AccessLab

Regional Labour Market Adjustments in the Accession Candidate Countries

Workpackage No. 3

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Analysing and Modelling Inter-regional Migration

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ZEW - Centre for European Economic Research

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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DELIVERABLE 5: Determinants of East-West Migration in Germany

Are East – West migrants in Germany Favourably Self-Selected

Authors: Herbert Brücker and Parvati Trübswetter

Analysing and Modelling Inter-regional Migration: Executive Summary and Policy Conclusions

Jan Fidrmuc and Peter Huber[1]

A number of analysts have recently pointed out the low levels of inter regional migration in Europe. This lack of labour mobility can have profound economic and political consequences. As it is often argued (see, for example, Eichengreen, 1998), the viability of currency unions such as the EMU is threatened by low labour mobility within and across member countries. Migration serves a channel through which regions adjust to changes in region-specific labour demand: as workers move in search of better wages and employment prospects, this helps equilibrate wages and unemployment rates and thus absorb adverse effects of labour-market shocks. In the absence of migration, regional shocks have persistent effects and translate into changes in unemployment or participation.

Aside from economic consequences there is also a danger of political repercussions. As a result of high unemployment, political unrest and increased demands for regional transfers may arise. This in turn may threaten the hegemony even of well-established states: If regional transfers are granted for long enough periods chances are that the part of the population financing these transfers will feel it is constantly subsidising another region. Secession and disintegration may be the consequences of this process. For instance, Fidrmuc et al. (1999) argue that low labour mobility in the former Czechoslovakia contributed to economic tensions that eventually lead to the break-up of Czechoslovakia. This is a problem that should be even more relevant in the context of European integration, where feelings of national identity towards the Union are less well developed than in existing states such as Czechoslovakia.

The empirical evidence on the low capacity of migration to equilibrate shocks in Europe is overwhelming. For instance, Decressin and Fatas (1995), Fatas (2000) as well as Obstfeld and Peri (2000) find that migration only contributes moderately to the reduction of differences in regional labour market conditions. Furthermore, in a recent study Puhani (2001) finds that it may take several years or even decades before regional unemployment disparities are evened out by migration. This

[1] The authors would like Mihail Hazans for helpful comments.

experience starkly contrasts to that in the U.S. where inter regional mobility is considered to be the most important adjustment mechanism of regions to asymmetric shocks (see Blanchard and Katz, 1992 as well as Treyz et al, 1993).

While thus the stylised fact of low migration rates in Europe have been clearly documented, little is known about its causes. Although number of suspects such as inefficient housing markets, problems in spatial matching between vacancies and available labour, generous transfer payments to less developed regions that discourage the unemployed from migrating, inefficient labour market institutions, black market and informal sector activities, and demographics have been put forward, there is only little evidence on which of these factors are most important when approaching this question from a broad comparative perspective across EU countries.

Contents of this Report

This report contains a series of papers on migration in the current EU members as well as the candidate countries and thus collects the results of Work package 3 of the AccessLab project. Its aims are to determine to what extent inter-regional migration serves as a channel of regional adjustment in the candidate countries, and how regional differences in unemployment rates, average wages, industrial structure and demographics affect migration patterns. It also compares these results to those obtained for the European Union and analyses the impact of human capital variables and other personal characteristics on migration decisions with an aim of discussing the prospects of East-West migration following the next EU enlargement.

The first part of the analysis was performed by estimating a gravity model of migration for a panel of regions in selected candidate and EU countries. The gravity model of migration relates inter-county migratory flows to economic and demographic variables pertaining to the regions of departure and destination as well as the distance between the two regions.

In the second part, we focused on the individual motives for East and West migration and commuting after German unification. The decision to migrate is understood in our model as an investment in human capital, whose costs are determined by the human capital already accumulated. The returns of migration and commuting depend on expectations concerning future income levels, which are, in turn,

determined by wages and employment opportunities in the respective locations. In the empirical analysis, a probit regression model derived from these theoretical considerations is used. The individual probability to migrate depends on wage levels and employment rates in the respective locations, education levels and other personal characteristics.

Results Concerning Migration in Candidate Countries

The central finding of this report is that inter regional migration in candidate countries is low even relative to the European Union. Fidrmuc (chapter 1) comparing internal migration in the Czech Republic, Poland, Hungary, Slovakia and Slovenia with that in Italy, Spain, and Portugal concludes that migration rates are little effective in reducing regional disparities in the candidate countries. Everdeen and Bardsley (chapter 2) conduct a meta-study of previous estimates of gravity models to determine the reactiveness of migration rates in candidate countries to unemployment and wage disparities. They find that even after controlling for methodological and data construction differences between studies migration in the candidate countries is less reactive in particular to differences in unemployment rates. This said there seems to be some important variance across countries. While in most of the countries analysed by Fidrmuc (chapter 1) low migration rates are the rule, Hazans (chapter 3) finds that in the Baltic countries migration rates are relatively high by international standards and Kallai (chapter 4) shows that Romanian migration rates are comparable to those found in many of the more flexible western European labour markets. This has to be interpreted on the background of the smaller region sizes in particular in the Baltic countries, however.

Furthermore, results also show that migration rates in the candidate countries have fallen substantially during the 1990's, even as regional disparities have widened. Indeed this "stylized fact" seems to apply even more ubiquously to all the candidate countries than low migration rates themselves. Fidrmuc (chapter 1) for the central European candidate countries, Hazans (Chapter 3) for the Baltic states and Kallai (chapter 4) for Romania all find this decline in migration rates to be a stylized fact of the transition period in the countries they analyse. The main difference here seems to be that in some countries (in particular in the Baltics) this decline ends early during the transition, while in others (in particular in the Central European Countries) it continued well into the second half of the 1990's.

Low and falling migration in the face of large regional disparities in terms of regional incomes and unemployment rates in the candidate countries present somewhat of a puzzle, as Fidrmuc and Huber (Chapter 5) point out. According to economic theory (see Todaro, 1969, and Harris and Todaro, 1970) migrants should move from places with low expected income to regions with high expected income in order to maximise their lifetime utility. Therefore, high regional disparities should increase the incentive to migrate rather than lower migration. Some studies in this report (in particular Hazans chapter 3 for Latvia and Fidrmuc and Huber chapter 5 for the Czech Republic) find evidence of an increasing responsiveness of migration to wages, thus other explanations for low and declining migration rates are needed if policy is to effecectively increase migration. A number of such explanations have been put forward and were analysed in the context of the current study:

First, it has been argued (see: Faini et al, 1997) that spatial matching in labour markets may be inefficient in Europe. In particular if job searchers in the labour market face a substantially higher probability of being hired (per unit of time spent searching) in their region of residence than elsewhere and if migration costs are high, low rates of migration despite large regional disparities may be an equilibrium outcome (see Mohlo, 2001). The reason for this is that in such a situation searchers will primarily search in their region of residence, which in turn will cause little migration due to workers finding employment in another region, and migration costs will be too high to warrant migration before finding employment in another region. This hypothesis finds some indirect empirical support in the case study on the Czech Republic by Huber and Fidrmuc (Chapter 5), which finds that distance has become a more important deterrent to migration and that migration rates have declined most severely over long distance categories.

Second, a number of authors have considered policy interventions as provided through social and regional policy as potential culprits for low migration rates. To the extent that such transfers provide additional disposable income primarily to depressed regions, this will countervail existing unemployment and wage disparities, thereby reducing migration incentives. Indeed, this hypothesis can be formulated more generally. Even if regional transfers are used to finance locally traded goods such as public infrastructure rather than consumption and the provision of these goods enters the

utility function of individuals positively, this may impede on the incentives to migrate. In this case provision of locally traded goods will countervail measured unemployment and wage differences. Huber (chapter 6) addresses this issue by analysing the cross country variation in internal of migration rates in the candidate and EU countries. He finds only mixed support. While the replacement rate of national unemployment benefit systems is not robustly correlated with the internal migration rates, his analysis does suggest that higher degrees of employment protection are robustly associated with lower internal migration rates.

Third, aside from government support other unmeasured income components, such as black market income or income from subsistence farming may induce labour market searchers to stay at home rather than move elsewhere in the country. Such income will tend to reduce emigration from high unemployment (low wage) regions, if the share of unmeasured income components is higher in these regions than elsewhere. In this case actual disparities will be smaller than the measured income and unemployment disparities. Huber (chapter 6) addresses this issue and finds little support that this could explain cross country differences in migration rates. Measures of the extent of the black market are not robustly correlated with cross country differences in internal migration rates.

Fourth, inefficiencies in the housing markets could have led to decreasing migration (see: Faini et al, 1997). This may be the case in particular in countries where rent controls are important and/or taxation of housing transactions is high. In such markets high transaction costs as well as excess demand for rented housing may act as an impediment to interregional mobility. In such a situation as shown by for instance Cameron and Muellbauer (1998) commuting may be an important alternative to migration, in particular when regions are close to each other. The evidence on the impact of this factor collected in this report suggests that housing market imperfections, while important in many EU member states may represent less of an impediment to migration in candidate countries. Hazans (chapter 3) finds that commuting and migration are complements rather than substitutes (i.e. high migration is associated with high commuting in the same direction rather than vice versa) in the Baltic countries, which suggests that in the Baltic's other factors than those described by Cameron and Muellbauer are at work. Huber and Fidrmuc (chapter 5) as well as Kallai (chapter 4) find little

evidence of a significant effect of housing availability on bilateral migration rates in the Czech Republic and Romania, respectively. These results, however, pertain only to indicators of aggregate housing availability. When considering the structure of housing stock, Huber (chapter 6) shows that for EU member states high shares of owner occupied housing belong to the most important correlates of low migration rates in EU member states. Unfortunately, however, the lack of data on candidate countries in this respect prevents further analysis for these countries

Fifth, as argued by Decressin (1994), high nation-wide unemployment rates may discourage internal migration, as they indicate falling probability of finding employment. This will lead to lower migration; since in times of high unemployment, escape probabilities from unemployment are also low (see. Westerlund, 1997). Furthermore, unemployment may change the expected gains from migration. If unemployment is high everywhere, risk averse actors in the labour market may find security in existing employment more attractive than migration with uncertain prospects. Thus high overall unemployment rates may be a deterrent to migration (see: Gordon, 1985). Furthermore, high unemployment is usually also associated with long-term unemployment. To the degree that long-term unemployed lose part of their human capital or become discouraged in their search efforts, this will also reduce migration motives. Again empirical evidence is highly supportive of the view that high nation wide unemployment is associated with low migration. However, this factor seems to be of lesser importance in the candidate countries. Huber and Fidrmuc (chapter 5) show that increasing aggregate unemployment rates are uncorrelated with the fall of Czech migration rates in the late 1990's after controlling for other factors impacting on migration.

Sixth, the context of transition draws attention to the fact that low migration rates may reflect differences between short and long term developments and changes in migrant behaviour. In particular, it may be that current wage and unemployment disparities do not fully reflect the regions' long-term economic prospects. The transition economies provide good examples for this argument. In the early 1990's the heavy-industry and mining districts were among the high wage regions and reported unemployment rates only slightly above the national average. Subsequently, these districts were hit disproportionately hard by the reform-induced shocks. To the extent that the decline of heavy

industry was anticipated, it may have induced inhabitants of these regions to emigrate already before the decline and even while wages and unemployment rates in these regions were in line with the rest of the country. Indeed changes in behaviour and expectations seem to have been an important factor underlying the decline in migration rates in the 1990's. Huber and Fidrmuc's (chapter 5) case study suggest that the decline in migration is entirely due to changes in behaviour among migrants.

Seventh, in particular in the context of the candidate countries, where income levels are substantially lower than in the EU, liquidity constraints could play an important role in causing low migration rates. Kallai (chapter 4) provides some evidence concerning the importance of this aspect of migration.

Results Concerning East-West Migration in Germany and the Structure of Migration

Another important aspect of migration is the democraphic and socio-economic profile of migrants. This is of particular relevance because a number of studies find that emigrants (both in the inter-regional as well as international context) tend to be drawn from among workers with above-average skills . In this context, the case of East-West migration in Germany presents a very interesting case as it concerns two regions with dramatically different economic conditions with few barriers (legal, linguistic or cultural) to migration. Moreover, the experience of Germany can shed lights on the potential long run growth effects of brain drain in the candidate countries after accession to the European Union

The work of Brücker and Trübswetter (chapter 7) on the skill composition of the East-West migrants in Germany contributes nicely to this literature. They show that if one focuses on the economically active (i.e. excluding students and job starters) migrants from East-Germany have a qualification profile, which is not any higher than that of East German residents. Results suggest that the high education of migrants results primarily from the mobility of young, well-educated East Germans migrating to find their first employment or receive education. This is important because it suggest that among the major impediments to attracting well-educated workers back to East-Germany (and by analogy to other peripheral and underdeveloped regions) is a lack of provision of adequate jobs and education, rather than the emigration of the working educated. Support for this comes also from

Hazans (chapter 3) who finds that, in Estonia, the propensity to migrate is higher for those with high education within the population at large (i.e. including the economically inactive) but not among employees. Migration of the highly qualified both in an international and a national context thus seem to primarily reflect the search of educated for education and employment commensurate to their level of education.

Brücker and Trübswetters (chapter 7) results, however, also suggest that migrants from East Germany are also more highly skilled concerning unobserved characteristics (i.e. that migrants from East Germany end to fare better in the West German labour market that observationally equivalent East German and West German citizen that did not migrate.) This suggests that, as held by much of traditional migration theory, although the most educated may not end up migrate, among narrowly defined educational groups the most able end up migrating.

Policy Conclusions and Future Research

In summary, the findings in this work package suggest that low migration rates are one of the major obstacles to equalisation of regional disparities as well as to effective absorption of asymmetric shocks in the candidate countries. Thus policies designed at increasing internal migration rates in the candidate countries should have a high priority.

The results, however, also suggest that a policy framework to address the low internal migration rates in the candidate countries should take a relatively broad view on migration and should encompass a multitude of factors such as housing and capital market imperfections (to overcome liquidity constraints), improving spatial matching and reviewing labour market institutions (in particular employment protection regulation). Clearly, for policy purposes it would be interesting to know which of these factors would be most effective in increasing the willingness to migrate in the candidate countries. This, however, is beyond the macro economic evidence presented in this report and must be left to more detailed micro-data analysis in the reports to be contained in the research conducted in work package 4 of the AcccessLab report.

Furthermore, the results indicate that the emigration of highly skilled labour both in a national and international context reflects both the search for education and for jobs. In the context of enlargement,

this on the one hand implies that any "brain drain" on the candidate countries induced by enlargement will probably reflect deficiencies in the educational system of these countries and their inability to attract high skilled workers. Policies designed to alleviate the problems of "brain drain" should thus be primarily focused on providing adequate education and on creation of job opportunities for high skilled workers in the region. On the other hand this also draws attention to the potential incentive effects which may countervail brain drain after a liberalisation of labour migration in an international context. To the extent that migration involves primarily young and well educated workers, this may increase incentives for education in the sending country.

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MIGRATION AND REGIONAL ADJUSTMENT TO ASYMMETRIC SHOCKS IN TRANSITION ECONOMIES*

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Abstract:

Does migration facilitate regional adjustment to idiosyncratic shocks? The evidence from post-communist economies indicates that the efficacy of migration in reducing inter-regional unemployment and wage differentials has in fact been rather low. High wages appear to encourage, and, similarly, high unemployment tends to discourage, overall migration – inbound and outbound – rather than induce a net flow from depressed regions to those with better economic conditions. Even when the impact of unemployment and wages on net migration is statistically significant, it is economically very small. Finally, migration flows have actually been declining in the course of transition, even as inter-regional disparities have been rising.

Keywords: Migration, Regional Adjustment, Regional Shocks, Optimum Currency Areas
JEL Categories: F22, J61, P23

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1 Introduction

Migration, or labor mobility[1], is an important economic phenomenon. Migrants move from regions with high unemployment and/or low incomes to more prosperous regions, attracted by higher wages and better employment prospects. In this manner, migration helps facilitate regional adjustment to asymmetric shocks (such as an idiosyncratic fall in demand for the region's products, or technological progress that renders productive facilities in the region obsolete). In a hypothetical economy with perfect labor mobility, regions would adjust to asymmetric shocks instantaneously.[2] When factor mobility is limited and/or prices and wages rigid, however, the effects of asymmetric shocks persist and regional economies have to rely on other mechanisms, such as inter-regional fiscal redistribution, to deal with them. A common comparison in this context is the difference between the US and continental Europe (see, for example, Eichengreen, 1993, 1998). In the US, labor mobility is high and plays an important role in reducing unemployment and wage differentials between regions (Blanchard and Katz, 1992). In contrast, European countries often display persistent economic differences between regions such as North and South of Italy, or East and West Germany, and labor mobility contributes little in smoothing those differentials away (Decressin and Fatas, 1995).

The role of migration in facilitating regional adjustment is particularly important in countries undergoing fundamental structural changes. The post-communist countries in Central and Eastern Europe initiated economic reforms with essentially no (official) unemployment and very egalitarian wage distribution. The subsequent transition from central planning to a market economy, however, was associated with dramatic and largely asymmetric economic developments (for example, regions differed in their dependence on trade with the CMEA, see Repkine and Walsh, 1999). In turn, these developments lead to increasing regional disparities (see section 4 and the appendix for a more detailed discussion). The widening gap between prosperous and depressed regions increases the need for regional adjustment, with migration being a potentially important mechanism evening out inter-regional differentials in wages and unemployment rates. This paper analyzes the efficacy of this mechanism in four Central European transition economies: the Czech Republic, Hungary,

[1] The terms migration and labor mobility are used interchangeably in the present paper.

[2] In fact, migration is only one of several possible channels of regional adjustment. According to the Heckscher-Ohlin model, with free trade, flexible prices and transferable technology, factor prices are equalized across regions, and trade, capital mobility and labor mobility are substitutes in facilitating regional adjustment.

Poland, and Slovakia. For comparison, results for three Southern European EU countries – Italy, Spain, and Portugal – are also presented.

Although studying migration is interesting in its own right, two additional considerations are important in the context of labor mobility in transition economies. First, the next round of EU enlargement is expected to bring a net inflow of migrants from the acceding countries to the current EU members. While most experts estimate that the inflow will be relatively modest (see Fidrmuc et al., 2002, for a survey of migration forecasts and discussion of labor-market implications of immigration), this expectation is not generally shared by policy makers or the public at large in the EU, and especially in the *front-line* countries such as Austria and Germany. While the paper at hand does not present an alternative forecast of the migration potential, it sheds light on the patterns of migration in the countries that are likely to be included in the first wave of EU enlargement. The comparison with Southern European countries is particularly instructive in this context.

Second, the efficacy of migration as a shock-absorbing mechanism will have important repercussion for the transition economies' future membership in the Economic and Monetary Union (EMU). If the new entrants continue to be exposed to asymmetric shocks (compared to those affecting the EMU core countries), giving up autonomous monetary policy will increase the need for alternative adjustment mechanisms. As labor mobility is one of such mechanisms, its efficacy in facilitating regional adjustment will have important repercussions also for the question of optimality of the transition countries' accession to the EMU.

In general, net migration does respond to regional economic conditions in the expected way – net immigration is positively related to the average wage and negatively to the unemployment rate prevailing in the destination region. However, the effect is economically very small – sizeable wage and unemployment differentials only give rise to modest net migration flows. This is so because wages and unemployment affect gross inflows and outflows similarly. Thus, regions with high wages tend to experience high immigration as well as emigration (rather than high immigration and low emigration). This pattern appears quite universally across all transition economies included in the analysis. In some transition economies, the effect of unemployment on gross migration flows is similar – high unemployment discourages not only immigration to but also emigration from depressed regions. This pattern implies that regions with relatively favorable economic conditions display high migration – both inbound and outbound – whereas depressed regions show low mobility and thus remain locked in with low average wages and high unemployment.

Moreover, migration flows have generally been declining since the onset of transition. The efficacy of labor mobility as a channel of regional adjustment to idiosyncratic shocks has been therefore rather low.

After briefly reviewing the theoretical and empirical literature on migration in the following section, the data and recent labor market developments in transition economies are discussed in sections 3 and 4, respectively. Results of the empirical analysis are presented in section 5. The implications for EU and EMU enlargement are then discussed in section 6. Finally, main conclusions of the present paper are summarized the last section.

2 Migration: Theories and Empirical Evidence

Theoretical foundations of modern migration literature[3] were laid by Todaro (1969), and Harris and Todaro (1970). In their framework, migration is motivated by expected earnings differentials, i.e. wage differential between home and destination regions, adjusted for the probability of employment at destination. Accordingly, the higher the wage (the lower the unemployment rate) in the region of destination, the greater will be immigration to that region. Faini and Venturini (1994) argue, however, that the effect of wages in the region of origin need not be linear because migration from poor regions may be limited by liquidity constraints. With rising wages at home, emigration may in fact increase rather than decline as the liquidity constraint ceases to be binding. Only for relatively affluent regions do rising wages reduce the incentive for migration. Borjas (1987) points out that migration responds not only to average wages but also to their dispersion reflecting underlying inter-regional differences in rewards to skills. In particular, regions (countries) with relatively egalitarian wage distribution will attract primarily low-skilled workers, whereas high-skilled workers will choose to migrate to regions with more uneven wage distribution, where the returns to skills are higher (Borjas, 1987). Stark (1991) moves the focus away from wage differentials. In particular, he explores the role of migration as a means for intra-family risk sharing – by moving to regions with imperfectly correlated income shocks, members of a family can reduce the variance of family income. Finally, Burda (1995) likens migration to investment decisions under uncertainty and argues that potential migrants may postpone migration because of option value of waiting, which he shows is positive. Accordingly, the prospects of

[3] See Borjas (1994), and Ghatak and Levine (1998) for recent surveys of literature.

an improvement at home and the option to migrate later in case of a further deterioration may in fact induce potential migrants to stay put.

