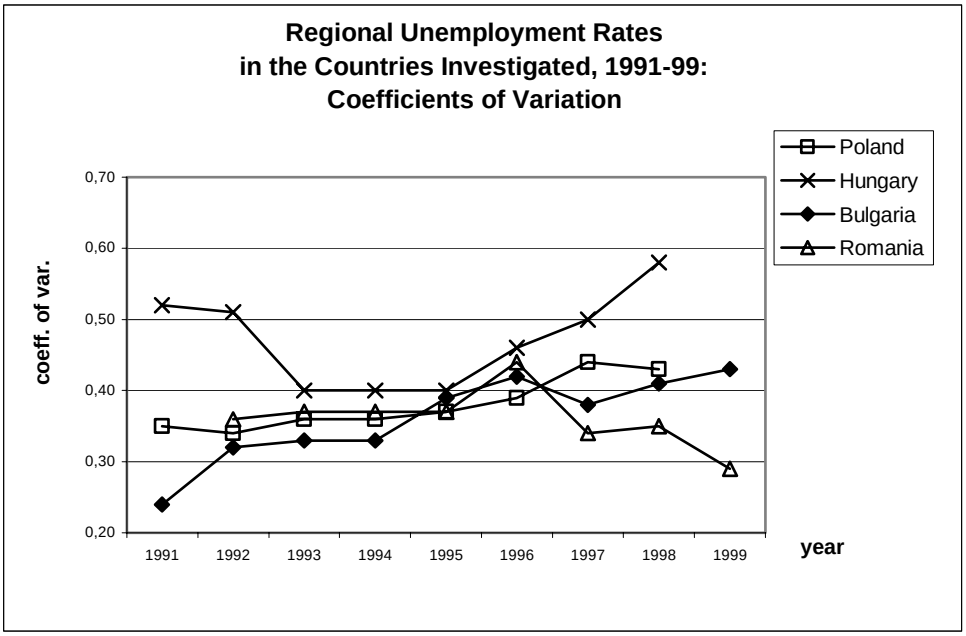

Figure 3: Real Monthly Earnings in the Countries Investigated, 1991-99

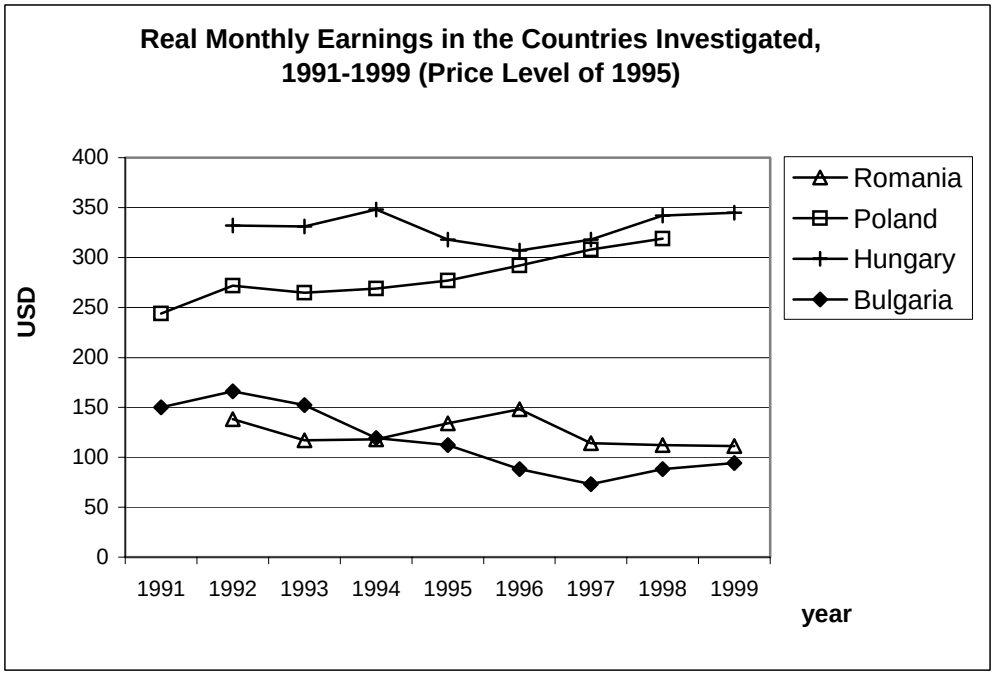

Figure 4: Real Average Earnings in CEEC, 1992-98: Regional Variation

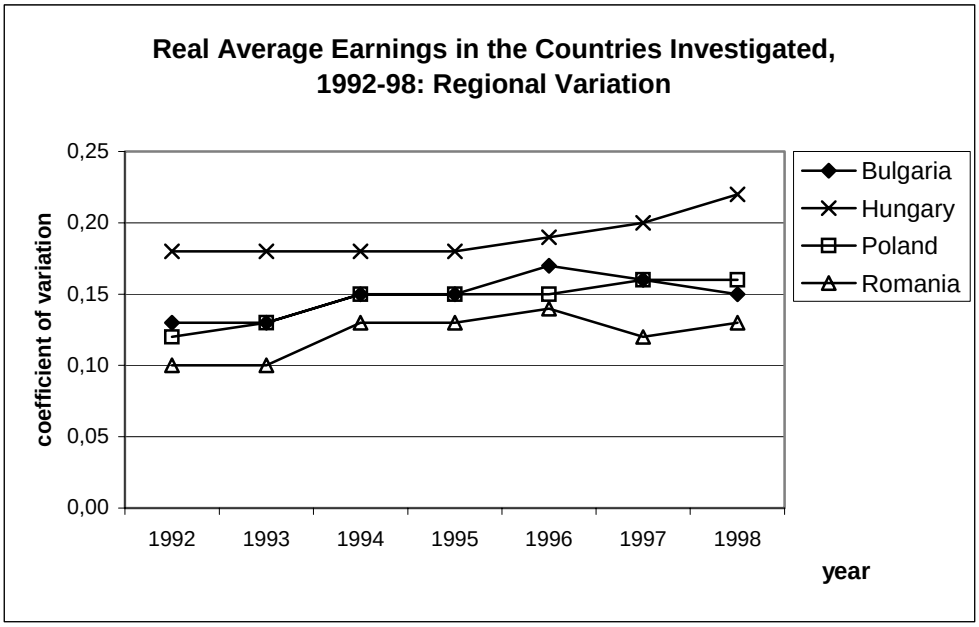

Table 5: Estimation Results: Static Fixed Effects Model, All Countries

depvar: lrwage	Bulgaria	Hungary	Poland	Romania
	1992-99	1992-99	1992-98	1992-99
lurate	**-0.05*** ** (0.02)	-0.01 (0.03)	**-0.06*** ** (0.02)	-0.003 (0.01)
s_empl1	**0.60*** ** (0.22)	-0.06 (0.24)	0.10 (0.08)	-0.33 (0.21)
s_empl2	0.13 (0.20)	**0.23*** ** (0.08)	**-0.09** ** (0.04)	**-0.89*** ** (0.17)
time dummies	yes	yes	yes	yes
fixed effects	yes	yes	yes	yes
N obs.	784	160	343	328
R^2	0.86	0.15	0.38	0.14

Note: Robust standard errors are reported in parentheses.
***, ** ,* indicate significance at 1, 5, 10 percent level, respectively

Table 6a: Estimation Results: Bulgaria, 1992-99

depvar: Δlrwage	**(1)**		**(2)**		**(3)**	
	1-step GMM, robust s.e.	**2-step GMM**	**1-step GMM, robust s.e.**	**2-step GMM**	**1-step GMM, robust s.e.**	**2-step GMM**
Δy_{t-1}	**0.72***** (0.16)	0.49*** (0.12)	**0.70***** (0.13)	0.70*** (0.23)	**0.75***** (0.10)	0.58*** (0.15)