Most of the empirical literature focuses, in line with Harris and Todaro's insights, on the role of wages and employment prospects (typically proxied by unemployment) in explaining migration patterns. Often, social and demographic variables, as well as measures of various amenities and/or quality of life are included as well. Pissarides and McMaster (1990) find that relative unemployment and wages (both expressed as ratios to national mean values) significantly affect inter-regional migration in Great Britain, but the resulting regional adjustment to shocks is very slow. Jackman and Savouri (1992), who also study British migration, obtain a similar finding for unemployment and vacancy rates but find the opposite result for wages (migration from high to low wage regions). Decressin (1994) in his analysis of migration among West German Federal States finds results similar to those of Pissarides and McMaster.

An important aspect of migration is its capacity to facilitate regional adjustment to idiosyncratic shocks.[4] When factors of production are mobile, labor and capital move in response to output shocks until marginal returns are equalized across regions. If, on the other hand, factor mobility is limited, asymmetric shocks lead to persistent inter-regional differentials in unemployment and wages.[5] Blanchard and Katz (1992) assess regional adjustment using US state-level data and conclude that the bulk of adjustment occurs via labor mobility (after an initial increase in unemployment) rather than capital mobility or price and wage adjustment. Moreover, the adjustment is relatively fast, with the effect of a shock disappearing completely after five to seven years. Hence, labor in the US is highly mobile and responds readily to idiosyncratic economic shocks. In contrast, Decressin and Fatas (1995) find that in Western Europe, the effects of such shocks are absorbed mainly by changes in labor-force participation rather than migration. Indeed, Bentivogli and Pagano (1999) argue that the responsiveness of migration to unemployment and wage differentials is much lower in the EU compared to the US. As a result, wage and unemployment differentials are generally greater and more persistent in Europe than in the US. This lack of labor mobility is often seen as a potential threat to the stability of the EMU (see Eichengreen, 1993, 1998; Braunerhjelm

[4] This role of migration is emphasized by the optimum currency area literature, as initiated by Mundelll (1961) and McKinnon (1963).

[5] Mobility of one of the factors of production is sufficient to facilitate regional adjustment – either labor moves to where wages are high and jobs available, or capital moves to regions where labor is cheap and plentiful.

et al., 2000). When idiosyncratic shocks have permanent or highly persistent effects, pressure for accommodating policy measures in affected regions or countries intensifies. The ability of individual countries in Europe to implement such measures, however, is severely limited because of the loss of monetary autonomy and the constraints on fiscal policy imposed by the Maastricht criteria.

Migration in transition economies received little attention so far, in part perhaps because of lack of suitable data. The main exception is the former East Germany, where massive outflow of East Germans to West Germany was expected in the wake of the reunification but did not materialize (see Burda, 1999, and Hunt, 2000). On the contrary, by mid 1990s, the number of migrants moving to the East approximately equalized with that leaving for West Germany. The lack of massive migration is often attributed to rapid (partial) convergence of wages in the new Federal States to the West German level and the transfers from the West (see Sinn, 1999), or the expectation of such convergence (Burda, 1995). The empirical analysis of Burda (1999) and Hunt (2000) confirms the importance of wage and unemployment differentials, but also highlights the generally low labor mobility in Germany (East and West).

3 Data

The paper at hand analyzes migration flows in the Czech Republic, Hungary, Poland, and Slovakia. The choice of these countries was motivated by several considerations. First, they all are candidates for EU membership and have very high probability to be included in the next wave of EU enlargement. Second, since the collapse of communism, they have undergone rigorous economic and political reforms and, by late 1990s, have, by and large, accomplished the transition from central planning to market economy. Finally, and rather importantly, the necessary regional data is available for these countries.

Is interesting to compare patterns of migration in transition economies with market economies. Therefore, the analysis is also performed for three Southern European countries – Italy, Spain, and Portugal. Comparison with the countries should be particularly instructive, as these countries share several common features with Eastern European transition economies: they are relatively similar with respect to the level of development, labor market rigidities and regional disparities. In addition, Spain and Portugal also have a history of being ruled by authoritarian regimes in recent past. Studies that analyzed migration in Western European

countries include Decressin (1994) for West Germany, and Pissarides and McMaster (1990), and Jackman and Savouri (1992) for the UK.

Comparisons across countries, however, are hindered by the different in the size of regions used in the analysis. In general, the transition economies have smaller regions, with the average population ranging from 136,000 in Czech Republic to 790,000 in Poland. In contrast, the average population of regions in the EU countries ranges between 1.4 million in Portugal and 4.3 million in Spain. Clearly, smaller regions offer better approximation of the local labor market conditions. On the other hand, data pertaining to smaller regions also capture greater fraction of migration flows that are not labor-market related, for example urban-to-suburban migration or moves between two adjacent districts without change of employment. Some types of non-labor migration – in particular urban-to-suburban min – can be easily controlled for in the analysis. As far as the remaining non-labor migration is not correlated with labor market variables, it should not systematically bias the results.

The periods covered by the data differ somewhat. The data for the transition economies cover between four and seven years during 1990s. The data for the EU countries span from late 1980s to mid 1990s, covering between six and twelve years.

The data report overall immigration and emigration per region, without distinguishing the regions of origin or destination of migrants, and are based on records from municipal population registers. Obviously, the fact that the data report population migration rather than labor migration may cause problems when interpreting the results, because population migration does not distinguish between employment-related migration and non-labor migration (because of marriage or divorce, education, retirement, and the like). This, however, is a general problem of most migration studies, as typically only population-migration data are available. Parikh and van Leuvensteijn (2000) compare population and labor migration data for Germany and find that regressions that use population and labor migration yield similar results, as long as migration figures are normalized by population and labor force, respectively.

4 Labor Market Developments in Transition Economies

The transition from central planning to a market economy has had dramatic labor-market repercussions. The formerly socialist countries set out to reform their economies with essentially no (official) unemployment and very egalitarian distribution of wages. In the

course of transition, overall unemployment as well as regional disparities in unemployment and especially wages increased rapidly, as Figures 1 through 3 clearly demonstrate (see the Appendix for additional details).

Insert Figures 1 through 3 about here.

Regional distribution of unemployment and wages in transition economies is strongly persistent: correlation coefficients between regional unemployment rates (wages) in 1991 and 1996 are 0.52 (0.70) for the Czech Republic, 0.45 (0.80) for Slovakia, 0.92 (0.93) for Poland and 0.74 (0.85) for Hungary (between 1991 and 1997). Hence, regions that were stricken by high unemployment and low wages at the outset of transition in general remained economically depressed also five years later. Regions with high unemployment tend to have also low wages – in 1996, the correlation between unemployment rates and average wages was –0.10 for the Czech Republic, –0.68 for Slovakia, –0.62 for Hungary and –0.41 for Poland. Negative correlation between unemployment and wages suggests low efficacy of migration in smoothing regional unemployment and income differentials. In contrast, even with high and effective labor mobility, a zero net migration equilibrium is conceivable whereby high wages compensate for high unemployment (thus leading to positive correlation between unemployment and wages).

In the presence of substantial regional disparities, workers in depressed regions stand to gain by moving to regions with higher wages and/or better employment opportunities. If this mechanism is effective, migration will eventually smooth away the effects of asymmetric shocks. Nevertheless, despite sizeable and growing gap between prosperous and depressed regions, migration in transition economies in fact declined in the course of reforms (see the Appendix). There may be several reasons for the overall fall in migration – rising costs of out-of-district job search and moving, or worsening situation at the housing market. Rising unemployment nation wide may also discourage migration as it reflects a general deterioration of employment prospects (as argued by Decressin, 1994).

Because of the different size of regions, direct comparison of labor mobility in transition economies and Western European countries is not straightforward. In general, the smaller the regions, the greater is the extent of migration across regional boundaries. Hence, when considering the size of regions, labor mobility in transition countries appears very low in international comparison.

5 Adjustment to Shocks via Migration: Empirical Evidence from the Transition Economies

Migration is one of the principal mechanisms (alongside capital mobility and price flexibility) for absorbing adverse effects of asymmetric shocks. Consider a region hit by a permanent negative demand shock. As output falls in the wake of the shock, unemployment rises and wages fall. The region can absorb, or smooth away, the effects of this shock in a number of ways. First, adverse labor-market conditions may induce the region's residents to leave and take up jobs where wages are higher and employment prospects better. Second, lower wages and plentiful labor may induce new firms to move into the region, so that newly created jobs eventually eliminate excess unemployment and bid up earnings. And finally, the relative price level can adjust sufficiently (either by falling wages and prices or by currency depreciation, if the region has its own currency) so that demand for the region's products rises again.

This section investigates the efficacy of regional adjustment via migration of labor and in particular the responsiveness of migration flows to regional economic characteristics such as unemployment rates and average wages. The dependent variables are gross and net migration flows normalized by population – so that they measure migration rates rather than aggregate number of migrants. The data record the total number of migrants arriving in (leaving) a district in a given year, without identifying the region of origin (destination). Gross inflow and outflow rates are strongly correlated, with correlation coefficients of 0.78 for the Czech Republic, 0.77 for Slovakia and 0.92 for Poland (the correlations are measured over the entire available period for each country, only net migration flows are available for Hungary). This implies that if some variables affect both inflows and outflows in the same direction, the coefficients estimated for the net immigration rate may be biased (see Bauer and Zimmerman, 1995). Therefore, it is important to consider both gross and net migration. Gross migration also appears strongly persistent (much more so than net migration), the correlation coefficients for gross migration rates in 1992 and 1996 are between 0.6 and 0.8 for the Czech Republic, Slovakia and Poland.

The analysis covers between three and seven years for the transition countries and between seven and twelve years for the EU countries (the choice of periods is mandated primarily by data availability). All regressions include year fixed effects and fixed or random region effects (depending on the results of specification tests). For the Czech Republic, data on overall migration as well as internal migration (i.e. excluding migrations to and from

abroad) are available. The data for Slovakia capture overall migration whereas those for Hungary and Poland as well as the three EU countries record internal migration. The results for the transition economies are reported in Tables 1 through 5. The focus of the analysis is on the impact of regional unemployment rates and average wages on inter-regional migration. The wage is normalized by the nation-wide average wage to eliminate the effects of wage inflation. Both unemployment and wages are lagged by one year because of their possible endogeneity with respect to migration.

Insert Tables 1 through 5 about here.

Clearly, many other factors besides unemployment and wages affect migration: the quality of infrastructure, housing stock, various amenities and social, cultural and demographic characteristics of regions. While most of these are likely to be captured by the regional fixed or random effects, I have included population density in regressions reported in the second panel of each table to account for the degree of urbanization (in case of Hungary, a dummy for the district of Pest surrounding the capital Budapest is also included).

The results suggest that although unemployment rates and average wages indeed affect migration in transition economies, the pattern is only imperfectly consistent with the role of migration as a mechanism of regional adjustment to shocks. In order for migration to be effective as a channel of regional adjustment, gross (and net) immigration should be positively related to average wages and negatively to unemployment, while gross emigration should be positively related to unemployment and negatively to wages. However, this is not the pattern that obtains for migration in the transition economies. Unemployment does have the correct signs in the regressions with net migration and is usually significant. However, average wages do not appear to drive net migration flows. In contrast, average wages exert typically a strong effect on gross migration flows (except in Slovakia) but the effect is positive for immigration as well as emigration and both coefficient are similar in size, thus leaving the net effect insignificant. Finally, unemployment does have the expected effect on gross flows in some regressions -- internal migration in the Czech Republic, and in Slovakia – but is not always significant. Moreover, unemployment appears more effective at discouraging immigration than encouraging emigration as none of the coefficient on unemployment appears significant in the regressions with gross emigration. Hence, the efficacy of migration in facilitating relocation of labor from depressed districts to the relatively prosperous ones appears rather limited. Instead, the pattern of migration revealed by the econometric results is such that regions with favorable economic conditions tend to

experience high immigration as well as emigration, whereas depressed regions display generally low labor mobility.

Urbanization (measured by the log of population density) discourages net immigration, possibly because of congestion. In Hungary, including a dummy for Pest dramatically increases the explanatory power of the regressions (Pest, a suburban region of Budapest, receives large inflows of migrants). This pattern suggest that a movement from cities to their suburbs is currently underway in these transition economies.

It is instructive to compare transition economies with market economies. Tables 6 through 8 present results obtained with the same regression specifications for Italy, Spain, and Portugal. The results are mixed. In contrast to the transition economies, the pattern of migration in Italy is rather close to the optimal response of migration to regional unemployment and wages. In particular, unemployment does discourage gross immigration and encourage emigration and both coefficients are strongly significant. The effect of wages is also correctly signed – positive for gross immigration and negative for emigration but it is not significant. Both unemployment and wages appear with the expected signs and are significant for net immigration. The pattern of the response of migration to local economic conditions is thus consistent with migration facilitating regional adjustment to shocks – labor relocates from depressed regions to more prosperous ones. This may appear surprising -- Italy is often brought up as an example of a country with very immobile labor force and persistent economic differences across regions. Nevertheless, these results suggest that even if labor mobility is generally low, it does respond to regional economic conditions in the correct manner.

Insert Tables 6 through 8 about here.

The results for Spain and Portugal are more disappointing. Unemployment does not affect migration flows. Average wages tent to lead to greater immigration as well as emigration. In Spain, the effect on emigration in fact appears stronger so that the impact of earnings on net immigration is significantly negative.

Hence, the evidence on the pattern of migration in transition economies suggests that migration does respond to regional differences in unemployment rates and wages, but in a manner that is only partially consistent with migration serving as a channel of regional adjustment to idiosyncratic shocks. Low mobility in depressed regions may be attributed to several factors. First, fixed costs of migration (for example, search and information costs, costs of moving, etc.) may be sufficiently high to deter low-wage earners and the unemployed

from migrating (although the hump-shaped relationship between wages and net migration does not appear consistent with this explanation). Second, employment prospects for high-skilled labor may be generally better so that the pool of potential migrants may consist largely of high-skilled workers earning relatively high wages. Finally, the low mobility in depressed regions may be due to structural factors. For example, if workers' human capital is not transferable across industries, then the unemployed workers in regions that were traditionally dominated by communist-era industries may have little options other than staying put.

Even more importantly, the potential effect of migration on regional differences in unemployment and wages is economically small. According to the regressions estimated with unemployment, wages, population density and dummies for suburbs, a ten percentage-point increase in the unemployment rate should give rise to a marginal net outflow between 0.03 and 0.25 percentage point of a district's population annually. Similarly, an increase of average wages by 10 percentage points relative to the national average is associated with an increase in the annual net migrant inflow between 0.03 and 0.08 percentage point (recall that wages are expressed in ratios to national average rather than in levels or logs). Table 9 reports a simple index measuring the responsiveness of migration to regional unemployment rates and average wages. The calculation is based on the regressions with unemployment rates, average wages, population density and suburban dummy (where applicable). The index adds the coefficient obtained for the unemployment rate (multiplied by -10) and the coefficient obtained for the average wage (divided by 10). Hence, the index quantifies the combined effect of a ten percentage-point difference in unemployment rate and a ten percentage point difference in average wage on net immigration – the higher is the value of the index, the greater is the response of migration to regional economic conditions. As the Table reveals, the resulting population increase is essentially zero in Poland, Spain and Portugal and between 0.2% and 0.3% in the Czech Republic, Hungary and Italy. There is thus substantial degree of variability in the efficacy of migration in facilitating regional adjustment within transition economies, as well as when comparing them with Southern European countries. The potential impact of migration on adverse effects of asymmetric shocks appears very small though. With the pace of adjustment this slow, it is not at all surprising that regional differences in unemployment rates and wages in the transition (and Southern European) economies have been highly persistent.

Insert Table 9 about here.

6 Implications for EU and EMU Enlargement

Recently, mobility of Eastern European labor received considerable attention also for a different reason – accession to the European Union will eventually introduce the possibility for East Europeans to seek employment throughout the Union. Some current EU member countries, especially the *frontline* countries, Austria and Germany, are concerned about the prospects of a large influx of migrants from the East. Thus, it is feared that scores of migrants will be attracted by high Western European wages, increasing unemployment and driving down wages of the incumbent workers (see Bauer and Zimmermann, 1999, and Boeri and Bruecker, 2000, for assessment of potential post-enlargement migration).

While the empirical results presented in this paper do not directly enable a forecast of post-enlargement migration, several lessons can be drawn. First, labor mobility in the accession-candidate countries has been low and falling, despite large and increasing wage and unemployment disparities across regions. Second, migration appears to occur chiefly among relatively prosperous regions rather than from depressed ones to those with better economic conditions. As discussed above, this may reflect the fact that a large fraction of migrants are relatively high skilled high-wage earners. If this pattern continues after the candidate countries' entry to the EU, free mobility of labor may actually have adverse effects on the new entrants (and positive effects on the current members) in as much as it would involve mainly migration of highly skilled workers. Finally, the response of net migration to regional economic characteristics, while statistically significant, is not significant in the economic sense – sizeable differentials in average wages and unemployment rates give rise only to very modest net migration flows. This is illustrated in Table 8 – for example, Portuguese migrants appear much more responsive to regional economic conditions than their counterparts in transition economies. The Czech Republic and Hungary seem comparable to Italy in terms of migration responsiveness, whereas Slovakia and Poland show much weaker response of migration to economic incentives.

The present paper also yields implications with respect to the eventual participation of the transition economies in the EMU. It is envisaged that the new members will join the EMU in due course after becoming members of the EU. This, however, will be an important policy decision, with potentially far-reaching economic implications for the accession countries as well as the incumbent EMU members (in particular, premature admission of new members may undermine the stability of the union as a whole). In the course of intensifying integration, the accession countries should eventually become exposed to similar shocks as the core EMU

countries. However, this process can be lengthy and in the meantime the accession countries are likely to continue experiencing shocks that are different from those affecting the EMU core (for example, the transition economies will be more prone to suffer due to adverse economic or political developments in the former Soviet Union countries). Indeed, Frenkel et al. (1999) and Horvath (2001) find that the shocks affect the transition economies are largely uncorrelated with those prevailing in the major EMU economies.

Joining the EMU implies relinquishing autonomy over monetary policy as well as submitting to important restrictions on fiscal policy (due to the Maastricht criteria imposing ceilings on public deficits and debt). Hence, the set of tools available for dealing with asymmetric shocks will be severely reduced by EMU membership. If the accession countries are exposed to asymmetric shocks and their labor markets cannot adjust easily enough to such shocks, then early participation in the EMU may not be the optimal exchange-rate regime for these countries. By retaining their separate currencies, the accession countries will be better able to cope with idiosyncratic shocks. Indeed, given the low responsiveness of labor mobility to regional unemployment and wages, it appears that the candidate countries may not be well equipped to deal with adverse effects of asymmetric shocks. Transitional barriers to labor mobility in the wake of the enlargement would in fact only aggravate this problem. Hence, an early entry to the EMU could make the monetary union more fragile and be potentially costly both in economic and political terms.

7 Conclusions

Labor mobility has the potential to serve as an important channel of regional adjustment to idiosyncratic shocks, as emigration from depressed regions to the more prosperous ones helps reduce inter-regional differentials in unemployment rates and earnings. This paper assesses the efficacy of migration in facilitating regional adjustment in several post-communist countries in transition. Economic reforms have had largely asymmetric repercussions in these countries, resulting in large and persistent unemployment and wage differentials, thus making the need for effective regional adjustment particularly acute. However, the results of the present paper indicate that the role played by labor mobility has been rather limited. While migration indeed responds to inter-regional wage differentials, its responsiveness to unemployment is weaker (and less robust to changes in regression specification). Moreover, the effect of wage differentials on migration is only partially consistent with regional adjustment occurring via migration. Although wages have a positive

effect on net migration, they are positively correlated with overall mobility – both gross immigration and emigration. Hence, depressed regions experience low overall migration (inbound and outbound) rather than a net outflow of migrants. The effect of unemployment is, to some extent, similar (although as emphasized above it is less robust to changes in regression specifications) – unemployment tends to discourage not only immigration but also emigration. When comparing post-communist transition economies with Southern European countries, migration patterns in Italy and especially Portugal appear much more effective in facilitating regional adjustment than those in transition economies.

Yet, gross migration flows in transition countries are not negligible – in 1996, gross migration (as a percentage of population) ranged between 0.6% in Slovakia and 1.1% in Poland. However, gross immigration and emigration are strongly correlated and hence the resulting net migration is tiny. This pattern can also be traced in the regression results presented above – while several socio-economic and demographic factors significantly affect gross migration, they often have a similar effect on the inflow and the outflow of migrants. Even though net migration is found to respond to regional economic characteristics, the effects are economically small and large inter-regional differentials in unemployment and average wages only give rise to modest net migration flows.

The pattern of labor mobility prevailing in transition economies has several important implications. First, regional differentials in unemployment and wages will not get smoothed away by migration. Indeed, as Table 8 demonstrates, it would take decades rather than years for moderately large unemployment and wage differentials to be smoothed away solely by means of migration. An appropriate policy response aimed at increasing labor mobility may be needed in order to avert the creation of new *Mezziogiorni*. Second, given the low labor mobility – and its low responsiveness to economic incentives – in the accession countries, it seems unlikely that there will be a massive East-West migration in the wake of the next EU enlargement. East Europeans do not move readily even within their own countries, despite sizeable wage and unemployment differentials. Although wage differentials with respect to the current EU members are larger, so are migration costs and informal (e.g. linguistic and cultural) barriers to migration. Third, because of the low efficacy of migration in smoothing away inter-regional differentials in unemployment and wages, an early membership in the EMU is not necessarily the optimal policy choice for the accession countries. EMU membership stipulates loss of autonomous monetary policy and imposes important limitations on counter-cyclical fiscal policy. As the transition countries continue to face different shocks

than the EMU core, at least in medium term, they may indeed benefit from retaining the option to adjust their exchange rates.

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Table 1 Determinants of Inter-regional Migration: Czech Republic 1992 – 1998, Overall Migration

	Inflows		Outflows		Net Inflows		Inflows		Outflows		Net Inflows	
	(1)		(2)		(3)		(4)		(5)		(6)	
Unempl. Rate (lagged)	-0.008	(1.33)	0.001	(0.32)	-0.015	(2.39)	-0.001	(0.21)	0.001	(0.33)	-0.005	(0.65)
Wage Ratio (lagged)	0.601	(3.38)	0.414	(3.70)	0.155	(0.97)	0.530	(2.79)	0.473	(4.11)	0.136	(0.59)
Population Density (log)							-3.643	(4.60)	-0.058	(2.08)	-3.941	(4.09)
Dummy 1993	-0.127	(5.43)	-0.070	(4.89)	-0.065	(2.41)	-0.112	(4.85)	-0.070	(4.85)	-0.046	(1.62)
Dummy 1994	-0.238	(10.76)	-0.258	(18.94)	0.015	(0.57)	-0.230	(10.59)	-0.256	(18.65)	0.027	(1.01)
Dummy 1995	-0.245	(10.03)	-0.282	(18.74)	0.030	(1.07)	-0.235	(9.68)	-0.279	(18.33)	0.045	(1.54)
Dummy 1996	-0.288	(11.64)	-0.347	(22.71)	0.050	(1.77)	-0.278	(11.31)	-0.344	(22.31)	0.066	(2.20)
Dummy 1997	-0.242	(10.33)	-0.342	(23.70)	0.094	(3.51)	-0.240	(10.33)	-0.339	(23.27)	0.101	(3.59)
Dummy 1998	-0.184	(7.41)	-0.316	(20.53)	0.134	(4.81)	-0.198	(7.96)	-0.311	(20.05)	0.121	(4.01)
Constant	0.744	(4.04)	0.815	(6.97)	-0.015	(0.09)	18.329	(4.79)	1.036	(6.55)	18.944	(4.07)
District Fixed Effects	No		No		No		Yes		No		Yes	
District Random Effects	Yes		Yes		Yes		No		Yes		No	
R^2 (within)	0.438		0.793		0.113		0.465		0.793		0.148	
R^2 (between)	0.090		0.045		0.101		0.023		0.135		0.014	
R^2 (overall)	0.155		0.308		0.102		0.021		0.346		0.008	
Breusch-Pagan test (p-value)	995.05	(0.00)	1132.39	(0.00)	235.63	(0.00)	919.62	(0.00)	1061.47	(0.00)	220.77	(0.00)
Hausman test stat. (p-value)	13.740	(0.09)	11.39	(0.18)	2.64	(0.96)	43.00	(0.00)	15.32	(0.08)	20.47	(0.02)

Notes: Number of observations: 518 (74 districts, average population 135,900 in 1994; the districts of Bruntal, Jesenik and Sumperk are excluded because of changes in their territorial structure as of 1996). T-statistics are reported in parentheses. The dependent variables are the gross inflow and outflow rates and net inflow rate as a percentage of the region's end-year population, respectively. The unemployment rate and the wage ratio are lagged by one year.

Table 2 Determinants of Inter-regional Migration: Czech Republic 1992 – 1998, Internal Migration

	Inflows		Outflows		Net Inflows		Inflows		Outflows		Net Inflows	
	(1)		(2)		(3)		(4)		(5)		(6)	
Unempl. Rate (lagged)	-0.022	(3.77)	0.002	(0.51)	-0.025	(4.18)	-0.017	(2.90)	0.002	(0.52)	-0.022	(2.97)
Wage Ratio (lagged)	0.502	(3.07)	0.410	(3.73)	0.002	(0.01)	0.462	(2.71)	0.469	(4.16)	0.069	(0.32)
Population Density (log)							-3.864	(5.43)	-0.061	(2.18)	-4.096	(4.65)
Dummy 1993	-0.199	(9.41)	-0.134	(9.51)	-0.067	(2.68)	-0.188	(9.05)	-0.134	(9.45)	-0.058	(2.25)
Dummy 1994	-0.274	(13.73)	-0.257	(19.33)	-0.021	(0.87)	-0.267	(13.69)	-0.255	(19.04)	-0.011	(0.46)
Dummy 1995	-0.297	(13.45)	-0.284	(19.28)	-0.019	(0.75)	-0.288	(13.23)	-0.281	(18.87)	-0.006	(0.23)
Dummy 1996	-0.351	(15.65)	-0.350	(23.41)	-0.007	(0.26)	-0.343	(15.53)	-0.347	(23.01)	0.004	(0.14)
Dummy 1997	-0.307	(14.49)	-0.346	(24.47)	0.033	(1.33)	-0.305	(14.66)	-0.343	(24.03)	0.039	(1.50)
Dummy 1998	-0.218	(9.66)	-0.325	(21.59)	0.101	(3.90)	-0.227	(10.18)	-0.320	(21.10)	0.101	(3.65)
Constant	0.852	(5.02)	0.813	(7.10)	0.132	(0.83)	19.482	(5.67)	1.047	(6.68)	19.781	(4.64)
District Fixed Effects	No		No		No		Yes		Yes		Yes	
District Random Effects	Yes		Yes		Yes		No		No		No	
R^2 (within)	0.538		0.780		0.080		0.567		0.780		0.124	
R^2 (between)	0.110		0.036		0.099		0.047		0.125		0.056	
R^2 (overall)	0.190		0.283		0.090		0.042		0.325		0.031	
Breusch-Pagan test (p-value)	1095.49	(0.00)	1141.08	(0.00)	314.72	(0.00)	1022.09	(0.00)	1071.07	(0.00)	290.12	(0.00)
Hausman test stat. (p-value)	5.36	(0.72)	14.50	(0.07)			48.82	(0.00)	15.90	(0.07)	21.36	(0.01)

Notes: Number of observations: 518 (74 districts, average population 135,900 in 1994; the districts of Bruntal, Jesenik and Sumperk are excluded because of changes in their territorial structure as of 1996). T-statistics are reported in parentheses. The dependent variables are the gross inflow and outflow rates and net inflow rate as a percentage of the region's end-year population, respectively. The unemployment rate and the wage ratio are lagged by one year.

Table 3 Determinants of Inter-regional Migration: Slovakia 1992 – 1996, Overall Migration

	Inflows		Outflows		Net Inflows		Inflows		Outflows		Net Inflows	
	(1)		(2)		(3)		(4)		(5)		(6)	
Unempl. Rate (lagged)	-0.007	(2.25)	0.003	(1.31)	-0.008	(2.76)	-0.006	(2.08)	0.003	(1.56)	-0.008	(2.75)
Wage Ratio (lagged)	0.151	(0.78)	0.142	(1.02)	0.147	(0.80)	0.076	(0.37)	0.054	(0.37)	0.173	(0.82)
Population Density (log)							0.057	(1.14)	0.057	(1.70)	-0.008	(0.23)
Dummy 1993	-0.036	(1.71)	-0.112	(7.31)	0.083	(3.66)	-0.039	(1.85)	-0.115	(7.53)	0.084	(3.64)
Dummy 1994	-0.102	(4.82)	-0.270	(17.46)	0.165	(7.21)	-0.106	(4.93)	-0.274	(17.67)	0.165	(7.13)
Dummy 1995	-0.198	(8.63)	-0.335	(20.03)	0.133	(5.50)	-0.203	(8.71)	-0.341	(20.16)	0.135	(5.40)
Dummy 1996	-0.221	(11.20)	-0.337	(23.44)	0.118	(5.51)	-0.225	(11.25)	-0.342	(23.55)	0.119	(5.42)
Constant	0.764	(3.75)	0.718	(4.89)	-0.106	(0.54)	0.567	(2.12)	0.530	(2.88)	-0.095	(0.46)
District Fixed Effects	No		No		No		No		No		No	
District Random Effects	Yes		Yes		Yes		Yes		Yes		Yes	
R^2 (within)	0.662		0.864		0.271		0.663		0.865		0.270	
R^2 (between)	0.125		0.002		0.095		0.115		0.051		0.098	
R^2 (overall)	0.259		0.494		0.165		0.271		0.514		0.167	
Breusch-Pagan test (p-value)	247.22	(0.00)	229.580	0.00	105.65	(0.00)	244.52	(0.00)	233.28	(0.00)	98.67	(0.00)
Hausman test stat. (p-value)	4.90	(0.56)	5.43	(0.49)	4.03	(0.67)	4.32	(0.74)	3.21	(0.87)	8.22	(0.31)

Notes: Number of observations: 190 (38 districts, average population 141,300 in 1995). T-statistics are reported in parentheses. The dependent variables are the gross inflow and outflow rates and net inflow rate as a percentage of the region's end-year population, respectively. The unemployment rate and the wage ratio are lagged by one year.

Table 4 Determinants of Inter-regional Migration: Hungary 1994–1998, Internal Migration

	Net Inflow		Net Inflow	
	(1)		(2)	
Unempl. Rate (lagged)	-0.019	(1.48)	-0.024	(3.47)
Wage Ratio (lagged)	-0.420	(0.80)	0.550	(1.25)
Population Density [1994, log]			-0.222	(4.54)
Dummy Pest			1.421	(14.26)
Dummy 1995	-0.008	(0.21)	-0.019	(0.54)
Dummy 1996	-0.034	(0.86)	-0.041	(1.19)
Dummy 1997	0.007	(0.18)	0.003	(0.08)
Dummy 1998	-0.019	(0.48)	-0.017	(0.48)
Constant	0.629	(1.11)	0.779	(2.48)
District Fixed Effects	No		No	
District Random Effects	Yes		Yes	
R^2 (within)	0.020		0.012	
R^2 (between)	0.281		0.948	
R^2 (overall)	0.246		0.895	
Breusch-Pagan test (p-value)	157.61	(0.00)	19.25	(0.00)
Hausman test stat. (p-value)	6.02	(0.42)	4.81	(0.57)

Notes: Number of observations: 100 (20 districts, average population 512,300 in 1995). T-statistics are reported in parentheses. The dependent variables are the gross inflow and outflow rates and net inflow rate as a percentage of the region's end-year population, respectively. The unemployment rate and the wage ratio are lagged by one year.

Table 5 Determinants of Inter-regional Migration: Poland 1992–1993 and 1996–1997, Internal Migration

	Inflows		Outflows		Net Inflows		Inflows		Outflows		Net Inflows	
	(1)		(2)		(3)		(4)		(5)		(6)	
Unempl. Rate (lagged)	0.012	(2.37)	-0.007	(1.08)	-0.002	(0.48)	0.003	(0.86)	0.003	(0.91)	-0.002	(0.95)
Wage Ratio (lagged)	-0.175	(0.78)	0.296	(1.02)	-0.293	(2.06)	0.669	(4.47)	0.533	(3.52)	-0.045	(0.41)
Population Density (log)							-0.305	(11.69)	-0.358	(12.94)	0.137	(5.63)
Dummy 1993	-0.084	(3.14)	-0.109	(4.81)	-0.001	(0.05)	-0.064	(2.55)	-0.130	(6.86)	0.001	(0.10)
Dummy 1996	-0.202	(6.39)	-0.192	(6.04)	0.020	(1.29)	-0.165	(6.07)	-0.232	(10.60)	0.023	(1.76)
Dummy 1997	-0.256	(9.53)	-0.234	(10.30)	0.023	(2.06)	-0.236	(9.37)	-0.256	(13.44)	0.025	(2.39)
Constant	1.377	(5.41)	1.207	(3.72)	0.246	(1.55)	2.087	(13.04)	2.534	(14.96)	-0.637	(4.43)
District Fixed Effects	No		Yes		Yes		No		No		No	
District Random Effects	Yes		No		No		Yes		Yes		Yes	
R^2 (within)	0.408		0.635		0.091		0.418		0.628		0.067	
R^2 (between)	0.263		0.338		0.261		0.810		0.837		0.482	
R^2 (overall)	0.294		0.016		0.168		0.673		0.787		0.446	
Breusch-Pagan test (p-value)	102.05	(0.00)	168.13	(0.00)	170.52	(0.00)	8.25	(0.00)	56.68	(0.00)	171.37	(0.00)
Hausman test stat. (p-value)	8.71	(0.12)	27.49	(0.00)	40.49	(0.00)	3.77	(0.58)	3.18	(0.67)	11.12	(0.05)

Notes: Number of observations: 196 (49 districts, average population 788,600 in 1996). T-statistics are reported in parentheses. The dependent variables are the gross inflow and outflow rates and net inflow rate as a percentage of the region's end-year population, respectively. The unemployment rate and the wage ratio are lagged by one year. Data for 1994 and 1995 were not available. Results obtained with separate regressions over 1992-93 and 1996-97 were similar to those above and are therefore not reported.

Table 6 Determinants of Inter-regional Migration: Italy 1984-1995, Internal Migration

	Inflows		Outflows		Net Inflows		Inflows		Outflows		Net Inflows	
	(1)		(2)		(3)		(4)		(5)		(6)	
Unempl. Rate (lagged)	-0.010	(4.83)	0.008	(4.38)	-0.020	(7.65)	-0.010	(4.83)	0.008	(4.36)	-0.020	(7.55)
Wage Ratio (lagged)	0.021	(0.09)	-0.241	(1.11)	0.412	(1.72)	0.211	(0.93)	-0.222	(0.99)	0.581	(2.39)
Population Density (log)							-0.155	(3.62)	-0.024	(0.41)	-0.099	(2.65)
Constant	0.747	(3.34)	0.799	(3.79)	-0.177	(0.75)	1.332	(4.92)	0.900	(2.69)	0.150	(0.57)
Year Dummies	Yes		Yes		Yes		Yes		Yes		Yes	
District Fixed Effects	No		No		No		No		No		No	
District Random Effects	Yes		Yes		Yes		Yes		Yes		Yes	
R^2 (within)	0.404		0.480		0.172		0.401		0.479		0.173	
R^2 (between)	0.119		0.188		0.669		0.406		0.231		0.752	
R^2 (overall)	0.146		0.215		0.587		0.391		0.245		0.657	
Breusch-Pagan test (p-value)	811.97	(0.00)	887.24	(0.00)	429.98	(0.00)	751.66	(0.00)	873.80	(0.00)	359.01	(0.00)
Hausman test stat. (p-value)	1.57	(1.00)	2.62	(1.00)	5.42	(0.94)	8.70	(0.80)	18.15	(0.15)	12.03	(0.53)

Number of observations: 219 (20 regions, average population 2,863,400 in 1995). The observation for *Valle d'Aosta* in 1994 was dropped because of missing data; all observations pertaining to 1990 were dropped because of data problems. T-statistics are reported in parentheses. The dependent variables are the gross inflow and outflow rates and the net inflow rate, as percentages of the region's end-year population. The unemployment rate and wage ratio are lagged by one year. Coefficients on year dummies are not reported.

Table 7 Determinants of Inter-regional Migration: Spain 1984-1994, Internal Migration

	Inflows		Outflows		Net Inflows		Inflows		Outflows		Net Inflows	
	(1)		(2)		(3)		(4)		(5)		(6)	
Unempl. Rate (lagged)	-0.010	(1.54)	0.001	(0.16)	-0.005	(1.19)	-0.009	(1.44)	-0.002	(0.34)	-0.006	(1.56)
Wage Ratio (lagged)	0.242	(1.11)	0.612	(4.00)	-0.157	(1.07)	0.277	(1.25)	0.355	(1.91)	-0.329	(2.31)
Population Density (log)							-0.039	(0.62)	3.797	(3.61)	0.053	(2.94)
Constant	0.337	(1.26)	-0.241	(1.27)	0.273	(1.57)	0.469	(1.33)	-16.870	(3.70)	0.237	(1.33)
Year Dummies	Yes		Yes		Yes		Yes		Yes		Yes	
District Fixed Effects	No		No		No		No		Yes		No	
District Random Effects	Yes		Yes		No		Yes		No		No	
R^2 (within)	0.432		0.665		0.035		0.432		0.692		0.072	
R^2 (between)	0.019		0.041				0.031		0.112			
R^2 (overall)	0.222		0.268				0.229		0.039			
Breusch-Pagan test (p-value)	287.13	(0.00)	365.64	(0.00)	3.08	(0.08)	288.90	(0.00)	364.86	(0.00)	0.45	(0.50)
Hausman test stat. (p-value)	2.05	(1.00)	7.62	(0.81)	0.92	(1.00)	4.32	(0.99)	7796.84	(0.00)	11.10	(0.60)

Number of observations: 187 (17 regions, average population 2,293,650 in 1994). Observations for *Ceuta y Melilla* were dropped. T-statistics are reported in parentheses (heteroskedasticity robust in regressions estimated without district effects). The dependent variables are the gross inflow and outflow rates and the net inflow rate, as percentages of the region's end-year population. The unemployment rate and wage ratio are lagged by one year. Coefficients on year dummies are not reported.

Table 8 Determinants of Inter-regional Migration: Portugal 1987-1992, Internal Migration

	Inflows		Outflows		Net Inflows		Inflows		Outflows		Net Inflows	
	(1)		(2)		(3)		(4)		(5)		(6)	
Unempl. Rate (lagged)	0.046	(2.75)	0.017	(0.61)	0.019	(1.38)	-0.008	(0.46)	-0.028	(1.41)	0.020	(0.72)
Wage Ratio (lagged)	0.743	(1.33)	-1.169	(1.57)	1.669	(2.17)	2.435	(3.55)	0.773	(1.37)	1.661	(1.80)
Population Density (log)							-0.247	(4.02)	-0.248	(3.28)	0.001	(0.01)
Constant	-0.995	(1.88)	1.156	(1.63)	-1.812	(2.43)	-0.944	(1.82)	0.868	(2.81)	-1.813	(2.37)
Year Dummies	Yes		Yes		Yes		Yes		Yes		Yes	
District Fixed Effects	No		No		No		No		No		No	
District Random Effects	No		Yes		No		No		No		No	
R^2 (within)	0.514		0.367		0.366		0.639		0.513		0.366	
R^2 (between)			0.365									
R^2 (overall)			0.301									
Breusch-Pagan test (p-value)	0.00	(0.99)	14.54	(0.00)	0.69	(0.41)	2.61	(0.11)	0.21	(0.65)	0.70	(0.40)
Hausman test stat. (p-value)	4.76	(0.69)	1.56	(0.98)	14.54	(0.04)						

Number of observations: 30 (7 regions, average population 1,408,610 in 1992). Several observations were dropped because of missing wage or unemployment data or other data problems. T-statistics are reported in parentheses (heteroskedasticity robust in regressions estimated without district effects). The dependent variables are the gross inflow and outflow rates and the net inflow rate, as percentages of the region's end-year population. The unemployment rate and wage ratio are lagged by one year.

Table 9 Migration Effectiveness Index

Czech Rep.	Slovakia	Hungary	Poland	Italy	Spain	Portugal
0.227	0.097	0.295	0.016	0.258	0.027	-0.034

Notes: The index is based on the regressions with unemployment rates, average wages and population density as reported above. The index adds up the coefficient obtained for the unemployment rate (multiplied by -10) and the coefficient obtained for the average wage (divided by 10) estimated in regressions that also included population density and dummies for suburban districts (where applicable) as reported above.