Δy_{t-2}	**-0.25***** (0.08)	-0.19*** (0.07)	**-0.20***** (0.07)	-0.32* (0.17)	**-0.19***** (0.06)	-0.19 (0.13)
Δ**lurate**$_t$	-0.03 (0.02)	-0.04*** (0.01)	**-0.10***** (0.04)	-0.07 (0.08)	**-0.12***** (0.04)	-0.04 (0.03)
Δ**lurate**$_{t-1}$	-0.02 (0.03)	-0.00 (0.02)	0.02 (0.04)	-0.00 (0.09)	0.04 (0.04)	0.05 (0.04)
Δ**lurate**$_{t-2}$	0.00 (0.03)	-0.02 (0.02)	0.03 (0.02)	0.01 (0.03)	**0.04*** (0.02)	0.01 (0.02)
Δ**s_empl1**$_t$	0.30 (0.20)	0.08 (0.15)	0.21 (0.19)	0.45 (0.60)		
Δ**s_empl1**$_{t-1}$	0.12 (0.24)	-0.03 (0.28)	0.08 (0.29)	0.31 (0.57)		
Δ**s_empl1**$_{t-2}$	0.02 (0.22)	0.20 (0.16)	0.06 (0.25)	0.23 (0.82)		
Δ**s_empl2**$_t$	0.11 (0.22)	-0.24 (0.18)	0.17 (0.22)	0.41 (0.54)		
Δ**s_empl2**$_{t-1}$	-0.05 (0.16)	-0.72 (0.47)	-0.11 (0.20)	-0.37 (0.46)		
Δ**s_empl2**$_{t-2}$	-0.15 (0.17)	-0.17 (0.15)	-0.13 (0.19)	-0.07 (0.56)		
time dummies	yes	yes	yes	yes	yes	yes
predet.	--	--	lurate	lurate	lurate	lurate
N obs.	168	168	168	168	168	168
Wald χ^2	7947.45	45650.33	6577.11	42721.02	4078.45	45947.86
AR1 errors z **P>z**	-3.53 0.00	-2.27 0.02	-3.49 0.00	-2.65 0.01	-3.45 0.001	-1.98 0.05
AR2 errors z **P>z**	1.14 0.25	0.34 0.74	0.80 0.42	1.08 0.28	0.67 0.51	0.52 0.60
Sargan χ^2 **Pr>χ^2**		14.78 0.95		10.30 1.00		14.97 1.00