Figure 1 Coefficient of Variation of Average Wages

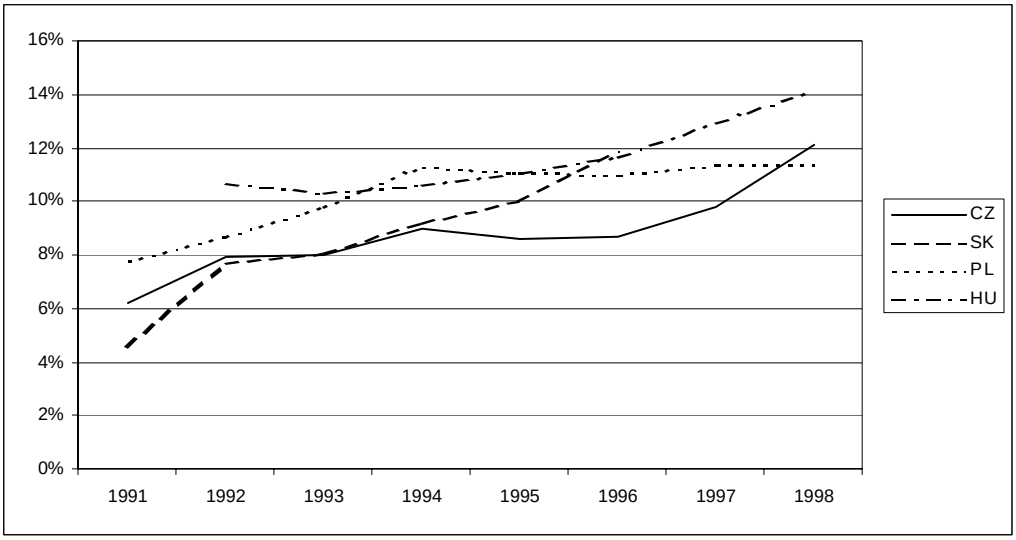


Figure 2 Coefficient of Variation of Unemployment Rate

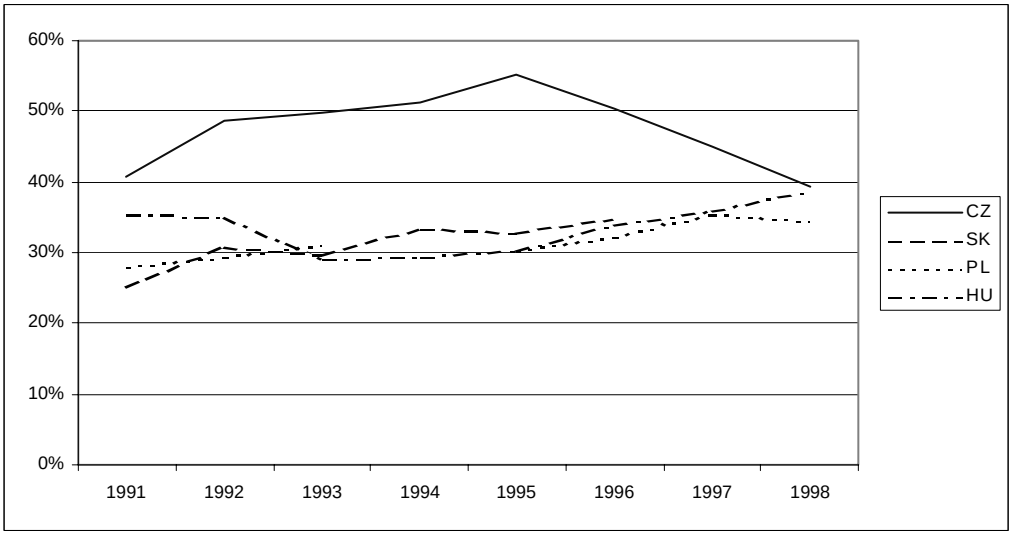
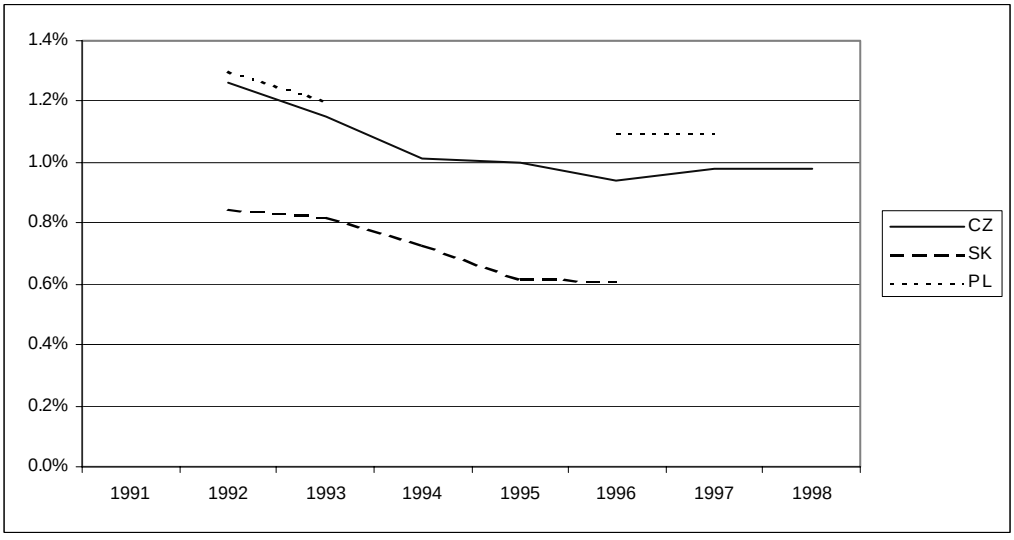


Figure 3 Gross Immigration Rate



Notes: Country abbreviations are CZ: Czech Republic, SK: Slovakia, PL: Poland and HU: Hungary.

Appendix: Statistics on Labor Market Developments and Migration

Table A1 Labor-Market Developments and Migration: Czech Republic

	1991	1992	1993	1994	1995	1996	1997	1998
Unemployment	4.62	2.9	3.89	3.38	3.08	3.79	5.63	7.81
Standard Deviation	1.88	1.41	1.94	1.73	1.7	1.91	2.53	3.06
Coeff. of Variation [%]	40.7%	48.6%	49.9%	51.2%	55.2%	50.3%	44.9%	39.2%
Wages [CZK]	3745	4571	5551	6411	7661	9056	9757	11239
Standard Deviation	234	361	446	575	656	786	958	1365
Coef. of Variation [%]	6.2%	7.9%	8.0%	9.0%	8.6%	8.7%	9.8%	12.1%
Gross Migration [%]	n.a.	1.26	1.15	1.01	1.00	0.94	0.98	0.98
Standard Deviation		0.30	0.27	0.27	0.28	0.28	0.33	0.41
Maximum		2.43	2.31	2.29	2.33	2.33	2.57	3.32
Minimum		0.82	0.73	0.62	0.57	0.57	0.57	0.59

Table A2 Labor-Market Developments and Migration: Slovakia

	1991	1992	1993	1994	1995	1996	1997	1998
Unemployment	12.89	11.82	16.57	17.7	14.56	14.56	n.a.	n.a.
Standard Deviation	3.23	3.65	4.91	5.89	4.79	5.06		
Coeff. of Variation [%]	25.1%	30.9%	29.6%	33.3%	32.9%	34.8%		
Wages [SKK]	3635	4185	5026	5747	6640	7267	n.a.	n.a.
Standard Deviation	163	323	408	529	664	862		
Coeff. of Variation [%]	4.5%	7.7%	8.1%	9.2%	10.0%	11.9%		
Gross Migration [%]	n.a.	0.85	0.82	0.73	0.62	0.61	n.a.	n.a.
Standard Deviation		0.21	0.21	0.20	0.18	0.23		
Maximum		1.51	1.41	1.39	1.23	1.40		
Minimum		0.42	0.44	0.34	0.29	0.28		

Table A3 Labor-Market Developments: Poland

	1991	1992	1993	1994	1995	1996	1997	1998
Unemployment	12.7	14.9	18.2	n.a.	16.8	14.9	11.9	12.0
Standard Deviation	3.6	4.4	5.6	n.a.	5.1	4.8	4.2	4.1
Coeff. of Variation [%]	28.1%	29.5%	31.0%	n.a.	30.3%	32.4%	35.3%	34.5%
Wages [PLZ]	167.73	269.15	358.39	479.2	632.6	797.5	965.7	1115.2
Standard Deviation	13.07	23.31	35.22	54.0	70.5	87.5	109.7	126.9
Coeff. of Variation [%]	7.8%	8.7%	9.8%	11.3%	11.1%	11.0%	11.4%	11.4%
Gross Migration [%]	n.a.	1.3	1.2	n.a.	n.a.	1.1	1.1	n.a.
Maximum	n.a.	1.7	1.6	n.a.	n.a.	1.5	1.6	n.a.
Minimum	n.a.	0.7	0.7	n.a.	n.a.	0.7	0.7	n.a.

Table A4 Labor-Market Developments: Hungary

	1991	1992	1993	1994	1995	1996	1997	1998
Unemployment	9.7	9.2	13.1	11.4	11.3	11.6	11.5	10.1
Standard Deviation	3.5	3.2	3.8	3.4	3.4	4.0	4.2	3.9
Coeff. of Variation [%]	35.5%	35.2%	29.1%	29.5%	30.3%	34.0%	36.0%	38.8%
Wages [HUF]		20,315.8	24,753.8	30,960.7	36,200.9	43,080.6	52,458.3	61,338.2
Standard Deviation		2,180.3	2,561.1	3,275.4	4,032.6	5,046.9	6,771.0	8,619.4
Coeff. of Variation [%]		10.7%	10.3%	10.6%	11.1%	11.7%	12.9%	14.1%
Net Migration [%]								
Maximum				-0.5	-0.6	-0.4	-0.6	-0.5
Minimum				1.4	1.4	1.2	1.5	1.5

Table A5 Labor-Market Developments: Italy

	1988	1989	1990	1991	1992	1993	1994	1995
Unemployment	11.31	10.40	9.35	9.13	8.75	10.49	11.54	12.26
Standard Deviation	6.34	6.44	6.16	5.80	4.68	5.48	6.20	6.95
Coeff. of Variation [%]	56.0%	61.9%	65.9%	63.5%	53.4%	52.3%	53.7%	56.7%
Wages [ECU]	1579.92	1747.42	1928.57	2088.01	2126.98	1913.33	1895.32	1785.86
Standard Deviation	139.21	164.17	178.69	190.60	196.74	169.94	173.72	158.35
Coeff. of Variation [%]	8.8%	9.4%	9.3%	9.1%	9.2%	8.9%	9.2%	8.9%
Gross Migration [%]	0.53	0.56	1.86	0.49	0.53	0.50	0.49	0.50
Maximum	1.30	1.36	3.06	1.14	1.24	1.12	1.20	1.22
Minimum	0.33	0.32	0.18	0.28	0.35	0.30	0.31	0.31

Table A6 Labor-Market Developments: Spain

	1987	1988	1989	1990	1991	1992	1993	1994
Unemployment	19.08	18.63	16.39	15.39	15.16	16.96	20.90	22.95
Standard Deviation	5.27	4.84	5.24	5.45	5.28	5.21	5.49	5.21
Coeff. of Variation [%]	27.6%	26.0%	32.0%	35.4%	34.8%	30.7%	26.2%	22.7%
Wages [ECU]	956.92	1130.42	1396.54	1676.73	1956.65	2212.69	2098.76	2033.41
Standard Deviation	107.09	119.53	130.15	148.64	153.65	185.62	189.49	172.41
Coeff. of Variation [%]	11.2%	10.6%	9.3%	8.9%	7.9%	8.4%	9.0%	8.5%
Gross Migration [%]	0.45	0.57	0.65	0.64	0.38	0.53	0.55	0.60
Maximum	1.44	2.25	2.26	1.47	1.11	1.28	1.17	1.00
Minimum	0.19	0.27	0.32	0.41	0.21	0.28	0.29	0.34

Table A7 Labor-Market Developments: Portugal

	1986	1987	1988	1989	1990	1991	1992	1993
Unemployment	8.30	6.70	6.17	5.06	4.57	4.16	3.87	5.36
Standard Deviation	3.93	3.30	4.26	3.32	2.66	2.30	1.76	1.82
Coeff. of Variation [%]	47.37	49.30	68.99	65.62	58.28	55.27	45.52	33.91
Wages [ECU]	402.92	435.47	471.27	518.11	601.05	721.68	859.86	851.72
Standard Deviation	58.37	48.49	64.86	75.12	56.60	69.16	87.61	89.79
Coeff. of Variation [%]	14.49	11.13	13.76	14.50	9.42	9.58	10.19	10.54
Gross Migration [%]	0.20	0.14	0.20	0.50	0.54	0.18	0.33	n.a.
Maximum	0.65	0.29	0.56	1.10	1.24	0.50	1.02	n.a.
Minimum	0.08	0.03	0.09	0.04	0.11	0.07	0.09	n.a.

The influence of wage and unemployment differentials on labour mobility in the EU: A meta-analysis

Sjef Ederveen and Nick Bardsley[1]

Abstract

This paper reviews the empirical literature on the impact of wage and unemployment differentials on the mobility of labour in the European Union. We calculated comparable elasticities for 26 empirical studies. The mean elasticity in the literature is quite small; around +0.4 for wage and -0.15 for unemployment differentials. A 1%-point rise in the host-country wage therefore raises the flow of in-migrants in that country by 0.4%. There exists substantial variation across studies, however. By performing a meta-analysis, the paper aims to explain this variation by the differences in characteristics of the underlying studies. Systematic differences are found with respect to the size of the regions and the specific country that is considered.

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1 Introduction

Labour mobility is of prime interest in the European Union. First, the upcoming EU enlargement will result in a strong increase in inequalities in the EU as a whole. These disparities may provoke flows of immigrants in the countries of the present EU. The actual size of these flows is the subject of a lively debate (see e.g. Straubhaar, 2001). A second reason for the European interest in labour mobility is its potential in helping regions adjust to asymmetric shocks. Since the introduction of a common currency in most countries of the European Union, monetary policies can not be used as a means of adjustment. Therefore the question whether labour mobility can act as a sufficient adjustment mechanism has received a lot of attention lately (see e.g. Puhani, 2001).

An assessment of the importance of both topics depends strongly on the actual impact of economic differentials on migration. Many economists have therefore dealt with this question. Bauer and Zimmermann (1998) provide a nice review of these studies. They conclude (p. 119) that "... International migration is not yet sufficiently analysed. There is a strong need for comparative research, either by testing similar hypotheses for various countries or by dealing with specific interrelationships within a group of countries." A narrative literature survey has clear limitations. One problem is that the underlying studies are difficult to compare because of different specifications, different data and different methodologies. This is especially so because there is no commonly agreed theory of labour mobility that yields a preferred specification. Therefore, studies use different ad-hoc specifications to estimate the elasticity. Second, the underlying studies report different types of elasticities. This makes a direct comparison virtually impossible.

These qualifications form the motivation for this paper. In particular, it tries to fill this gap by making the results of empirical studies comparable. It synthesizes the results and tests the importance of different ways to analyse labour mobility in primary research. In this way, it reviews the existing studies and guides the way forward. This meta-analysis is interesting for at least three reasons.[2] First, compared to an ordinary survey, an advantage of meta-analysis is that it more systematically compares the results of past studies. Second, using meta-analysis, one can assess the importance of particular choices by researchers for their quantitative results. A third contribution is that meta-analysis itself yields interesting insights for policy makers.

The rest of this paper is organized as follows. We start in section 2 with a discussion of the relationship between economic incentives and labour mobility. Section 3 reviews the empirical literature and provides a summary table with the main characteristics of the 26 studies that form our meta sample. Section 4 presents the meta-analysis by means of a number of regressions. Finally, section 5 concludes.

[2] See Stanley (2001) for a more extensive discussion of the potential of meta-analysis in economics.

2 Geographical Labour Mobility: Theory

There are two main strands to the modern theoretical economic literature on geographic labour mobility, as revealed through migration patterns. The first approach models migration as a process driven by differences in expected earnings in different locations. The second views migration from a "human capital" perspective.

The Harris-Todaro Model

The first approach stems from Harris and Todaro (1970).[3] Their original model concentrates on a developing country context in which there is rural to urban migration, but the basic approach can be applied to migration in general, both interregional and international. Expected earnings are defined as the product of the probability of securing employment (that is, the regional employment rate) and the prevailing regional real wage rate. Since there is assumed to be a degree of wage inflexibility, migration acts as an equilibrating mechanism across regions. Migration between two regions is driven by the wage or (un)employment differential between them. Workers migrate until differences in expected earnings are eliminated, as unemployment in higher wage regions increases, lowering the probability of finding a job. Therefore the theory predicts that lower amounts of immigration are associated with higher rates of unemployment or lower rates of real wages, and conversely that higher immigration is a product of lower rates of unemployment or higher real wages. The equilibrium prediction is that the same expected earnings, defined as above, prevail in each region, accompanied by zero migration.

The basic formulation might be criticised for a lack of realism in positing that in the long run incentives are equalised across regions. Equilibrium differences in incentives between regions can be accommodated by positing a "compensating equilibrium" in which, for example, better local amenities make up for a higher unemployment rate or lower real wage. Fundamentally, it is expected utility which is equalised across regions, so a broad range of additional factors can be incorporated. Various extensions to the model exist, which do not change the basic predictions regarding wages and unemployment. For example, many authors (such as Decressin (1994) and Bentivogli and Pagano (1999)) incorporate risk aversion, which provides one reason for entering unemployment and wages separately into migration equations, rather than collapsing them into a single expected income variable. Pissarides and McMaster (1990) and Decressin (1994) show that if agents are risk averse, migration flows are sensitive to the *aggregate* rate of unemployment. That is, at times of high national unemployment there is less migration, for given relative wage and unemployment rates. This is important since migration streams have been declining within Europe over the post-war period as a whole,

[3] The approach has precursors in Smith (1776), Ravenstein (1889) and Hicks (1932). It differs from a pure neoclassical approach in allowing unemployment to exist in equilibrium, because of given political factors such as minimum wages, and in positing that migration depends on expected, as opposed to actual, earnings.

despite persistent and sometimes increasing regional disparities; one explanation may be increased unemployment (see Braunerhjelm et al. (2000)).

Other extensions to the Harris-Todaro model, which do not alter the basic predictions concerning wage and unemployment, are offered by Bhagwati and Srinivasan (1974), Cordon and Findlay (1975), Stiglitz (1974), Calvo (1978) and Schmidt et al. (1994).

The Human Capital Perspective

The second approach stems from Sjaastadt (1962). Here, the individual's expected utility calculation, implicit in Harris and Todaro (1970), is explicitly modelled. The migration decision is based upon a comparison of the net present value of expected future income streams in different locations, rather than simply the expected real wage. This naturally leads to a richer set of predictions concerning the constitution of the relevant incentives, based on the characteristics of individual potential migrants. For example, a person's age is of relevance since for a given expected wage, the future income stream increases with the agent's life expectancy. By extension, the age structure of the population should be a determinant of aggregate migration flows. Other variables such as education and training characteristics are held to determine individuals' employment prospects in various locations and their capacities to acquire and process the relevant information.

The human capital approach and Harris Todaro model share a focus on pecuniary incentives, and provide common predictions for effects of wage and unemployment differences on migration flows. It is not clear that there is any inconsistency between the two approaches; indeed, in their review of the migration literature, Ghatak et al. (1996) formulate a "Harris Todaro" model using a net present value calculation. Rather the human capital approach involves an explicit analysis of the determinants of an individual's expected utility from migration. The Harris and Todaro model simply assumes it is increasing in the expected wage. The human capital approach seems more informative for micro data studies of individual migration decisions (see below), but various inter-individual differences determining migration decisions might be expected to average out at the macro-level.[4]

Developments within the human capital approach include incorporation of the option value of waiting into the migration decision (Burda (1995)). This model shows that, given uncertainty about the relevant expected wage differentials, it may be in an individual's interests to delay migration pending improved information, even when there is an expected gain from migration. This provides an additional reason why migration flows may be low despite high spatial differentials.[5]

[4] For a fuller overview of theoretical migration literature than offered here, see Bauer and Zimmerman (1995).

[5] Though not an explanation why migration can fall over time with the same or increased differentials prevailing.

Other Approaches

In contrast to these approaches, models of *network* migration assume that the presence of migrants from a given nationality or ethnic group lowers the costs of migration for future potential migrants from the same group. These are dynamic models in which migration becomes path-dependent. Without some counteracting forces, the models will predict migration explosions involving the transmission of entire populations. Such factors include finite networks, falling relative wages in the destination region at higher levels of migration, and the changing characteristics of migrant communities over time.[6] The network migration approach implies a smaller short run responsiveness of migration to wage and unemployment differentials relative to the neoclassical models discussed above, but greater long term responsiveness, since a change in these differentials at a point in time affects migration at all future times. See Hugo (1981), Massey (1990a and b), Massey and España (1987) and Bauer (1995).[7]

Another theoretical framework is that of the matching-function. In this approach, migration is seen as a special case of job-matching in which a job-seeker from one region is matched to a job in another region. Migration is thus a consequence of successful job search, rather than a precondition for it. The implications of unemployment for migration are therefore different than in the standard models of labour mobility.

Finally, some studies depart from the usual assumption that the individual is the unit of analysis, seeing families as the relevant decision making bodies. Mincer (1978) analysed labour force participation of women as a determinant of migration from this perspective, arguing that female paid employment has a negative effect on migration. This is because if family welfare is to be maximised, gains from one family member from migration need to be offset against losses accruing to others for a move to occur. On the other hand, there is also a positive effect via the (allegedly) unstabilising influence of female employment on marriage. That is, the more women work, the less prevalent secure marriage becomes as a living arrangement, which favours migration because independent decision makers are more mobile. Stark (1991) proposes that families can reduce income variability by having members work in different locations. In a similar vein, Daveri and Faini (1999) also adopt a familial perspective, according to which families have risk attitudes determining their migration behaviour. This results in sensitivity of the migration decision to the variance of income in different locations and their correlation with incomes in the origin region. In general, the family approach to migration does not alter the standard predictions concerning wage and unemployment differentials, but points to a broader range of determinants of migration. For example, migration between two countries might occur

[6] Bauer and Zimmerman (1995) suggest that migrants will become a more representative sample of the sending region as the migrant stock increases, reducing the self-selective effect of migration. Another check might be the assimilation of the migrant stock into the host community, whereby it loses affinity with the sending community.

[7] Stark (1991) also models asymmetric information as a determinant of migration.

in the absence of expected wage differentials, if their business cycles are negatively correlated, as a means of minimising risk to family income.

3 Geographical Labour Mobility: A review of empirical studies

This section presents a review of studies that empirically assess the influence of wage and unemployment differentials on labour mobility. The main purpose of this review section is to describe our data set and explore possible determinants of variations in elasticities between studies. This enables us to reflect on the kinds of differences there are between studies and which are likely to be important determinants of differences between regression results. The analytical comparison of studies is then undertaken by the meta-analysis in the following section.

We found 26 empirical studies which provide our data set. We selected any empirical study of migration in any EU countries, published or unpublished, containing a regression equation including wages and/or unemployment. If it was possible to calculate comparable elasticities (see next section) for either or both variables, these were calculated and included in the meta-regression. Whilst our primary focus is on Europe, if a study also looked at the USA, we included these elasticities for purposes of comparison. A brief overview of our sample is given in table 3.1 below which lists all studies used, indicating whether they look at net or gross migration, between or within countries and in which countries. In the remainder of this section we use the distinction between studies that analyse migration flows within countries and those that investigate international flows to divide them into two groups. We will discuss both in turn.

3.1 International migration

Country to country

Molle and van Mourik's (1988) study was the first to examine mobility in a European context, using data on stocks of foreign migrants resident in a selection of EU countries (see table 3.1 below). Surprisingly, it is the only study we found to examine trade as a determinant of migration between countries. In theory trade between countries could substitute for migration, and this is in line with the reported findings. In the final reported regressions, the unemployment rate was dropped because it yielded insignificant coefficients in most specifications.

Therefore we were, regrettably, unable to include this study in our meta-analysis. Recently we have gotten hold of a slightly different publication (Molle and van Mourik, 1989), in which the regressions with unemployment are reported as well. We intend to use this to update our meta-analysis in the future.

Table 3.1 Summary of the studies included in the sample

Id	Title	Net/Gross	Inter(natio)nal	Countries	Period
1	Puhani (1999)	Net	Total (and internal)	WGermany, France, Italy	1983-1995
2	Gros and Hefeker (1998)	Net	Internal and International	Reunited Germany, Italy	1993
3	Bentivogli and Pagano (1999)	Net	Total	EU: European 11 versus USA	1981-1994
4	Neven and Gouyette (1994)	Gross	Internal	EU (EC as it was in 1985)	1985
5	Barro and Sala-i-Martin (1995)	Net	Total	WGermany, France, Italy, UK, Spain (together with USA and Japan)	1900-1988
6	Pissarides and McMaster (1990)	Net	Internal	UK	1963-1982
7	Nahuis and Parikh (2001)	Net	Total	EU: current EU 15	1983-1995
8	Alecke, Huber, and Untiedt (2000)	Net	Internal	Germany	1990-1997
		Gross	International	Belgium, France, Germany, Netherlands and UK	1984-1990
9	Daveri and Faini (1999)	Gross	Internal	Italy	1970-1989
10	Orazio and Padoa Schioppa (1990)	Net and Gross	Internal	Italy	1962-1986
11	Eichengreen (1993)	Net	Internal	UK, Italy versus USA	1962-1985
12	Molle and van Mourik (1988)	Stock	International	WGermany, France, Netherlands, Belgium, Sweden, Austria and Switzerland	1980
13	Pissarides and Wadsworth (1989)	Gross	Internal	UK	1976; 1983
14	Bentolila and Dolado (1990)	Net	Internal	Spain	1964-1986
15	Decressin (1994)	Gross (and Net)	Internal	Western Germany	1977-1988
16	Chies (1994)	Gross	International	From Greece, Italy, Turkey and Spain to Germany and France	1961-1990
17	Lundborg (1991)	Gross	International	From Finland, Norway and Denmark to Sweden	1968-1985
18	Hatzius (1994)	Gross	Internal	UK	1984-1991
19	Waldorf, Esparza, and Huff (1990)	Gross	International	From Turkey to Western Germany	1960-1986
20	Antolin and Bover (1997)	Gross	Internal	Spain	1987-1991
21	Jackman and Savouri (1992)	Gross	Internal	UK	1975-1989
22	van-Wissen and Visser (1998)	Gross	International	EU 15	1991
23	Van Leuvensteijn and Parikh (2001)	Gross	Internal	Germany	1993-1995
24	Van Leuvensteijn and Parikh (2002)	Gross	Internal	Germany	1993-1995
25	Büttner (1999)	Net	Internal	Western Germany	1987-1994
26	Fidrmuc (2002)	Net and Gross	Internal	Accession countries: Czech Rep., Slovakia, Poland, Hungary versus EU: Italy, Spain, Portugal	1992-1998

Van Wissen and Visser (1991) use a kind of gravity model to analyse international migration flows within the EU 15 (plus Norway). They found an insignificant influence of both unemployment and wages. Their results imply that the size of the population in each country

together with the migrant population are the most important determinants of migration. Strangely enough, they do find perverse effects for distance and language.

The importance of the size of the migrant population already present in the host country is also recognized by Waldorf, Esparza and Huff (1990). Furthermore, they provide the only study in our data set that was able to distinguish between labour- and non-labour-migration. Their analysis is restricted to one migration flow only, from Turkey to Western Germany. Besides evidence for network effects, they found a significant estimate for unemployment differentials. However the big influence of time trends in their results is, at least in our opinion, unsatisfactory.

Chies (1994) also considers migration from Turkey to Western Germany. In addition, she looks at inflows from some other countries in Germany and France. She estimates a simultaneous model for immigration, wages and unemployment. Her results with respect to unemployment and wages are diverse. A problem with her approach is that the model is not well specified and that the reported migration figures are higher than in other data sources.

Estimates of potential migration from the Central and Eastern European Countries to the present EU often focus exclusively on income differentials. Alecke et al. (2000) test this approach using data on the changes of stocks of foreign labour for a selected group of European countries. They conclude that differences in unemployment are more important than GDP levels and that receiving country fixed effects differ significantly from each other. A more elaborate model of the migration potential should therefore incorporate these elements.

International migration to regions

Mobility in the Nordic labour market is the topic of a paper of Lundborg (1991). He estimates two models to explain the differences in behaviour between Finnish, Danish and Norwegian migrants, distinguished by gender, to Swedish provinces. His estimates are mostly conform theory with respect to both wages and unemployment and do not systematically differ between the three countries considered. Lundborg also shows that benefits may play a role in explaining migration.

Daveri and Faini (1999) examine gross international emigration flows from regions of Southern Italy. They also look at domestic migration. We will discuss their results in the next part.

Gros and Hefeker (1998) also consider both external and internal immigration, using a simple regional regression analysis. They regress net external (foreign) immigration scaled by population on unemployment rates, for regions in Germany, for a single year, namely 1993. Wage rates are not included as an independent variable. Their main conclusion is that labour mobility is too low to serve as an adjustment mechanism.

Puhani (1999) also examines regional net immigration for German regions. However, he considers a longer time period. Moreover, he also performs regression analyses for Italy and

France, in a panel study spanning 1983-1995. Separate panel models are estimated for data from each country, using the same regression specification. Independent variables are wage and unemployment differentials, and their first difference, finding a significant unemployment effect, but no significant wage effect, in all cases. The results are used for a simulation exercise showing, in accordance with Gros and Hefeker (1998), pessimistic prospects for migration as an adjustment mechanism. Labour was found to be most mobile in West Germany. It is estimated, however, that at most 30% of an increase in unemployment in a West German region is absorbed by migration, 1.5 years after the shock, with corresponding estimates of 8% and 4% for France and Italy respectively. In Western Germany it takes more than 4 years for half the unemployed to migrate.

Nahuis and Parikh (2001) use the same data, but differ from Puhani in combining countries into a single panel, thereby constraining coefficients on independent variables to be equal across countries but allowing the intercept term to differ. In addition, the authors try to model the effects of network effects and female labour market participation in some specifications. In almost all regressions, unemployment and wage differentials are significant determinants of migration flows. Fixed effects models are found to out-perform the random effects estimator, which may reflect the diversity of European regions. The authors conclude that migration in Europe is an unlikely adjustment mechanism, but that the consequences are partly mitigated by female labour participation.

Barro and Sala-i-Martin (1995) perform regressions not only for European regions, but also for US states (and Japan). They have data covering a much longer time-span than the other studies in our sample: 10 yearly migration rates are used, covering 1900-1989 (US) and 1950-1989 (Europe). The authors find that migration is strongly related to GDP differentials in the US but the relationship is weaker in Europe, where the elasticity of migration with respect to regional GDP is uniformly lower than in the US and less precisely estimated. They do not consider the influence of unemployment differentials.

Bentivogli and Pagano (1999) also compare mobility in US states and European regions. Their sample of European regions is larger than for the previous study, including regions of all 11 countries using the Euro currency. Their study is also interesting in its consideration of risk aversion, which they incorporate into a model of migration. For Europe, but not the US, the risk factor was found to have a significant effect - that is, higher time variance of GDP per capita was associated with lower migration rates in Europe, but not in the US. Only wage effects were significant in the EU and these were orthodox. In the US both wages and unemployment bore significant regression coefficients, which were also orthodox. In the case of Europe - and in contrast to Nahuis and Parikh (2001) - they find that the Hausman test favours the random effects model, but they prefer the fixed effects model for the US.

3.2 Internal migration

Many studies consider interregional migration within a country. This is partly because data are easier available at the national level, but also because there are doubts about the comparability of data for different countries. A justification for using this approach for broader conclusions about the EU is often given by referring to the free movement of people in the European Union. Indeed, it is possible to consider international migration between EU member states as internal migration.

Many studies in our sample estimate migration determinants for the regions of one European country. Some of these studies use aggregate data, as do those already outlined, whilst others use micro data from surveys. This enables effects of inter-individual differences in, typically, age, education, housing and occupational characteristics to be estimated in addition to those of inter-regional economic disparities which are the typical focus of aggregate data studies. We will discuss both in turn.

Aggregate data

An influential study on interregional migration in Britain is provided by Pissarides and McMaster (1990). Their results suggest that wage and unemployment differentials provoke migration, as theory predicts. However, when the level of a region's relative wage is used instead of the change, there is no significant effect. Furthermore, their results imply an extremely slow adjustment to equilibrium through migration. Hence, there is important potential for regional policy to reduce the adjustment costs of unemployment, by transferring jobs to depressed areas.

Jackman and Savouri (1992) also look at interregional migration in the UK, but they use an entirely different theoretical framework, namely that of job-matching. They conclude that migration indeed can be modelled using a hiring function and that unemployment differentials have significant effects, consistent with their theoretical framework. An important result is that a high proportion of long-term unemployment diminishes out-migration. This implies that migration is low during a recession, because overall engagements then fall. The impact of wages has a perverse effect, which might be explained by compositional effects.

Eichengreen (1993) builds on the work of Pissarides and McMaster (1990) for the UK, and extends it to Italy and the USA, so that he can systematically compare their results. Elasticities of migration with respect to wages and unemployment are higher for the US than those estimated for the U.K., while the Italian regressions deliver no significant coefficients apart from for migration in the previous period. Alternative wage data and model specifications for Italy do return significant coefficients, but again these are lower than those estimated for the US The author goes on to estimate the relationship between regional and national-average unemployment rates for the same countries. He argues that despite lower labour mobility in the European cases, there is no evidence that deviations from the long term relationship between

regional unemployment rates are more persistent in Europe. The author concludes that other factors than labour mobility are at work in Europe to restore this equilibrium relationship, including wage adjustment, capital mobility and government policy.

The Italian case has attracted the attention of more economists. Orazio and Padoa Schioppa (1990) examine net migration into six regions of Italy. They estimate separate migration equations for each region. Their study also analyses gross flows, but we are unable to include these results, because the scaling of the variables seems different from what is implied in the text. For the influence of wage and unemployment variables on net flows, they obtain quite variate results, but always small.

Daveri and Faini (1999) examine gross emigration flows, both domestic and international, from regions of Southern Italy. In addition to regional wage and unemployment rates, they include risk factors. Wage effects were orthodox in both domestic and international regressions, but unemployment generally had an insignificant coefficient. For domestic migration, the more correlated are home and foreign incomes, the more migration occurred within Italy. Coefficients for internal migration were generally higher than those for migration abroad.

Gros and Hefeker (1998) used the same simple regional regression framework for the analysis of net external (foreign) and internal (domestic) immigration. For both Italy and Germany, for 1993, they found a significant effect of unemployment differentials.

Alecke et al. (2000) also look at German East-West migration. Both unemployment as per capita GDP differences show the expected signs. Furthermore, equality of both coefficients can't be rejected. Next to these differentials, there is an important role for fixed effects.

Decressin (1994) considers Western Germany. He presents a simple theoretical model to analyse gross migration between regions and concludes that wage and unemployment differentials show the expected signs. Furthermore, he argues that aggregate shocks have an important influence on gross flows, because not only unemployment differentials but also the level of unemployment has a significant impact. Migration might therefore work less well as an adjustment mechanism during recessions.

Büttner (1999) extends the analysis for West Germany to the small spatial level of districts. His results support a matching framework, since the regional vacancy rate significantly increases net immigration. Immigration from abroad also has strong effects on internal migration. With respect to the main variables of interest, the unemployment rate shows the expected sign and is highly significant, but the estimated wage rate is at odds with the theoretic predictions. Büttner suggests that some specific composition effect might explain this latter impact.

Van Leuvensteijn and Parikh (2001) study whether population migration data can be used to study labour mobility, as for instance Decressin does. By using both normalized population and labour migration data, they conclude that the discrepancy is not significant and that the results are similar. Only the magnitude of the housing variable seems to be affected. They therefore

conclude that population migration may be used to examine labour migration issues and do so in a follow-up paper (Van Leuvensteijn and Parikh, 2002), which extends Decressin's analysis to the whole of Germany. They conclude that unemployment and wage differences are important factors in determining migration. This conclusion is not affected by including infrastructure and housing variables, unlike in Decressin's study. The authors take this as evidence that economic variables are more relevant for migration between East and West German regions than within West Germany. An important contribution of their study is that they allow for a more complex wage-response. Their results suggest that the wage relationship is concave for blue-collar workers and convex for skilled labour. These results can be explained by option value theory of waiting, combined with risk aversion.

Internal migration in Spain is the topic of Bentolila and Dolado's (1990) paper. Based on a pooled regression of net migration flows into 17 Spanish regions they conclude that their regression fits the data well and produces the theoretically expected results with respect to wages and unemployment.

Fidrmuc (2002b)[8] is the only author to provide a comparison between migration in countries planning to accede to the EU and that in current EU member states. His approach is to examine inflows, outflows and net inflows for each country, with four specifications, all of which are panel models. For both gross and net in-migration in the Accession countries the results are generally orthodox, though some perverse elasticities are reported. However, wages were found to have a positive effect on gross out-migration for all the Accession countries. These results are interpreted as reflecting the concentration of migrants amongst the highly skilled and highly paid. In comparison, the results for the European states are generally orthodox when significant, though many coefficients are insignificant. Fidrmuc concludes that migration is a less likely adjustment mechanism in Accession countries than in the EU, but even in the latter it is an inadequate one. He counsels caution over the Accession states' joining the Euro zone.

Neven and Gouyette (1994) report a cross-sectional analysis of gross inter-regional emigration flows within countries comprising the EU, for 1985. They use Eurostat's REGIO database, finding a significant negative coefficient for wages but no significant result for unemployment. They also include both country dummies and a "periphery index", the latter indicating a Southern European region. These indicate that migration is relatively pronounced in the UK and slight in Italy, and that less inter-country migration occurs from southern European regions. They conclude that low labour mobility contributes to a lack of adjustment in southern Europe.

[8] This replaces Fidrmuc (2002a), which was used in an earlier version of this paper.

Micro data

Pissarides and Wadsworth (1989) analyse UK gross migration flows for 1976 and 1983 using micro data from the Labour Force Survey. They examine effects of local-national wage and unemployment differentials in the sending region, concentrating on the latter. Three unemployment effects are analysed. First, a dummy variable is included representing whether the head of household is unemployed. Second, the regional unemployment differential is included, and third, the unemployment differential is multiplied by the difference between the occupational wage and average unemployment benefits (both of which are expressed as a ratio to the average national wage). The third variable is intended to measure the cost of unemployment. Furthermore, a lot of other individual characteristics are included in the regressions, like wages, plus a vector of age, education and occupational variables. The results were that unemployment was associated with migration mainly through the first effect, with the unemployed being significantly more likely to migrate. Regional unemployment differentials had a weak independent effect. The coefficient on the cost of unemployment, when significant, exhibited the 'wrong' sign, suggesting that migration is less likely the more expensive it is to be unemployed. Differences in results between the 1983 and 1976 regressions are argued to reflect higher aggregate unemployment in the former period. Since the unemployed were more likely to migrate in the 1976 regression, the authors conclude that aggregate unemployment reduces the mobility of the unemployed. These results are in line with those of Decressin (1994).

Another study on the effects of individual characteristics on the migration decision within the UK was performed by Hatzius (1994). He uses a sample for eight succeeding years, from 1984 till 1991. This differs from the other studies using micro data, which only include data for a single year. In its approach, it's similar to Pissarides and Wadsworth (1989). The estimated unemployment results in his study are orthodox, but he finds perverse wage effects. He argues that this may be because regional cost-of-living indices are absent.

Finally, Antolin and Bover (1997) provide a micro-study for Spain. They show that personal characteristics are important for a person's decision to migrate. In addition, they consider the influence of regional economic variables. They distinguish between registered and unregistered unemployed and show that this distinction is highly relevant: Unregistered unemployed have a higher chance of migration, whereas registered employed have a lower chance. This may be due to benefits. However, a problem with their approach for the calculation of the unemployment effect is that they also distinguish between different classifications for the employed: for instance, they show that the likelihood of migrating is higher for employees in the public sector than in the private sector, which in turn is higher than for self-employed. An implication is that higher unregistered unemployment at the expense of the self-employed will raise migration, whereas it will lower migration if it is at the expense of employees in the public sector. Therefore, we decided not to include the unemployment effect of this study. We did, however, use their estimated wage effect, which had the orthodox sign.

4 Meta-analysis of the elasticities

Meta-analysis refers to the statistical analysis of results from individual studies. Next to summarizing results found by previous studies, it aims to add knowledge by relating the variation in estimates of elasticities to the underlying differences in study characteristics. In doing so, meta-analysis goes beyond an ordinary survey of the literature. Moreover, the statistical analysis forces one to be explicit in the selection process of the original studies. This is not to say that meta-analysis is without problems. Especially, sample selection and publication bias, heterogeneity, and dependence of observations may cause problems.

First of all, an important methodological problem of meta-analysis is the possibility of 'publication bias'. This occurs if only statistically significant results with the 'correct' sign are being published. One reason might be that editors of journals prefer to publish these 'correct' results. In our sample, we include several unpublished studies. By including a 'published/unpublished'-dummy in our meta-regression, we gain some insight in the importance of this aspect of publication bias. It should be noted, however, that some of these papers may be published in a journal in the future. This holds for instance for Puhani (1999, 2001), for which we used an unpublished version while we were working on this paper. Moreover, another aspect of publication bias is that researchers do not write up their perceived 'unsatisfactory' results. It is impossible to include these results in the meta-analysis.[9]

A closely related concept is sample selection bias (or 'retrieval bias'). This occurs when only studies are collected that use the same theoretical perspective, or studies that are published in the same journal. This can be harmful when there is a systematic relationship between the characteristics of the sampling process and the significance of the effect size.

Heterogeneity is almost inherent to meta-analysis as studies differ in numerous dimensions. In our meta sample, the estimated elasticities are obtained from 26 different studies, each with its own characteristics. Indeed, the studies show considerable heterogeneity in terms of the type of migration, the distinction between net and gros flows, and in the countries considered. This heterogeneity renders a direct comparison of studies difficult. At the same time, however, the diversity in study characteristics makes it possible to examine their effect on the magnitude and significance of the elasticity.