Note: Standard errors are reported in parentheses.
***, ** ,* indicate significance at 1, 5, 10 percent level, respectively.

Tests: Arellano-Bond test on average order 1 autocovariance in residuals (AR1 errors) – H_0: The residuals are not autocorrelated. Arellano-Bond test on avareage order 1 autocovariance in residuals (AR1 errors) – H_0: The residuals are not autocorrelated. Sargan test of over-identifying restrictions - H_0: The over-identifying restrictions are valid.

Table 6b: Estimation Results: Hungary, 1992-99

depvar: Δlrwage	(1)		(2)		(3)	
	1-step GMM, robust s.e.	2-step GMM	1-step GMM, robust s.e.	2-step GMM	1-step GMM, robust s.e.	2-step GMM
Δy_{t-1}	**0.45*** **	-0.36	**0.42*** **	0.01	**0.51*** **	0.31***
	(0.12)	(0.52)	(0.09)	(0.17)	(0.09)	(0.12)
Δy_{t-2}	0.09	0.40	**0.13** **	0.23	**0.13** *	0.21**
	(0.08)	(0.42)	(0.06)	(0.30)	(0.07)	(0.10)
Δy_{t-3}	-0.08	-0.38	-0.06	0.02		
	(0.09)	(0.20)	(0.09)	(0.31)		
Δlurate$_t$	-0.01	0.01	-0.01	0.03	-0.01	-0.006
	(0.01)	(0.02)	(0.01)	(0.04)	(0.01)	(0.02)
Δlurate$_{t-1}$	**-0.05*** **	-0.02	-0.03	-0.07*	-0.03	-0.02
	(0.02)	(0.03)	(0.03)	(0.04)	(0.03)	(0.03)
Δlurate$_{t-2}$	-0.02	-0.09	-0.03	-0.01	-0.04	-0.06**
	(0.02)	(0.04)	(0.02)	(0.06)	(0.03)	(0.03)
Δlurate$_{t-3}$	0.02	-0.01	0.02	-0.01	**0.02** *	0.02**
	(0.02)	(0.02)	(0.02)	(0.03)	(0.01)	(0.01)
Δs_empl1$_t$	0.40	-2.06	0.29	-0.52	**0.43** **	0.10
	(0.27)	(2.13)	(0.25)	(1.20)	(0.21)	(0.72)
Δs_empl1$_{t-1}$	**-0.43** *	-1.25	**-0.38** *	0.21		
	(0.25)	(2.37)	(0.23)	(0.92)		
Δs_empl1$_{t-2}$	-0.17	-0.45	0.01	0.91	**0.33** **	0.82***
	(0.16)	(2.05)	(0.11)	(1.11)	(0.18)	(0.43)
Δs_empl1$_{t-3}$	**0.45** *	0.68	0.35	0.90		
	(0.26)	(1.09)	(0.21)	(0.88)		
Δs_empl2$_t$	**0.15** **	-0.11	0.15	-0.12	**0.19*** **	0.14
	(0.07)	(0.32)	(0.06)	(0.33)	(0.06)	(0.09)
Δs_empl2$_{t-1}$	**-0.14*** **	-0.18	**-0.14*** **	-0.05	**-0.12*** **	-0.10*
	(0.04)	(0.17)	(0.04)	(0.13)	(0.04)	(0.06)
Δs_empl2$_{t-2}$	-0.02	-0.15	-0.05	0.05		
	(0.04)	(0.08)	(0.04)	(0.19)		
Δs_empl1$_{t-3}$	**0.06** *	0.14	0.04	0.38		
	(0.04)	(0.13)	(0.04)	(0.33)		
time dummies	yes	yes	yes	yes	yes	yes
predet.	--	--	lurate	lurate	lurate	lurate
N obs.	80	80	80	80	80	80
Wald χ^2	133485.96	121478.74	35695.05	8511.51	15701.86	23571.42
AR1 errors z	-2.49	-0.23	-2.70	0.45	-2.96	-1.71
Pr>z	0.01	0.82	0.01	0.65	0.003	0.09
AR2 errors z	-0.49	0.45	-0.57	0.23	0.40	-0.13
Pr>z	0.62	0.66	0.57	0.82	0.69	0.90
Sargan χ^2		0.17		0.62		6.07
Pr>χ^2		1.00		1.00		1.00

Note: Standard errors are reported in parentheses.
***, ** ,* indicate significance at 1, 5, 10 percent level, respectively.
On the tests reported, see Notes to Table 6a.