Related to heterogeneity is the problem of dependence. Because multiple elasticities are used from each study, the observations in our meta sample are mutually dependent. For instance, we draw no less than 44 elasticities from the Fidrmuc (2002b) study. Bijmolt and Pieters (2001) show, however, that taking all elasticities from the underlying studies in a meta-analysis is preferable to representing each study by a single value only.[10] Therefore, we use all elasticities in

[9] Florax (2001) discusses techniques to identify and remedy this type of publication bias.

[10] Bijmolt and Pieters (2001) also discuss different approaches to deal with multiple measurements and show that the optimal procedure explicitly deals with the nested error structure.

our meta sample. In the appendix, we also present the results when we restrict the set of elasticities to the 'original' ones, i.e. we drop all the results from mere robustness analysis, like the use of a more elaborate estimation technique.

Furthermore, the problem is not so much the number of estimates per study, but the number of results that were obtained using the same data set. In our case this seems particularly relevant for the Eurostat data, that are used by a number of the primary studies. We try to get some idea of the importance of dependence by including a dummy for the Eurostat data set in the meta-regression.

These problems of meta-analysis imply that the results should be interpreted with caution. However, these problems also apply to ordinary literature surveys. As illustrated before, meta-analysis may still yield additional insights as compared to surveys. Moreover, meta-analysis allows for statistical tests on the importance of these problems, for instance, as we do with the dummy for unpublished studies.

Literature surveys usually implicitly assign more value to one study over the other because quality typically differs among papers. In fact, this selection process might be seen as the main value added of the author of a literature review. Such a selection is also possible in meta-analysis. What is more, meta-analysis can assign explicit values to each of the primary studies. Hence, the reviewer is forced to be explicit on how he weights one study compared to the other. It is less straightforward, however, to find an objective measure for these weights. Therefore, people often assign an equal value to each of the underlying studies.[11] This is also done in this study.

4.1 Constructing a meta sample

The studies discussed above use different specifications, thus producing coefficients with different interpretations. Moreover, authors either do not report the corresponding elasticity values or adopt different definitions of elasticities. To make the outcomes of various studies comparable, we transformed the coefficients of each of the studies into a uniformly defined elasticity. This elasticity measures the responsiveness of immigration flows to a 1% change in the variable of interest in the host region or country.

The definition for the elasticity with respect to wages reads as:

$$\text{Elasticity} = \partial \ln(\text{Immigration Flow}) / \partial \ln(\text{Wage})$$

while the elasticity with respect to unemployment is defined as:

$$\text{Elasticity} = \partial \ln(\text{Immigration Flow}) / \partial \ln(\text{Unemployment})$$

[11] Natural candidates as weights are the standard error of the elasticity, the number of observations that are used to estimate the elasticity, or the journal impact factor.

These elasticities measure the impact on *gross immigration* with respect to a change in the economic situation in the *receiving* country. However, some studies report regressions for net flows, for emigration or with respect to the sending region. In these cases, we had to adjust the reported coefficient to get comparable results. When elasticities are reported for sending regions (emigration), as is done for instance by studies that use micro data, we adjusted the coefficient by putting a minus sign before the calculated elasticity. In our meta-regressions we include the distinction between emigration and immigration and try to assess whether they exhibit differences in their sensitiveness.

For net migration, the adjustment is a little more complex. Net migration can be close to, or even equal zero. In that case, the sensitiveness of the net flow can be extremely high or even undefined. To transform a marginal coefficient for net migration into a comparable elasticity, one should recognize that the net flow is in fact nothing else than the result of two gross flows in opposite directions, one inwards and one outwards. The extra net inflow of people into a region that experiences an economic boom, should therefore be calculated relative to the sum of both gross flows. Consider for example a region with 90 emigrants and 110 immigrants each year. The net inflow is thus 20. As a consequence of a wage explosion with 10%, the next year 120 immigrants flow in, while only 80 people leave. The net flow therefore increases with 100% to 40. However, relative to both gross flows, this only amounts to an increase of 20/(110+90) * 100% = 10%. This is the result that we can compare with the responsiveness of gross flows, so in this case we would report an elasticity of 1.

A final remark is in order about the actual calculation of the elasticity. This is often not straightforward. Unless the regression model is specified in a double-log specification, we need additional information to calculate the comparable statistic. In these cases, we evaluated the elasticity at the mean. For example, if the dependent variable was not specified in a logarithmic format, we used the mean value of the dependent variable to transform the marginal coefficient into an elasticity. Only if we could obtain this information, we included an elasticity in our meta sample.

In this way we ended with a meta-sample of 207 elasticities with respect to wages and 194 with respect to unemployment. In the remainder of this section we will discuss both samples.

Elasticities with respect to wages

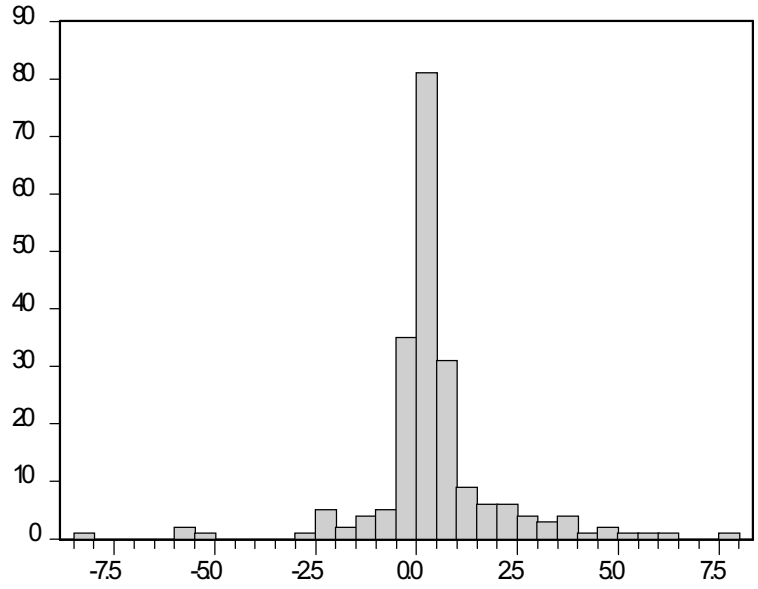
Table 4.1 lists the studies that we reported above and shows some characteristics of the wage-elasticities we obtained from them.

Table 4.1 Summary statistics for wage elasticities in our sample

Id	Title	Mean	Median	Max	Min.	Obs.
1	Puhani (1999)	0.33	0.29	0.69	0.03	4
3	Bentivogli and Pagano (1999)	1.23	1.23	2.07	0.26	6
4	Neven and Gouyette (1994)	2.03	2.03	2.03	2.03	1
5	Barro and Sala-i-Martin (1995)	0.57	0.47	1.87	0.07	9
6	Pissarides and McMaster (1990)	1.32	1.32	1.98	0.65	2
7	Nahuis and Parikh (2001)	0.14	0.13	0.30	-0.04	13
8	Alecke, Huber, and Untiedt (2000)	0.41	0.24	0.89	-0.14	10
9	Daveri and Faini (1999)	0.71	0.65	1.41	0.04	11
10	Orazio and Padoa Schioppa (1990)	0.10	0.06	0.58	-0.29	12
11	Eichengreen (1993)	1.15	0.57	2.43	0.34	5
13	Pissarides and Wadsworth (1989)	3.52	3.74	4.06	2.75	3
14	Bentolila and Dolado (1990)	0.32	0.35	1.18	-0.38	21
15	Decressin (1994)	1.23	1.40	1.41	0.89	3
17	Lundborg (1991)	1.63	2.25	6.15	-8.08	24
18	Hatzius (1994)	-4.16	-4.19	-2.45	-5.79	4
20	Antolin and Bover (1997)	-2.39	-2.39	-2.36	-2.42	2
21	Jackman and Savouri (1992)	-0.50	-0.49	-0.36	-0.60	5
22	van-Wissen and Visser (1998)	0.17	0.17	0.17	0.17	1
23	Van Leuvensteijn and Parikh (2001)	0.44	0.45	0.62	0.25	4
24	Van Leuvensteijn and Parikh (2002)	0.38	0.41	0.66	-0.36	10
25	Büttner (1999)	-0.75	-0.31	-0.14	-1.63	13
26	Fidrmuc (2002)	0.40	0.09	7.73	-2.45	44
All		0.43	0.27	7.73	-8.08	207

The table reveals a great variation among the studies. First of all, the number of elasticities derived from each study differs: it ranges from 1 to no less than 44 for the Fidrmuc-study. Secondly, there is great variation in the value of the elasticity. The majority of the elasticities shows the expected sign, but several studies report unorthodox findings. The calculated elasticities range from −8 to +8 with a mean of +0.43. The distribution of the entire meta-sample is depicted in figure 4.1 (next page).

Figure 4.1 Distribution of wage elasticities



From the distribution we note that most of the elasticities with respect to wages are quite small. More than half of the sample is between -0.5 and +1.0. On the negative side, there are a few exceptionally high results, whereas the development is more smooth on the positive side. In the meta-regressions, we use the whole sample.

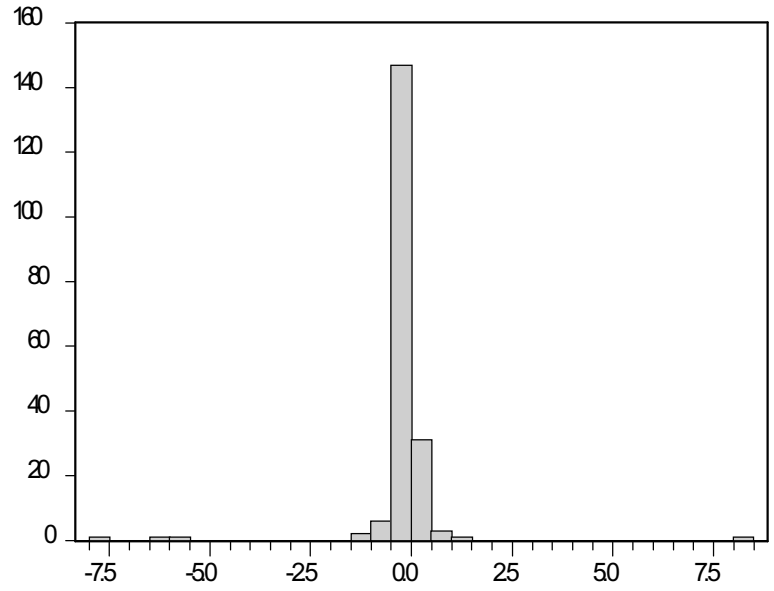
Elasticities with respect to unemployment

Table 4.2 (next page) shows the summary statistics for the sample of unemployment-elasticities. This table also shows a lot of variation among the studies. Almost half of the studies reports at least one elasticity with the 'wrong' sign. The range for the unemployment-elasticities is about the same as for the wage-elasticities, from -8 to +8. The mean value of -0.15 is however negative, as expected. The median is still smaller in an absolute sense. The distribution of the entire meta-sample is depicted in figure 4.2.

Table 4.2 Summary statistics for unemployment elasticities in our sample

Id	Title	Mean	Median	Max	Min.	Obs.
1	Puhani (1999)	-0.16	-0.17	-0.10	-0.21	4
2	Gros and Hefeker (1998)	-0.18	-0.20	-0.13	-0.22	3
3	Bentivogli and Pagano (1999)	-0.22	-0.06	0.14	-0.72	6
4	Neven and Gouyette (1994)	-0.22	-0.22	-0.22	-0.22	1
6	Pissarides and McMaster (1990)	-0.15	-0.15	-0.15	-0.15	1
7	Nahuis and Parikh (2001)	-0.20	-0.16	-0.08	-0.34	13
8	Alecke, Huber, and Untiedt (2000)	-0.04	-0.04	0.03	-0.12	10
9	Daveri and Faini (1999)	-0.03	-0.03	0.09	-0.12	11
10	Orazio and Padoa Schioppa (1990)	-0.03	-0.02	0.00	-0.09	12
11	Eichengreen (1993)	-0.18	-0.14	-0.10	-0.35	5
13	Pissarides and Wadsworth (1989)	-5.92	-5.92	-5.70	-6.13	2
14	Bentolila and Dolado (1990)	-0.06	-0.07	0.15	-0.27	21
15	Decressin (1994)	-0.48	-0.63	-0.13	-0.68	3
17	Lundborg (1991)	-0.03	-0.11	0.83	-0.57	18
18	Hatzius (1994)	-0.40	-0.40	-0.39	-0.41	2
19	Waldorf, Esparza, and Huff (1990)	-1.33	-1.33	-1.31	-1.35	2
21	Jackman and Savouri (1992)	-0.19	-0.21	-0.03	-0.23	8
22	van-Wissen and Visser (1998)	0.06	0.06	0.06	0.06	1
23	Van Leuvensteijn and Parikh (2001)	0.22	-0.04	1.16	-0.21	4
24	Van Leuvensteijn and Parikh (2002)	0.09	0.08	8.06	-7.82	10
25	Büttner (1999)	-0.15	-0.16	-0.09	-0.21	13
26	Fidrmuc (2002)	-0.03	-0.06	0.75	-0.33	44
All		-0.15	-0.08	8.06	-7.82	194

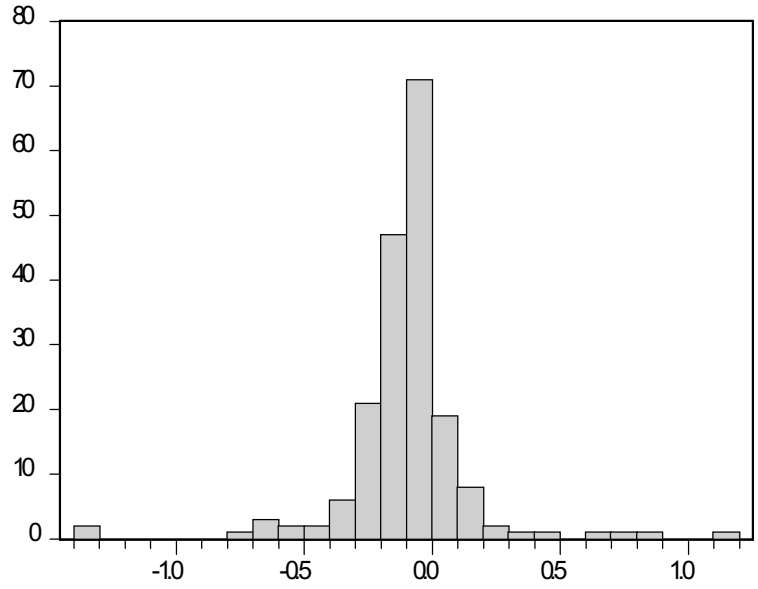
Figure 4.2 Distribution of unemployment elasticities



From figure 4.2 it is clear that most unemployment elasticities are clustered around zero. However, four extreme outliers obscure the picture. These elasticities could have a disproportionate effect on the outcomes of the meta-regressions. Therefore we decided to eliminate these values. As a result, the mean drops to -0.09. The median is of course unaffected by this.

The resulting sample is shown in figure 4.3. Most elasticities show the expected negative sign, but that they are generally very small. It should be noted, however, that the elasticities show the effect of a 1% increase in the unemployment rate (e.g. from 6% to 6.06%). This is of course much smaller than the effect of a 1%-point increase.

Figure 4.3 Distribution of unemployment elasticities without outliers



4.2 Meta-regressions of the elasticities

We now present the meta-regressions. That is, we estimate $y = \beta X + \epsilon$, where y represents the vector of elasticities (with respect to wages resp. unemployment) and X is a matrix of dummy variables that reflect various study characteristics. The parameter β thus measures the impact of each of the study characteristics (relative to some benchmark) on the elasticities. In the regressions, we focus on a selection of study characteristics. Among them, we see the distinction between net and gross migration, internal versus international migration, the regional size and the specific country under consideration. To make the results for wages and unemployment comparable, we decided to use the same set of variables in both regressions.

The regression results for the main variables of interest are presented in table 4.3. The coefficients in the table show the estimated differential impact of a particular study characteristic, relative to some benchmark. For example, a value of 0.52 in the wage-column for the characteristic *Internal* indicates that the estimated wage-elasticity for internal migration is 0.52 higher than for international migration.

The appendix presents the results for a smaller set of elasticities, namely without the primary results from mere robustness analysis. These results are similar to the ones reported here and therefore don't need any further discussion.

Table 4.3 Meta regressions

	Regressions for Wage elasticities			Regressions for Unemployment elasticities		
Variable	Coefficient	Standard Errors [a]		Coefficient	Standard Errors [a]	
Constant	1.63	0.36	**	0.13	0.08	
Countries	-2.15	0.53	**	-0.58	0.19	**
NUTS1 regions	-1.08	0.38	**	0.03	0.05	
Internal	0.52	0.34		-0.12	0.07	*
Gross flows	0.34	0.24		0.02	0.04	
UK	2.33	0.66	**	0.30	0.09	**
Spain	-1.42	0.41	**	0.14	0.06	**
Italy	-0.69	0.34	**	0.16	0.05	**
Access Countries	-1.12	0.30	**	0.04	0.05	
Omitted var unemp / wage	0.54	0.47		-0.48	0.11	**
Labour data	-3.05	0.52	**	-0.29	0.09	**
Panel	-0.33	0.24		-0.19	0.04	**
Unpublished	-1.20	0.36	**	-0.16	0.09	*
Average year	0.05	0.03	*	0.02	0.01	**
R2	0.26			0.36		
Observations	207			190		

A * indicates significance at the 10% confidence level; ** at the 5% level.

[a] White Heteroskedasticity-Consistent Standard Errors.

We will discuss the results for each of the main variables of interest below.

Regional size

Different studies measure migration rates between regions of different sizes. In general, the smaller the regional size, the smaller the average distance will be between regions, since a study using a smaller regional size will measure migration within regions used by other studies. Hence we might expect that studies using smaller region sizes return higher estimates of wage and unemployment elasticities than studies using larger areas, since the costs of relocation are on average smaller. Furthermore, it may also be the case that potential migrants are more informed about differentials in their immediate vicinity. By including dummy-variable for

countries and for large regions (operationalised as Nuts 1[12]) in the meta regression, we tried to estimate the effect of the regional size used on the resulting elasticity. From the results in table 4.3 we see that the elasticity with respect to wages is indeed smaller in large regions than in smaller ones. The estimated coefficient, -2.15 for countries and -1.1 for NUTS 1 regions, are both significant at the 5% level. Turning to the regressions for unemployment elasticities, we would expect a positive coefficient for larger regions, because the average unemployment elasticity is negative. However, for unemployment elasticities the country effect is also negative and significant. This is unexpected, because it implies a more negative, and thus more sensitive, unemployment elasticity for countries as compared to smaller regions.

Migration characteristics

Studies differ in the type of migration considered. Among the distinctions, two stand out: internal versus international migration and net flows versus gross flows. We would expect internal migration to be more sensitive to economic differentials than international migration. It turns out that the meta-regression results do support this claim as far as the sign of the estimated coefficient is concerned, but only the effect on unemployment-elasticities is significant (at the 10% level). Turning to other migration characteristics, we don't find any evidence of differences in sensitiveness: the elasticity with respect to gross flows is not significantly different from net flows.

Country

We also considered the influence of the country that was studied. As is clear from the review section, four countries are especially popular in the primary migration studies. These are the UK, Spain, Italy and (Western) Germany. The estimated coefficients for Germany were not significant in any regression, so we left them out in the reported results. The meta-regression results further show that migration flows in the two South European countries, Spain and Italy, are clearly less sensitive to wage and unemployment differentials than in other countries. The results for the UK are ambiguous: migration in the UK seems more responsive to wage differentials and less to unemployment. Furthermore, we are especially interested to see whether the elasticities for the accession countries would differ from elasticities for other countries. Although Fidrmuc (2002) provides the only study in our sample that analyses these countries, the meta-regressions have a value-added in that they control for other characteristics of the specific case analysed, like internal migration. We did not have an a priori expectation about the sign of this effect. The results in table 4.3 reveal that migration in the accession countries is less sensitive to economic differentials, although the estimated coefficient is only

[12] Nuts is an abbreviation of 'nomenclature des unité terriroriales statistiques' and refers to the decomposition of the EU into smaller administrative units. Nuts 2 comprises for instance the German 'Regierungsbezirke' and the Dutch provinces.

significant for wages. Although we should be cautious in drawing firm conclusions about migration streams from the accession countries to the EU on the basis of this result, it does give an indication that the reaction to economic incentives is not stronger in the accession countries than in the present EU members.

Methodology

Different authors use different specifications, different data and different estimation methods. We considered whether these differences influence the results. We were especially concerned about studies that excluded either wages or unemployment as an explanatory variable. Because regions with high wages often have less unemployment, we felt that this could lead to a serious upward bias in the results. This feeling is partially substantiated by the regression results: primary studies that omitted one of these variables reported ceteris paribus stronger effects, although this is only significant for unemployment according to the meta-regression results.

Another topic of interest is whether population data lead to different results when compared to labour data. Leuvensteijn and Parikh (2001) studied this question and concluded that both methods produce similar results. However, the results from the meta-regressions suggest that there are substantial and highly significant differences between both methods. This topic therefore deserves some more research.

We also assessed whether the use of panel methods influenced the elasticities. According to the meta-regressions this didn't have a major impact on the wage-elasticities, but it did influence the unemployment elasticities significantly.

Miscellaneous

We also considered a number of other potentially interesting characteristics. A highly debated issue in meta-analysis is whether significant results get more easily published. We tried to gain some insight in this topic by including a dummy for unpublished studies. Unpublished studies indeed seem to report lower wage elasticities than published ones. However, the opposite holds true with respect to unemployment elasticities. It is not clear what drives these results and how we should interpret them.

A number of studies use data from Eurostat. It is possible that the results obtained with these data are significantly different from those obtained with other data sources. However, we did not find any effect in the meta-regressions. Therefore, we decided to leave this variable out the presented regression.

Finally, we considered the development of the elasticities over time. Our results suggest that migration has become more sensitive towards wages, but less responsive with respect to unemployment. Again, it is not clear what drives these results.

5 Conclusions

This paper finds a mean elasticity of migration flows with respect to wages of 0.43 and with respect to unemployment differentials of -0.15. There is substantial variation among studies, however, which can be partly explained by underlying study characteristics. For instance, we find that the elasticity differs among countries. Migration in Spain and Italy reacts for instance not as sharply to wage and unemployment differentials as migration in other European countries. Also the sensitiveness of migration in the accession countries seems a bit weaker than in the present EU. This might give some confidence in the estimates of migrants from those countries, because these are typically based on the European experiences in the past.

Another important conclusion is related to the methodology used in primary work. Evidence from the meta-regressions suggests that it matters a great deal when either unemployment or wage variables are omitted. Furthermore, the use of panel methods and the distinction between migration or population data seems crucial for the perceived results.

These conclusions are important for future empirical studies of the sensitiveness of labour mobility to economic variables, which need to make choice on these study characteristics. For it is clear that the last word has not yet been said about the influence of economic differences on labour mobility.

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Appendix: Regression robustness results

The table below shows the results when the sample is restricted to the main results from the papers, i.e. when robustness checks from the primary papers are deleted. As a result, the number of elasticities halves, to about one hundred elastities for either wages or unemployment. However, the main results are not significantly changed. This gives some extra confidence in the presented results in the main text.

Table A.1 Meta robustness regressions

	Regressions for Wage elasticities			Regressions for Unemployment elasticities		
Variable	Coefficient	Standard Errors [a]		Coefficient	Standard Errors [a]	
Constant	1.41	0.58	**	0.24	0.11	**
Countries	-1.89	0.77	**	-0.66	0.18	**
NUTS1 regions	-1.05	0.40	**	0.04	0.07	
Internal	0.62	0.34	*	-0.18	0.11	*
Gross flows	0.22	0.32		0.03	0.06	
UK	2.16	0.76	**	0.33	0.09	**
Spain	-1.50	0.41	**	0.16	0.12	
Italy	-0.61	0.44	*	0.14	0.07	**
Access Countries	-1.25	0.34	**	0.00	0.08	
Omitted var unemp / wage	0.67	0.38	*	-0.50	0.10	**
Labour data	-2.67	0.67	**	-0.37	0.10	**
Panel	-0.17	0.31		-0.18	0.07	**
Unpublished	-1.14	0.44	**	-0.23	0.13	*
Average year	0.06	0.04	*	0.03	0.01	**
R2	0.19			0.45		
Observations	104			98		

A * indicates significance at the 10% confidence level; ** at the 5% level.

[a] White Heteroskedasticity-Consistent Standard Errors.

DETERMINANTS OF INTER-REGIONAL MIGRATION IN THE BALTIC COUNTRIES

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Abstract

We show that Estonia, Latvia and Lithuania despite small geographical size feature considerable and persistent regional disparities. Registered migration rates have declined dramatically since the last years of Soviet era, yet they are high by international standards. Evidence from regional inflows and outflows in Latvia and from Estonian labour force survey is used to show that regional unemployment and especially wage differentials, as well as demographic factors, have a significant impact both on gross and net migration flows. Age and education effects are consistent with predictions of the human capital model of migration. Non-employed persons, as well as commuters between regions, are significantly more likely to become migrants in Estonia.

Keywords: Migration, Regional Disparities, Regional Labour Markets.

JEL Categories: J61, J31, J15, R23, P52

1. Introduction

Expected EU enlargement has increased researchers' interest in mobility of population and especially labour force of the accession countries. How mobile are people in these countries and to what extent their geographic mobility has been driven by economic incentives, - these are particular questions addressed in the literature (we do not discuss here related literature dealing with post-accession migration plans and forecasting of East-West migration flows). Both intensity and patterns of internal inter-regional migration in Czech Republic, Slovakia, Poland, Hungary, Slovenia and Romania have been examined in Fidrmuc (2002), Fidrmuc and Huber (2002), Huber (2003), Kallai (2003). Current paper adds to this strand of literature by including the three Baltic countries: Estonia, Latvia and Lithuania (as far as previous research of internal migration in these countries is concerned, we know only a paper by Toomet (2001) which has looked at migration between Tallinn and the rest of Estonia in mid 1990s). While migration rates in the Baltic Countries are higher than in other CECs, net effect on regional distribution of

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labour is small, especially if compared to large effect of commuting (Hazans 2003). Gross and net migration flows in Latvia are increasingly influenced by regional unemployment and wage differentials, but the nature of these effects seems to be country-specific. In contrast with Fidrmuc's (2002) findings for Czech Republic, Slovakia, Hungary, and Poland, we find, after controlling for population density, positive and significant wage effect on net migration, as well as unemployment effect on outflows. On the other hand, negative unemployment effect on inflows is found in Czech R. and Slovakia, but not in Latvia and Poland.

This paper also contributes to the general migration literature (see seminal papers by Sjaastad (1962) for human capital model, Harris – Todaro (1970) for unemployment-adjusted income model, Burda (1995) for the option value model; see also Decressin and Fatas (1995) and Bentivogli and Pagano (1999) on efficiency of migration in Europe; Cameron and Muellbauer on the role of housing market and commuting; Pissarides and McMaster (1990), Burda (1993), Hunt (2000), Puhani (2001) for empirical studies; Ghatak and Levine (1998), Borjas (1999), Ederveen and Bardsley (2003) for recent surveys). First, we provide some evidence on possible magnitude of errors in migration registration data not adjusted to latest population Census. Next, we emphasize the role of demographic factors, which, as noticed by Fertig and Schmidt (2001), were "widely neglected". We introduce a hierarchy of regional variables, where population density (proxying for economic activity) explains unemployment; density and unemployment explain wages; and density, unemployment and wages explain mortality, marriage rate and divorce rate (see Table 11). When modelling aggregate migration flows in a country, where the above-mentioned variables are strongly inter-related, use of 'excessive', i.e. unexplained by 'more fundamental' factors, regional variables might be helpful in disentangling their effect on migration.

Using individual-level Estonian data leads to some findings similar to those of Hunt (2000) and Burda and Hunt (2001) for East-West migration in Germany.

2. Background information.

The three countries of interest are small both in terms of population (1.4, 2.4 and 3.5 million in Estonia, Latvia and Lithuania respectively[1]) and size (maximal distance between capital and any other city is less than 250 km in Estonia and Latvia and 341 km in Lithuania). Migration records

[1] Population figures hereafter refer to beginning of 2001 unless stated otherwise.

account for permanent change of residence of the following types: (i) between cities (even within the same e administrative unit, or district); (ii) from urban to rural municipalities or vice versa (again both within and between districts); (iii) between rural municipalities in different administrative units.

Evolution of gross internal migration rates in Estonia, Latvia and Lithuania based on these records since late 1980s is shown in Figure 1 (to be discussed later). To put these and other mobility measures in an international context one has to take into account size of the regions. Indeed, net internal migration rates (inflow less outflow as percent of population) by regions are obviously higher for smaller regions, other things equal (notice that net internal migration is zero when there is just one region including the whole country). Most of the available internal migration statistics from other European countries (see Huber (2003)) does not include moves of types (i) and (ii) within the same region, so reported gross migration rates also tend to be smaller for larger regions.

Regional migration rates used in this paper are based on the following administrative units[2]:

Estonia – 15 counties (largest with 525 thousand population, including 400 thousand in the capital city, Tallinn; smallest with 10 thousand and the rest between 27 and 179 thousand; average population 91 thousand);

Latvia – 33 NUTS4 regions, including capital city of Riga with about three quarter million population, 6 other main cities with population between 38 and 115 thousand, and 26 districts (the largest and the smallest have 145 and 15 thousand population, other range between 27 and 66 thousand); average population 71 thousand.

Lithuania – 60 municipalities, including capital city (542 thousand), 7 other main cities (from 18 to 377 thousand), and 52 districts with average size of population 36 thousand. Overall average population per municipality is 58 thousand. Lithuania has also larger territorial units: 10 counties, with average population 349 thousand.

One can conclude that Latvian and Lithuanian cities-and-districts-based data are well comparable with each other and more or less comparable with Estonian county-based data, as well as with Czech and Slovak district-based data (Czech and Slovak districts are somewhat more populated than Baltic ones but smaller in size, see Table 1). Latvian-Estonian comparison can be further facilitated by merging 7 main Latvian cities with adjacent districts thus reducing

[2] Which also serve for rural-rural migration accounting.

number of regions to 26. On the other hand, Lithuanian counties could be compared with Hungarian and Danish regions (see Table 1).

3. Internal migration in the Baltic countries: patterns and outcomes

Several observations can be made from Figure 1 displaying evolution of gross internal migration rates in Estonia, Latvia and Lithuania. First, both before the transition and in 1998-2000 average registered mobility of population was at comparable levels in all three countries. Second, there was a dramatic decline in registered migration rates in the late 1980s, before substantial inter-regional disparities in economic conditions have been developed and without any significant recovery afterwards. To explain this phenomenon one has to accept that quality of registration declined even more dramatically. This implies that data considerations are of utmost importance when one studies migration in the transition context. Using the most reliable data source from each country even if the data are of different nature (e.g. registration and survey) might be a better strategy than using data of similar nature but unclear reliability.

Third, inherent mobility of population in the Baltic countries seems to be rather high by international standards. Indeed, Table 1 shows that even recent (lowest than ever) gross migration rates displayed in Figure 1 exceed 1.5 times (respectively, 2.5) times rates observed in Czech R. (respectively, Slovakia) based on the same methodology (i.e. including inter-city and urban-rural migration within regions; these rates are marked with a star in Table 1).

When only inter-regional migration is considered, Estonian and Latvian gross rates (0.81 and 0.75 or 1.13, depending on whether or not Latvian main cities are merged with nearby districts) are significantly higher than those observed for comparable regions in Czech R. (0.44) and Slovenia (0.30).

If migration stands to be an equilibrating tool which helps to smooth disparities and adjust to asymmetric shocks, *net migration rates* (gross rates less churning flows) are of special importance. Latvian net migration rates are higher than in any of comparison countries, but Estonian ones are relatively low. Lithuanian inter-municipality net migration rate is comparable with Czech inter-district rate, and Lithuanian inter-county rate is similar to Danish and Dutch rates, although lower than Hungarian rate for comparable regions. Notice that Danish NUTS3 regions have average population almost identical to Lithuanian counties but are smaller in size, so one could expect higher migration rates in Denmark; this is the case for gross rates, but not for the net ones, so migration in Lithuania is potentially more efficient.

Did high mobility of population in the Baltic countries significantly change its regional distribution during the last decade? Table 2 shows that the answer is no, as one should expect given that net migration rates are (as elsewhere) very low in absolute terms. Moreover, even these small changes are to a large extent due to international rather than internal migration (emigration of Russian-speaking population took place mainly from cities). Despite high wages and modest unemployment in Riga, outflow abroad was not compensated by internal migration, which also had negative balance during the whole period. By contrast, in Lithuania both capital county and Vilnius city itself have seen big net internal inflows. This shows that migration patterns are to a large extent country-specific.

4. Evolution of labour market and regional disparities.

After a sharp decline in real incomes in 1991-1992 and explosive growth of unemployment in 1992 (see Figure 2) all three countries experienced steady growth of real wages (strongest in Estonia and interrupted in 2000 in Lithuania), while unemployment have featured increasing trend (with some fluctuations in Lithuania and no change between 1995 and 1998 in Estonia) for a prolonged time. In the middle of the transition period highest unemployment was found in Latvia (21% by ILO definition in 1996), but here it also started to decline earlier than in the other two countries, while in Estonia and Lithuania the trend has been reversed only in 2001 and 2002 respectively. By 2001, at the end of the period considered in this paper, unemployment rate still was very high in all three countries: 12.6% in Estonia, 13.6% in Latvia and 17% in Lithuania (ILO definition). See Table 3 for details.

Evolution of regional disparities is shown in Figure 3 and Tables 4-5. Notice that from migration perspective weighted measures (including Gini) are more relevant: high emigration rates from relatively small depressed regions will have little impact on national migration rates. We therefore discuss weighted measures, although non-weighted ones are also reported in the tables (and sometimes show different trends).

In all three countries, disparities in wages are significant (and larger than between comparable regions in Czech R., Slovakia and Hungary, see Fidrmuc, 2002) but smaller than unemployment disparities. After 1992 both kinds of disparities featured similar trends: Some increase in the beginning of the period was followed by signs of convergence in the mid 1990s and slight increase again at the end (after Russian financial crisis of 1998).

Overall level of wage disparities in 2000 was not too different from 1992. The main source of income disparities in Estonia and Latvia is high wage level in capital regions (no other region had

wage above average level except Ventspils is Latvia). In Lithuania, by contrast, there are several high income agglomerations. Regions' earnings ranks are extremely persistent (for Lithuanian counties even constant in most cases), and first order autocorrelation of wages across regions is above 0.95 in each country (in Lithuania both for counties and districts).

Unemployment disparities are severe in Latvia (latest coefficient of variation above 60%, and Gini index measuring inter-regional inequity of distribution of unemployed as high as 0.31), considerable in Lithuania and modest in Estonia. Regional unemployment patterns are quite persistent in Latvia (correlation with previous year's values is above 0.92 during last 8 years of observation, and correlation with values of 1993 is about 0.70) and Estonia (here autocorrelation is somewhat lower but 6 counties have had above average unemployment levels in at least 9 out of 12 years of observation)[3]. In Lithuania first order autocorrelation of unemployment rates across 46 districts has been between 0.87 and 0.94, but in the long run unemployment ranks are less stable than earnings ranks.

On average, high unemployment regions tend to have low wages – as in many other countries (see Blanchflower and Oswald (1994), Blanchflower (2001), Traistaru and Iara (2003) for discussion). Table 6 reports unemployment elasticities of pay (controlling for population density) -0.068 in Estonia and -0.114 in Latvia (highly significant in both cases).[4] The same table shows also that in both countries unemployment is lower in more urbanised regions (despite the fact that unemployment rates are lower in rural areas than in urban ones!).

Depressed regions with persistent high unemployment and low wages are easily identified in Latvia and Estonia but have relatively small population shares. In Latvia four districts have had lowest wages and registered unemployment rates above 20% for 9 years in a row, and another two districts unemployment rates between 18 and 20% and modest wages for the last 5 years. In Lithuania the three counties which had lowest wages in 1996-2001 (Taurage, Shauliai, and Marjampole) remained among the three with highest registered unemployment in 1993-2000, 1997-2001 and 1998-2001 respectively. In Estonia situation is less dramatic, but Ida Viru and Polva counties with high and stagnant unemployment recently have also gone down in the earnings ranking.

[3] Notice, however, that even in Latvia persistency indicators are not as strong a in Poland and Hungary (Traistaru and Iara, 2003).

[4] OECD (2003) confirm existence of wage curves in Estonia and Latvia (but not in Lithuania) using crosssectional microdata of 1999 and 2000. Estimated elasticities were -0.15 for Estonia -0.05 for Latvia in 2000, and -0.24 and -0.11 in 1999.

One can conclude that both pull and push factors for inter-county migration have been in place in all three countries. Figure 3 shows that in Estonia fluctuations of registered migration rates in 1989-2000 have been remarkably consistent with developments of regional disparities. In Lithuania it was to some extent true in 1993-1997, assuming one year lag in migration response to change in disparities. In Latvia migration rates have been almost constant at the national level since 1993, but regional rates, as we shall see later, did response to wage and unemployment differentials.

5. Determinants of migration: evidence from Latvian regional outflows and inflows.

Data. The aim of this and next section is to test whether inter-regional migration flows in the Baltic countries during the transition process were responsive to wage and unemployment differentials between regions. It has become common to refer to low quality of registration-based internal migration data both in EU and transition countries, but one can rarely find estimates of the size of errors. In this section we use Latvian registration data on internal immigration and emigration flows (1989- 2001) by main cities and districts with corrections based on population Census 2000. Comparison of revised and previously (with a lag of just couple of months) published data of net migration flows in 2001 reveals very sizable errors in most cases (Table 7), suggesting that results based on unrevised data for other transition countries have to be taken with great care.

Statistical Office of Estonia has stopped publishing migration data in 2000 due to their low quality and does not recommend to use previously released disaggregated data; therefore Estonian case will be treated in the next section using Labour Force Survey data which (in contrast with Latvian and Lithuanian ones) provides information on migration. Statistical Department of Lithuania has revised migration data of 2000-2001 (based on 2001 Census) but it is not clear whether and when the data for previous years (particularly disaggregated by counties) will be revised. Consequently, Lithuanian data will not be used for econometric analysis in this paper.

Discussion. Similarly to what was observed by Fidrmuc (2002) for Czech Republic, Slovakia, and Poland, our data reveal positive correlation between inflows and outflows (this indicator has been as high as 0.90 for Latvia, 1989-1999, varying from 0.76 to 0.94 by years, although dropped to 0.58 in 2001). Given degree and persistency of regional disparities (discussed in the previous section), this might suggest that the role of welfare differentials in shaping the migration flows

either has not been significant or has been masked by other factors. Liquidity constraints, under-developed (especially in the early transition) housing market and higher housing prices in 'good places' (particularly in the capital city) are obvious obstacles to moving out from depressed regions. Segmentation of Latvian housing market (rent in the private sector is regulated for 'old' residents, but not for newcomers) also makes moving from poor to rich region less attractive; even more so because in many cases such a move means leaving behind free accommodation in a family house somewhere in the countryside or in a small town.

On the other hand, substantial flows from cities to the countryside were generated by the restitution process (returning land properties to descendants of the former owners); these flows were not driven by and most likely were directed against spatial welfare gradients. Apart from this, ongoing depopulation of rural areas (caused by out-migration and negative natural increase) together with low money income levels in the countryside resulted in rather low prices of land and housing in the countryside (especially in depressed regions). Many of those who lost their jobs during the restructuring process could therefore opt for subsistence farming (and some have later turned it into profitable farming); average cost of doing so was further reduced due to small country size and traditionally strong family links sustained between relatives living in different parts of the country. Such links make the typical 'travel-to-find-a-spouse-area' larger than one would otherwise expect, also contributing to inter-regional migration not necessarily related to wage and unemployment differentials in expected way.

Table 8 reveals that almost 50 percent of internal migrants in Latvia (1989-1999) mentioned family reasons as main purpose of moving, while job-related and housing related reasons account for 22 and 15 percent respectively. Job related-reasons were more frequent for movers into capital city, giving some hope to our econometric investigation. Notice, however, that one cannot exclude economic reasons behind family ones. Table 9 shows that in 2001 at least 40 percent of moves in year 2001 in Latvia were still reported as associated with family reasons; importance of job related reasons seems to decrease, while more than a quarter of migrant households have indicated housing related reasons[5]. Same table reports that in Estonia (1998) housing and family related reasons accounted for more than a quarter of migration cases each, while job related

[5] Conclusions from comparison of the two tables have to be taken with caution because the first one is based on survey data, while the second is based on residence registration data and therefore is likely to under-report job-related moves.

reasons were mentioned by less than 13 percent of migrants (like in Latvia, the latter proportion is higher – about 20 percent, for movers into capital city).

Finally, as was pointed by Fidrmuc (2002), small (compared to Western Europe) size of the regions in question implies that our data contain considerable share of moves not associated with job changing. To give an example, many of the high-income earners prefer to move from sleeping districts in big cities to own houses in adjacent rural municipalities.

Table 10 reports that 30 to 50 percent of internal out-migration from 7 largest Latvian cities in 2001 was directed to adjacent districts (which are administratively different municipalities), thus supporting hypothesis drawn by Fidrmuc (2002) from the example of Pest in Hungary. These flows appear in our data as unexplained by regional differentials: Table 10 shows that in 2000 unemployment (both registered and LFS) was (with one exception) 2 to 7 percentage points lower and (reported) average gross wages 15 to 25 percent higher in the cities (in one case more than 100 percent). Opposite flows (the ones of the 'right' direction), however, are comparable in size and therefore in all but one cases exceed urban-suburban flows when measured as rate per 1000 population of the sending region, see columns (b) and (d) in Table 10; of course the result is reversed when rates are calculated with respect to receiving regions, suggesting that one can face more difficulties modelling inflows than outflows. To deal with this problem we control for population density[6].