Table 6c: Estimation Results: Poland, 1992-98

depvar: Δlrwage	(1)		(2)		(3)	
	1-step GMM, robust s.e.	2-step GMM	1-step GMM, robust s.e.	2-step GMM	1-step GMM, robust s.e.	2-step GMM
Δy_{t-1}	0.39 (0.24)	0.42*** (0.14)	0.50*** (0.17)	0.46*** (0.10)	0.31 (0.20)	0.36*** (0.12)
Δy_{t-2}	**-0.25***** (0.08)	-0.20*** (0.05)	-0.23*** (0.07)	-0.24*** (0.04)	**-0.25***** (0.08)	-0.18*** (0.04)
Δlurate$_t$	0.01 (0.02)	0.01 (0.02)	-0.08** (0.04)	-0.09*** (0.02)		
Δlurate$_{t-1}$	**-0.05***** (0.02)	-0.04*** (0.01)	0.000 (0.03)	0.01 (0.01)	**-0.04**** (0.02)	-0.04*** (0.01)
Δlurate$_{t-2}$	-0.004 (0.01)	-0.01 (0.01)	-0.002 (0.02)	0.0002 (0.01)		
Δs_empl1$_t$	0.03 (0.09)	-0.04 (0.06)	-0.05 (0.09)	-0.07 (0.05)		
Δs_empl1$_{t-1}$	**0.14*** (0.07)	0.17*** (0.06)	0.03 (0.08)	0.01 (0.05)	**0.14**** (0.06)	0.16*** (0.05)
Δs_empl1$_{t-2}$	-0.09 (0.07)	-0.05 (0.05)	-0.13* (0.07)	-0.06 (0.04)		
Δs_empl2$_t$	**-0.10**** (0.05)	-0.13*** (0.04)	-0.11* (0.04)	-0.14*** (0.04)	**-0.14***** (0.04)	-0.16*** (0.03)
Δs_empl2$_{t-1}$	0.02 (0.05)	0.03 (0.04)	0.03 (0.05)	0.04 (0.03)		
Δs_empl2$_{t-2}$	-0.04 (0.05)	-0.03 (0.04)	-0.04 (0.04)	-0.05 (0.03)		
time dummies	yes	yes	yes	yes	yes	yes
predet.	--	--	lurate	lurate	--	--
N obs.	196	196	196	196	196	196
Wald χ^2	162.27	222.85	149.14	673.17	109.21	157.54
AR1 errors z Pr>z	-1.39 0.17	-1.94 0.05	-3.04 0.002	-3.29 0.001	-1.26 0.21	7.21 0.84
AR2 errors z Pr>z	1.13 0.26	0.91 0.36	1.03 0.30	1.61 0.11	1.31 0.19	-1.78 0.08
Sargan χ^2 Pr>χ^2		7.18 0.85		18.11 0.75		1.02 0.31

Note: Standard errors are reported in parentheses.
***, ** ,* indicate significance at 1, 5, 10 percent level, respectively.
On the tests reported, see Notes to Table 6a.

Table 6d: Estimation Results: Romania, 1992-99

depvar: Δlrwage	(1)		(2)		(3)	
	1-step GMM, robust s.e.	2-step GMM	1-step GMM, robust s.e.	2-step GMM	1-step GMM, robust s.e.	2-step GMM
Δy_{t-1}	0.12 (0.24)	0.08 (0.11)	0.09 (0.12)	0.07 (0.07)	0.07 (0.13)	0.04 (0.04)
Δy_{t-2}	**-0.18*** (0.10)	-0.19*** (0.05)	**-0.19**** (0.10)	-0.19*** (0.06)	**-0.16**** (0.07)	-0.16*** (0.02)
Δy_{t-3}	0.04 (0.19)	0.04 (0.07)	0.03 (0.14)	-0.000 (0.06)		
Δlurate$_t$	**-0.03**** (0.01)	-0.02** (0.01)	0.01 (0.03)	0.01 (0.01)	0.001 (0.02)	0.001 (0.01)
Δlurate$_{t-1}$	-0.01 (0.02)	-0.01 (0.01)	-0.003 (0.03)	-0.003 (0.01)		
Δlurate$_{t-2}$	-0.02 (0.02)	-0.01 (0.01)	-0.02 (0.02)	-0.02* (0.01)		
Δlurate$_{t-3}$	0.002 (0.03)	-0.0004 (0.01)	-0.001 (0.02)	0.01 (0.01)		
Δs_empl1$_t$	**-1.01***** (0.36)	-0.76*** (0.23)	**-0.84**** (0.38)	-0.72** (0.29)	**-0.69**** (0.32)	-0.77*** (0.11)
Δs_empl1$_{t-1}$	**0.48**** (0.24)	0.49*** (0.15)	**0.54**** (0.22)	0.68*** (0.17)		
Δs_empl1$_{t-2}$	0.21 (0.24)	0.30** (0.12)	0.006 (0.22)	0.14 (0.12)		
Δs_empl1$_{t-3}$	**0.39**** (0.16)	0.42*** (0.09)	0.26 (0.16)	0.35*** (0.10)		
Δs_empl2$_t$	**-1.26***** (0.25)	-1.34*** (0.17)	**-1.17***** (0.29)	-1.22*** (0.16)	**-1.18***** (0.20)	-1.22*** (0.08)
Δs_empl2$_{t-1}$	0.49 (0.42)	0.33 (0.20)	0.35 (0.26)	0.30* (0.16)		
Δs_empl2$_{t-2}$	0.17 (0.31)	0.003 (0.13)	-0.09 (0.26)	-0.12 (0.14)		
Δs_empl1$_{t-3}$	0.40 (0.22)	0.30** (0.14)	0.29 (0.22)	0.24* (0.13)		
time dummies	yes	yes	yes	yes	yes	yes
predet.	--	--	lurate	lurate	lurate	lurate
N obs.	164	164	164	164	164	164
Wald χ^2	4751.39	20839.61	4453.39	185884.37	5851.65	89166.22
AR1 errors z Pr>z	-1.38 0.17	-1.56 0.12	-2.05 0.04	-1.72 0.09	-1.78 0.07	-1.52 0.13
AR2 errors z Pr>z	0.74 0.46	0.97 0.33	0.12 0.91	0.39 0.70	0.30 0.76	0.29 0.77
Sargan χ^2 Pr>χ^2		23.07 0.19		30.28 0.40		33.27 0.69

Note: Standard errors are reported in parentheses.
***, ** ,* indicate significance at 1, 5, 10 percent level, respectively.
On the tests reported, see Notes to Table 6a.

Table 7: Spatial Autocorrelation in the Main Variables

	lrwage		lurate		s_empl1		s_empl2	
	LM test	Pr>LM	LM test	Pr>LM	LM test	Pr>LM	LM test	Pr>LM
Bulgaria								
1992	0.0050	0.94	1.1804	0.28	1.9672	0.16	0.9915	0.32
1993	0.0340	0.85	0.1528	0.70	1.3050	0.25	1.8240	0.18
1994	0.0670	0.80	0.0528	0.82	1.2424	0.27	0.6963	0.40
1995	0.0003	0.99	0.1948	0.66	0.8206	0.36	1.5263	0.22
1996	0.1715	0.68	0.5922	0.44	0.9193	0.34	0.9314	0.33
1997	0.1437	0.70	0.7642	0.38	0.3040	0.58	1.5703	0.21
1998	0.0005	0.98	0.9337	0.33	0.1344	0.71	2.4336	0.12
1999	0.0303	0.86	1.3618	0.24	0.4670	0.49	1.7752	0.18
Hungary								
1992	0.0592	0.81	1.6607	0.20	0.0000	1.00	1.1253	0.29
1993	0.0008	0.98	2.2632	0.13	0.0876	0.77	0.4656	0.50
1994	0.2266	0.63	2.8646	0.09	0.2312	0.63	0.3640	0.55
1995	0.1388	0.71	2.7132	0.10	0.1715	0.68	0.5156	0.47
1996	0.3404	0.56	3.1808	0.07	0.3818	0.54	0.0934	0.76
1997	0.8689	0.35	2.7409	0.10	0.2651	0.61	0.0324	0.86
1998	0.6365	0.42	2.8495	0.09	0.4688	0.49	0.0003	0.99
1999	0.8371	0.36	1.9154	0.17	0.4222	0.52	0.0978	0.75
Poland								
1992	0.1646	0.68	3.6663	0.06	11.3508	0.00	5.8671	0.02
1993	0.2687	0.60	4.2243	0.04	10.5313	0.00	2.0134	0.16
1994	0.4166	0.52	1.9126	0.17	10.9388	0.00	3.4046	0.07
1995	0.5720	0.45	1.2581	0.26	9.5231	0.00	1.1651	0.28
1996	0.6188	0.43	0.9060	0.34	14.7458	0.00	5.9518	0.01
1997	0.8126	0.37	0.1499	0.70	15.0584	0.00	7.1536	0.01
1998	0.6637	0.42	0.0088	0.93	15.1339	0.00	6.7609	0.01
Romania								
1992	0.0226	0.88	3.1051	0.08	0.0004	0.98	0.5739	0.45
1993	0.0653	0.80	0.9988	0.32	0.0567	0.81	0.3662	0.55
1994	0.2751	0.60	2.0767	0.15	0.0197	0.89	0.6251	0.43
1995	0.0881	0.77	3.3467	0.07	0.0047	0.95	0.5631	0.45
1996	0.0448	0.83	3.5424	0.06	0.0133	0.91	0.4134	0.52
1997	0.0075	0.93	2.2205	0.14	0.0486	0.83	0.2788	0.60
1998	0.6295	0.43	1.2585	0.26	0.0086	0.93	0.6523	0.42
1999	0.4778	0.49	1.0421	0.31	0.0111	0.92	0.6694	0.41

Table 8a: Estimation Results with Spatially Filtered Variables: Bulgaria, 1991-99

depvar: Δlrwage	**(1)**		**(2)**		**(3)**	
	1-step GMM, robust s.e.	**2-step GMM**	**1-step GMM, robust s.e.**	**2-step GMM**	**1-step GMM, robust s.e.**	**2-step GMM**
Δy_{t-1}	**0.63*** ** (0.16)	0.41*** (0.13)	**0.65*** ** (0.13)	0.43** (0.21)	**0.67*** ** (0.13)	0.61*** (0.13)
Δy_{t-2}	**-0.33*** ** (0.08)	-0.29*** (0.07)	**-0.26*** ** (0.07)	-0.53*** (0.12)	**-0.27*** ** (0.07)	-0.32*** (0.10)
$\Delta lurate_{t}$	-0.03 (0.02)	-0.04** (0.02)	**-0.13** ** (0.06)	-0.13 (0.08)	**-0.12** ** (0.06)	-0.05 (0.05)
$\Delta lurate_{t-1}$	-0.01 (0.03)	-0.005 (0.03)	0.02 (0.06)	0.01 (0.12)		
$\Delta lurate_{t-2}$	-0.002 (0.03)	-0.01 (0.02)	0.03 (0.02)	-0.01 (0.03)		
Δs_empl1_{t}	**0.38** ** (0.16)	0.25 (0.18)	**0.31*** (0.18)	0.39 (0.62)		
Δs_empl1_{t-1}	0.12 (0.22)	-0.24 (0.58)	0.05 (0.26)	1.14 (0.77)		
Δs_empl1_{t-2}	0.11 (0.18)	0.08 (0.20)	0.09 (0.22)	1.13* (0.62)		
Δs_empl2_{t}	0.17 (0.18)	0.07 (0.15)	0.23 (0.19)	0.43 (0.51)		
Δs_empl2_{t-1}	0.09 (0.14)	-0.13 (0.24)	-0.005 (0.17)	-0.05 (0.56)		
Δs_empl2_{t-2}	-0.12 (0.14)	-0.01 (0.10)	-0.16 (0.17)	0.33 (0.48)		
time dummies	yes	yes	yes	yes	yes	yes
predet.	--	--	lurate	lurate	lurate	lurate
N obs.	168	168	168	168	168	168
Wald χ^2	7821.92	82608.62	5140.86	42036.94	4203.17	29873.57
AR1 errors z	-3.10	-1.94	-2.88	-2.09	-3.26	-2.37
P>z	0.001	0.05	0.004	0.04	0.001	0.02
AR2 errors z	0.91	0.67	0.30	1.13	0.62	1.03
P>z	0.36	0.50	0.76	0.26	0.54	0.30
Sargan χ^2		13.68		5.05		20.70
Pr>χ^2		0.97		1.00		1.00

Note: Standard errors are reported in parentheses.
***, ** ,* indicate significance at 1, 5, 10 percent level, respectively.
On the tests reported, see Notes to Table 6a.

Table 8b: Estimation Results with Spatially Filtered Variables: Hungary, 1992-99

depvar: Δlrwage	(1)		(2)		(3)	
	1-step GMM, robust s.e.	2-step GMM	1-step GMM, robust s.e.	2-step GMM	1-step GMM, robust s.e.	2-step GMM
Δy_{t-1}	**0.46*** **	-0.34	**0.42*** **	0.40	**0.48*** **	0.63***
	(0.13)	(0.39)	(0.10)	(0.60)	(0.08)	(0.13)
Δy_{t-2}	0.09	-2.15	**0.12***	-0.51		
	(0.08)	(2.43)	(0.06)	(0.75)		
Δy_{t-3}	-0.09	-0.13	-0.05	0.45		
	(0.09)	(0.12)	(0.09)	(0.45)		
Δlurate$_t$	-0.01	-0.01	-0.01	0.06	-0.003	-0.02
	(0.01)	(0.01)	(0.01)	(0.07)	(0.01)	(0.02)
Δlurate$_{t-1}$	**-0.04*** **	-0.24	-0.02	0.21	-0.04	0.002
	(0.02)	(0.21)	(0.03)	(0.28)	(0.03)	(0.03)
Δlurate$_{t-2}$	-0.03	-0.10**	**-0.05***	-0.04	**-0.05***	-0.05**
	(0.02)	0.04)	(0.02)	(0.07)	(0.03)	(0.02)
Δlurate$_{t-3}$	**0.03***	0.36	0.03	-0.05	**0.03** **	0.05***
	(0.02)	(0.36)	(0.02)	(0.06)	(0.02)	(0.01)
Δs_empl1$_t$	0.23	2.34	0.17	-3.95		
	(0.28)	(2.50)	(0.25)	(3.91)		
Δs_empl1$_{t-1}$	**-0.46** **	0.23	**-0.41** **	-2.15		
	(0.20)	(0.90)	(0.20)	(2.25)		
Δs_empl1$_{t-2}$	-0.14	-8.46	0.004	0.09	**0.28***	0.02
	(0.15)	(8.65)	(0.11)	(0.93)	(0.16)	(0.28)
Δs_empl1$_{t-3}$	0.40	-6.93	0.33	2.47		
	(0.25)	(7.50)	(0.22)	(2.08)		
Δs_empl2$_t$	**0.17** **	0.43	**0.16*** **	-0.07	**0.16*** **	0.36***
	(0.07)	(0.33)	(0.06)	(0.23)	(0.06)	(0.12)
Δs_empl2$_{t-1}$	**-0.15*** **	-0.24	**-0.15*** **	-0.56	**-0.14*** **	-0.09**
	(0.04)	(0.19)	(0.04)	(0.59)	(0.04)	(0.04)
Δs_empl2$_{t-2}$	-0.01	-0.43	-0.03	0.04		
	(0.04)	(0.37)	(0.04)	(0.11)		
Δs_empl2$_{t-3}$	0.06	-1.02	0.03	-0.08		
	(0.04)	(1.15)	(0.04)	(0.19)		
time dummies	yes	yes	yes	yes	yes	yes
predet.	--	--	lurate	lurate	lurate	lurate
N obs.	80	80	80	80	80	80
Wald χ^2	104116.41	13197.52	89753.07	23890.83	12193.81	25763.83
AR1 errors z	-2.46	0.	-2.63	0.29	-2.61	-2.23
Pr>z	0.01	0.	0.01	1.00	0.01	0.03
AR2 errors z	-0.21		-0.17	0.	1.29	1.42
Pr>z	0.83		0.86	0.	0.20	0.16
Sargan χ^2		0.85		1.33		9.31
Pr>χ^2		1.00		0.18		1.00

Note: Standard errors are reported in parentheses.
***, ** ,* indicate significance at 1, 5, 10 percent level, respectively.
On the tests reported, see Notes to Table 6a.

Table 8c: Estimation Results with Spatially Filtered Variables: Poland, 1992-98

depvar: Δlrwage	**(1)**		**(2)**		**(3)**	
	1-step GMM, robust s.e.	**2-step GMM**	**1-step GMM, robust s.e.**	**2-step GMM**	**1-step GMM, robust s.e.**	**2-step GMM**
Δy_{t-1}	0.36 (0.23)	0.42*** (0.13)	0.32 (0.20)	0.36*** (0.12)	**0.35*** (0.20)	0.43*** (0.12)
Δy_{t-2}	**-0.24***** (0.08)	-0.20*** (0.04)	**-0.21***** (0.06)	-0.21*** (0.04)	**-0.25***** (0.08)	-0.20*** (0.04)
Δ**lurate**$_t$	0.003 (0.02)	0.01 (0.02)	**-0.11***** (0.04)	-0.12*** (0.02)		
Δ**lurate**$_{t-1}$	**-0.05***** (0.02)	-0.04*** (0.01)	0.003 (0.03)	0.02* (0.01)	**-0.04**** (0.02)	-0.04*** (0.01)
Δ**lurate**$_{t-2}$	0.00 (0.01)	-0.002 (0.01)	-0.00 (0.02)	0.002 (0.01)		
Δ**s_empl1**$_t$	0.08 (0.10)	0.01 (0.07)	-0.01 (0.10)	-0.06 (0.06)		
Δ**s_empl1**$_{t-1}$	**0.17**** (0.08)	0.18*** (0.06)	0.05 (0.09)	0.04 (0.06)	**0.15***** (0.07)	0.15*** (0.06)
Δ**s_empl1**$_{t-2}$	-0.07 (0.08)	-0.03 (0.06)	-0.09 (0.09)	-0.04 (0.05)		
Δ**s_empl2**$_t$	-0.07 (0.06)	-0.11*** (0.04)	-0.09 (0.07)	-0.12*** (0.04)	**-0.13***** (0.04)	-0.15*** (0.03)
Δ**s_empl2**$_{t-1}$	0.03 (0.05)	0.03 (0.04)	0.04 (0.06)	0.04 (0.03)		
Δ**s_empl2**$_{t-2}$	-0.03 (0.05)	-0.01 (0.04)	-0.03 (0.05)	-0.03 (0.03)		
time dummies	yes	yes	yes	yes	yes	yes
predet.	--	--	lurate	lurate	--	--
N obs.	196	196	196	196	196	196
Wald χ^2	169.30	220.61	131.54	633.34	104.28	157.54
AR1 errors z **Pr>z**	-1.45 0.15	-2.05 0.04	-2.15 0.03	-2.80 0.01	-1.43 0.15	-2.06 0.04
AR2 errors z **Pr>z**	1.34 0.18	1.23 0.22	1.10 0.27	1.38 0.17	1.40 0.16	1.27 0.21
Sargan χ^2 **Pr>χ^2**		7.67 0.81		16.14 0.85		7.30 0.64

Note: Standard errors are reported in parentheses.
***, ** ,* indicate significance at 1, 5, 10 percent level, respectively.
On the tests reported, see Notes to Table 6a.
Note to (2): The Sargan test statistic from this model has a slightly higher p-value than from Model (1). However, dropping insignificant regressors with predetermined log unemployment rates results in second order autocorrelation.

Table 8d: Estimation Results with Spatially Filtered Variables: Romania, 1992-99

depvar: Δlrwage	(1)		(2)		(3)	
	1-step GMM, robust s.e.	2-step GMM	1-step GMM, robust s.e.	2-step GMM	1-step GMM, robust s.e.	2-step GMM
Δy_{t-1}	0.06 (0.28)	0.04 (0.12)	0.12 (0.13)	0.08 (0.05)	0.08 (0.14)	0.08 (0.04)
Δy_{t-2}	**-0.20**** (0.09)	-0.20*** (0.04)	**-0.19**** (0.09)	-0.19*** (0.05)	**-0.15**** (0.07)	-0.15*** (0.02)
Δy_{t-3}	0.04 (0.21)	0.03 (0.08)	0.06 (0.14)	0.005 (0.06)		
$\Delta lurate_t$	**-0.03**** (0.01)	-0.02** (0.01)	0.01 (0.03)	0.008 (0.01)	0.01 (0.02)	0.01 (0.01)
$\Delta lurate_{t-1}$	-0.01 (0.02)	-0.01 (0.01)	-0.01 (0.03)	-0.005 (0.01)		
$\Delta lurate_{t-2}$	-0.03 (0.02)	-0.02* (0.01)	**-0.03*** (0.02)	-0.02** (0.01)		
$\Delta lurate_{t-3}$	-0.003 (0.03)	-0.001 (0.02)	0.001 (0.02)	0.002 (0.01)		
Δs_empl1_t	**-0.99**** (0.41)	-0.76*** (0.22)	**-0.82**** (0.41)	-0.74** (0.32)	**-0.63*** (0.34)	-0.74*** (0.11)
Δs_empl1_{t-1}	**0.40*** (0.21)	0.38*** (0.13)	**0.53**** (0.22)	0.54*** (0.17)		
Δs_empl1_{t-2}	0.14 (0.27)	0.23* (0.14)	-0.01 (0.25)	0.09 (0.13)		
Δs_empl1_{t-3}	**0.33**** (0.18)	0.42*** (0.11)	0.20 (0.17)	0.28*** (0.09)		
Δs_empl2_t	**-1.28***** (0.24)	-1.34*** (0.15)	**-1.18***** (0.29)	0.28*** (0.09)	**-1.17***** (0.21)	-1.24*** (0.08)
Δs_empl2_{t-1}	0.46 (0.47)	0.25 (0.20)	0.44 (0.29)	0.29* (0.17)		
Δs_empl2_{t-2}	0.14 (0.33)	-0.06 (0.12)	-0.08 (0.28)	-0.16 (0.14)		
Δs_empl2_{t-3}	**0.44**** (0.22)	0.32** (0.13)	0.35 (0.22)	0.26** (0.11)		
time dummies	yes	yes	yes	yes	yes	yes
predet.	--	--	lurate	lurate	lurate	lurate
N obs.	164	164	164	164	164	164
Wald χ^2	6204.98	37150.06	6665.65	82308.88	6420.19	133791.94
AR1 errors z Pr>z	-1.03 0.30	-1.26 0.21	-2.13 0.03	-1.85 0.06	-1.67 0.10	-1.56 0.12
AR2 errors z Pr>z	0.58 0.56	0.49 0.62	0.26 0.79	0.52 0.61	-0.27 0.78	-0.21 0.84
Sargan χ^2 Pr>χ^2		22.62 0.09		30.27 0.40		

Note: Standard errors are reported in parentheses.
***, ** ,* indicate significance at 1, 5, 10 percent level, respectively.
On the tests reported, see Notes to Table 6a.

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