Despite all above-mentioned problems, which have the potential to leave econometric analysis of migration flows with no decisive answer, our results for Latvia (to some extent in contrast with Fidrmuc's findings for other CECs) strongly support the hypothesis that wage and unemployment differentials are instrumental in shaping the migration flows.

Estimating strategy. Unfortunately revision of Latvian data has been made only for total flows (including international migration). Using these data for econometric purposes would not be correct because international migration flows, which dominated internal ones in the first half of the period, were not related to regional economic conditions. Therefore it was decided to calculate internal flows as difference between revised total and unrevised international flows. It can be justified by the fact that registration of international migration has been a lot more

[6] One can draw one more interesting message from Table 10: although migration (together with other forces, including commuting, see Hazans (2003)) has reduced disparities between cities and nearby rural districts (wage differentials have gone down substantially since 1992), even in these cases, when informational frictions and direct cost of moving are minimal, reduction is at best going slow, while unemployment differentials have been persistent.

accurate at least in terms of net flows: for the whole country (in this case international migration has been revised) net outflow was underestimated by 10 to 20 percent in four cases, by 20 to 30 percent in another four cases, and by about 50 percent in three cases out of 11 years of observation. The fact that errors are all of one sign makes them less likely to bias the results.

Choice of the estimating method for the panel data was decided by the following considerations. First, as migration rates are in fact cell means, and cell sizes (population of regions at hand) vary very strongly in our cases, we feel necessary to use weights and to allow for heteroskedasticity across panels.

Second, as we are in fact interested in the effect of between-groups rather than within-groups variation of wages and unemployment, the fixed effects method (which has the advantage of removing effects of region-specific factors not included in the models) should not be overemphasized. Third, persistency of depressed and prosperous regions suggests that models allowing for autocorrelation within panels have to be tried, although this again can result in underestimating the effect of between variation. Fourth, the choice is limited by the fact that our panels are short (number of time periods less than number of regions). Based on all of these we have used linear regression (OLS and Prais – Winsten) with panel-corrected standard errors, allowing for heteroskedasticity across panels, with and without (common) autocorrelation within panels, but not allowing, due to small number of time periods, (spatial) correlation across panels. Similar results (not presented here) were obtained with feasible generalised least squares for panel data allowing for heteroskedasticity across panels.

Wage was measured in constant prices and expressed in logs rather than ratio to national average (the latter variable, used by some authors, see e.g. Fidrmuc (2002), does not give additive response to proportional wage increase). Unemployment, (log) wages and other explanatory variables were lagged one year with respect to migration rates. To avoid endogeneity problems caused by interconnections between main explanatory variables - population density, unemployment and wages, as well as additional variables, like marriage rate, divorce rate and mortality (see Table 11), we have used residuals from regressions reported in Table 11, i.e. unemployment unexplained by density, log wages unexplained by density and unemployment etc.

Results reported in Table 12 show that high unemployment significantly encourages outflows. Both size and significance of the effect increases if only the late transition (1997-2001) is considered. High wages, other things equal, discourage outmigration. Numerical value of the

coefficient also somewhat increases in the late transition. When per capita GDP is used instead of wage, it is also negative and even more significant than wage (these results are not reported). When the whole period is considered, allowing for autocorrelation within regions gives results almost identical to the reported ones, with estimated autocorrelation 0.550.

Other things equal, people are less likely to move both from and to high density (more urbanised) regions. The size of these effects seems to be quite persistent over time: coefficients for 1993-2001 and 1997-2001 are nearly equal.

Mortality and divorce rates in excess of what is predicted by density, unemployment, and wages encourage outmigration. Mortality here proxies for quality of life, while interpretation of the coefficient of divorce rate is straightforward: two extra divorces force 3 people to leave the region.

High wages significantly encourage immigration, and the size of this effect (as well as wage effect on net migration) has more than doubled in the late transition compared to the whole period.

Positive wage effect on net migration is stronger than in case of inflows and outflows, in contrast with what was found for Czech R., Slovakia and Poland by Fidrmuc (2002) and for Romania by Kallai (2003).

Unemployment has “wrong” positive sign both in gross and net inflow models. This could be attributed to non-labour related reasons for migration discussed above, particularly land ownership restitution and low housing prices in depressed regions. In the case of net migration, however, unemployment coefficient becomes negative (although not significant) when autocorrelation within regions is allowed; estimated rho is 0.445.

Excessively high marriage rates, as one could expect, and mortality rates (surprisingly) enhance immigration. The explanation for the role of mortality is that when old people die, their apartments or houses become free. In the late transition this effect disappears, while effect of excessive mortality on net inflows becomes significantly negative. People have started to care more about quality of life, and this effect overweighs the ‘grandma’s house is free!’ positive impact of mortality on inflows.

Overall effect of density on net inflows is negative; its size has hardly changed in the late transition compared to the early one. Excessive marriage rate encourages net inflows, and influence of this factor has increased over time.

6. Determinants of individual migration decisions: evidence from Estonia.

Estonian Labour Force Survey in 1997-2000 has retrospective part including one year history of employment, unemployment, residence, and marital status. Here we use ELFS 1998-2000 data to analyse what has driven the migration decisions in 1997-1999. Results reported in Table 13 show that other things equal, people are much less likely to move from regions with high average wages; this effect, however, becomes not significant (although still has correct sign) when sample is restricted to employees.

Local unemployment rate did not have a significant impact on migration decision. However, similarly to what was found by Hunt (2000) for East – West migration in Germany, probability to change county of residence was significantly higher for inactive persons and jobseekers than for otherwise similar employed individuals; both marginal effects, 1.3 and 0.4 percentage points, are large, given overall migration rate 1.5% (the jobseeker dummy is not significant in Table 13, but it becomes significant when the model is estimated without population weights; the same is true for the ethnic dummy).

Respondents, who had job not in the same county where they lived in the beginning of the year, were significantly more likely to move across regions than those employed in the county of residence (and even than unemployed). This suggests that commuting between counties (in contrast with commuting within counties, which did not have a significant impact) is for some employees a temporary substitute for migration, again similarly to Hunt's (2000) finding for Germany. However, migration rate was just 2.5% per year even for inter-county commuters. Given that almost 8% of all employees did commute between counties (and another 12.5% did commute between rural municipalities and cities within counties), one can conclude that commuting is a lot more efficient than migration as an adjustment mechanism (see Hazans (2003) on commuting in the Baltic countries).

Likelihood of migration goes down as the age of respondent increases, reaching minimum at the age of 55 when all respondents aged 15 to 59 are included in the analysis, and three years earlier when the sample is restricted to those was an employee in the beginning of the year.

Other things equal, highest propensity to move was found among persons with tertiary education, while lowest propensity was featured by those with basic or less education. Education effect on migration disappears when the sample is restricted to beginning of the period employees (see Brucker and Trubswetter (2003) for a similar observation), suggesting (together with above-mentioned age effect) that recent graduates were among the most active movers.

Importance of family reasons for migration is highlighted by the fact that single and especially divorced or widowed (in the beginning of the period) persons were significantly more likely to change regions than married.

Rural residents were significantly less likely, while residents of the capital county – more likely to move to another county.

Females and ethnic minorities were significantly less likely to change county of residence (gender effect becomes insignificant when only employees are considered).

Job changing rate amongst inter-county migrants was almost 5 times higher than amongst stayers. It is worth noticing, however, that change of residence from rural to urban or from urban to rural within the county was also associated with high job changing rate.

Analysis of Latvian sample of the NORBALT 2 project (not reported) leads to similar findings with respect to education, age and ethnicity effects on mobility; gender effect (of the same sign) is found only for urban – rural migration.

7. Conclusions.

Analysis of internal migration rates has shown that mobility of population in the three Baltic countries is at comparable levels and rather high by international standards. Even recent gross migration rates (much lower than the ones registered in the late 1980s) are well above those found in Czech R., Slovakia and Slovenia for comparable regions. Net migration is also higher than in comparison countries in Latvia, but relatively low in Estonia; Lithuanian net migration rates are comparable to Czech R., Denmark and Netherlands but lower than in Hungary.

However, changes in distribution of population between regions in the Baltic countries during the last decade are so small, and current net migration rates so low in absolute terms, that migration can hardly play a substantial role as an inter-regional adjustment mechanism at macro level – in contrast with commuting (see Hazans 2003).

Despite small size of the Baltic countries, they feature considerable and persistent regional disparities. As in many other countries, high unemployment regions tend to have low wages. Both gross and net inter-regional migration flows in Latvia, as well as outflows in Estonia responded to regional wage differentials in the expected way, i.e. higher wages discouraged emigration and encouraged immigration thus enhancing net migration. In Latvia, impact of wage differentials on migration has increased in the late transition. In the case of net migration wage effect observed in Latvia is a lot stronger and more significant than found for Czech R., Slovakia

and Poland (Fidrmuc, 2002), and for Romania (Kallai, 2003). High unemployment regions in Latvia are exposed to significantly larger outflows but also inflows, thus rendering unemployment effect on net migration insignificant (in contrast with Czech R. and Hungary).

High urbanisation (measured by population density) discouraged both emigration and immigration, and had significant negative effect on net migration in Latvia.

Evidence from Estonian and Latvian micro data shows that likelihood of inter-regional migration strongly decreases with age and increases with education, consistent with predictions of the human capital model. In Estonia, however, education effect seems to be due only to recent graduates - similarly to what is found for East – West migration in Germany by Hunt (2000), Burda and Hunt (2001). Ethnic minorities and females are much less inclined to move between regions. Importance of labour market related incentives for mobility is highlighted by the finding that inactive and unemployed persons, as well as commuters between regions, are significantly more likely to become migrants; this confirms Hunt's (2000) results for Germany. On the other hand, non-labour-related reasons, especially family ones, are also important determinants of inter-regional flows.

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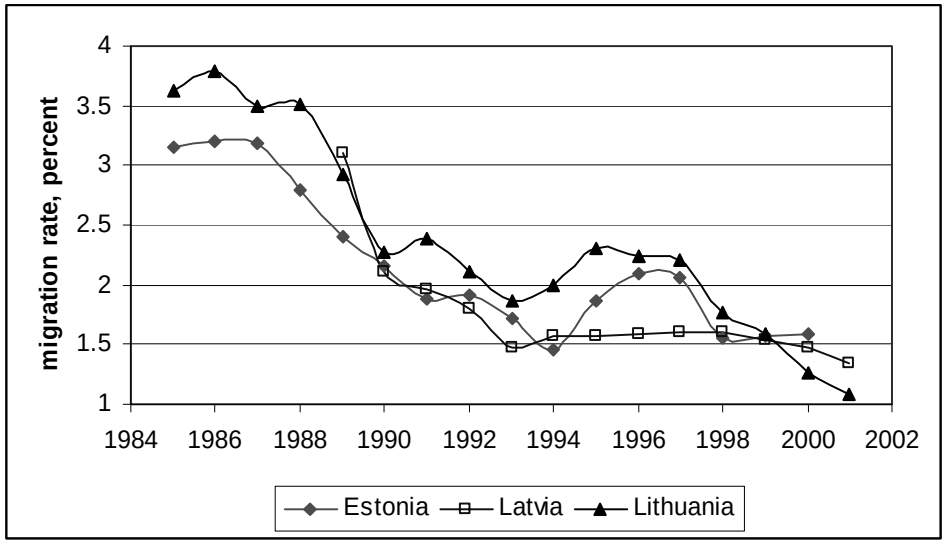
Figure 1. Internal migration rates (percent),

Estonia (1985-2000), Latvia (1990-2001), Lithuania (1989-2001)



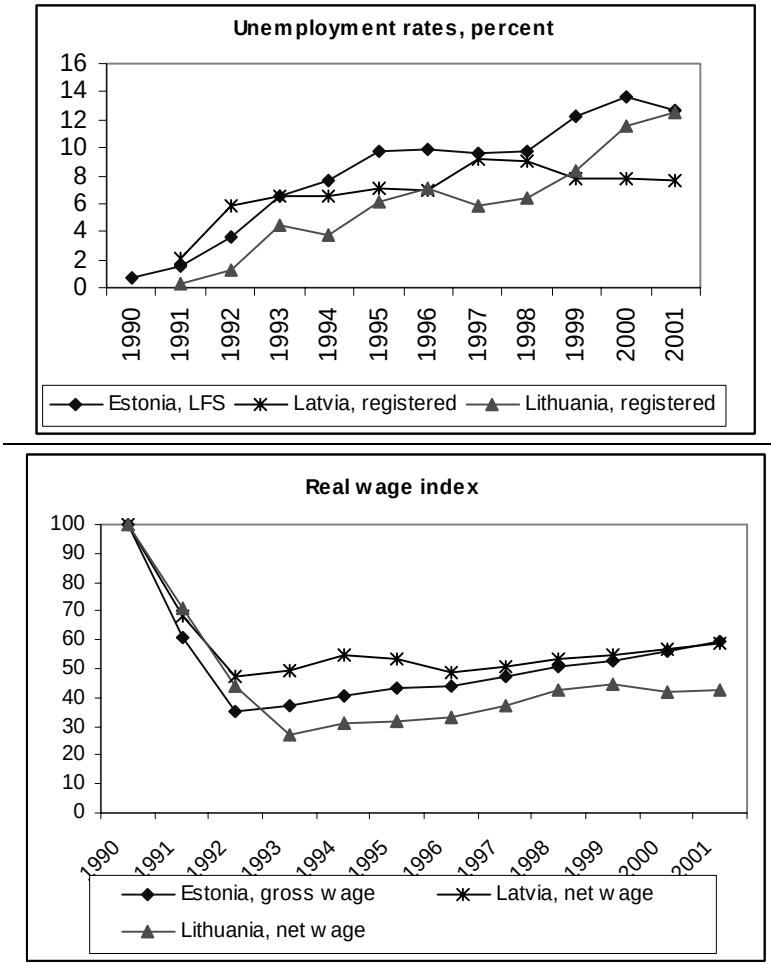
Notes. All rates are based on registration data. Population numbers in 1990-2001 have been updated using results of latest Population Census (2000 in Latvia and Estonia, 2001 in Lithuania). However, migration data as such have been recalculated (correcting to some extent under-registration errors) only in Latvia. *Sources*: Official publications of national Statistical Offices and own calculations.

Table 1. Gross and net inter-regional migration rates.
Baltic countries, Czech R., Slovakia, Slovenia, Hungary, Denmark and Netherlands.

	Regions			Gross migration, %			Net migration, %	
Country	Number	Average pop., 1000 [a]	Average area, 1000 sq. km	Average	Min	Max	Average	Share in gross migration
Estonia, 1989-2000	15	91	2.7	0.81				
Estonia, 1998	15	91	2.7	0.69	0.33	2.63	0.04	6.4
Estonia, 1998	15*	91	2.7	1.55*				
Latvia, 2001	33*	71	2.0	1.34*	0.73*	3.24*	0.22	16.4
Latvia, 2001	33	71	2.0	1.13	0.35	3.24	0.22	19.6
Latvia, 2001	26	84	2.5	0.75	0.35	1.82	0.19	25.8
Lithuania, 2001	60*	58	1.1	1.07*	0.44*	2.53*	0.11	
Lithuania, 2001	10	348	6.5	0.46	0.30	0.87	0.07	14.6
Czech R., 1998	74*	137	1.1	0.98*	0.59*	3.32*	0.10	10.2*
Czech R., 1998	74	137	1.1	0.44			0.10	22.0
Slovakia, 1996	38*	141	1.3	0.61*	0.28*	1.40*		
Slovenia, 1998	12	167	1.3	0.30			0.02	7.2
Hungary, 1998	20	512	4.6				0.17	
Denmark, 1999		355	2.9	3.4			0.09	2.8
Netherlands, 1995	12	1308	2.8	1.7			0.07	4.3

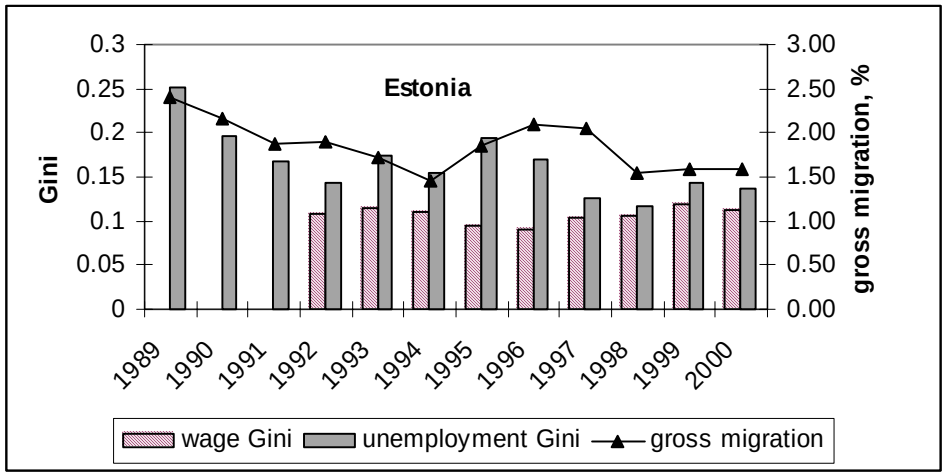
Notes: [a] Population figures refer to 2001 for the Baltic countries, for 2000 in other cases. * Rates including not only inter-regional migration but also inter-city, urban-rural and rural-urban migration within regions.
Source: Baltic countries - official publications of National Statistical offices and own calculation. Other countries: Huber (2003), except for rates marked with * for Czech R. and Slovakia, which are taken from Fidrmuc (2002).

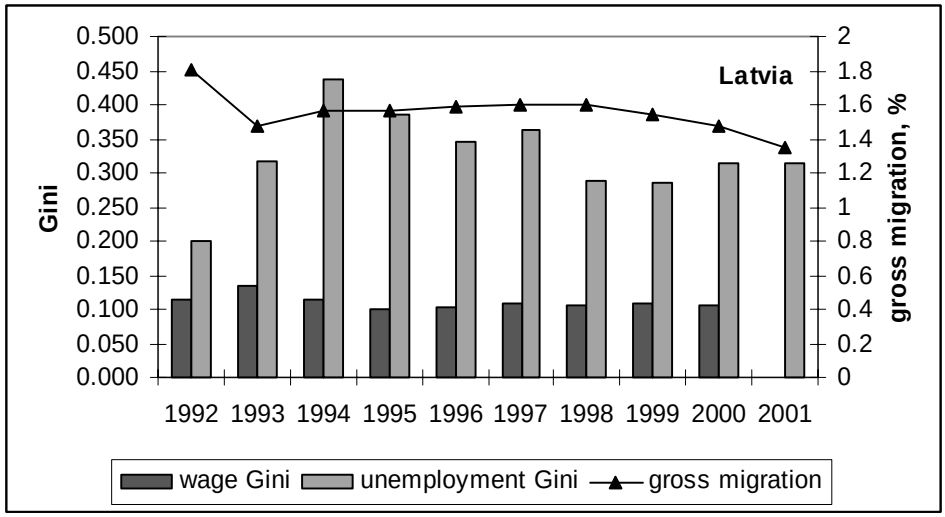
Figure 2. Unemployment and real wage trends in Baltic countries, 1990-2001.

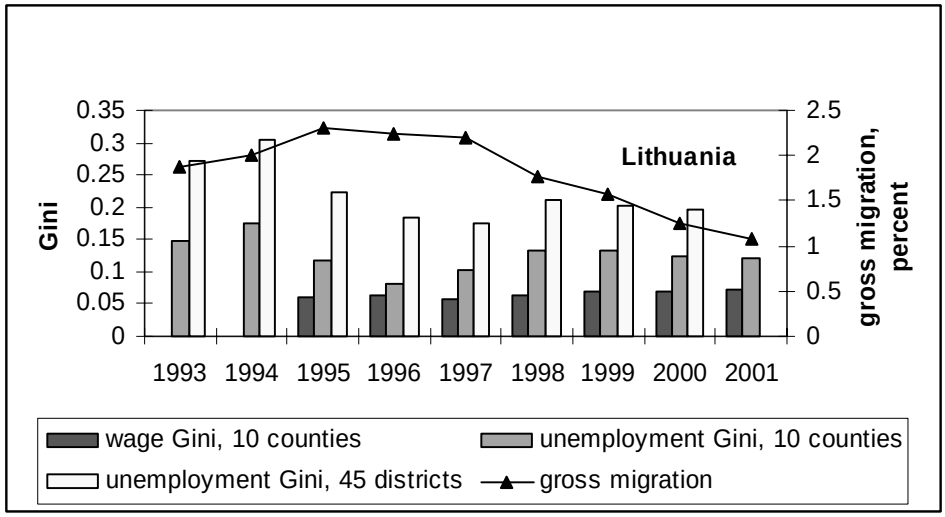


Notes: Unemployment rates are not comparable across countries. See Table 3 for comparable (LFS-based) rates, which, however, are not available for the whole period in Latvia and Lithuania.
Sources: Official publications and websites of national statistical offices. Source of wage index for 1991 (Estonia), 1991-1994 (Latvia), 1991-1995 (Lithuania) is OECD (2000).

Figure 3. Regional disparities and gross migration rates in the Baltic countries, 1989-2001







Notes: Wage and unemployment Gini coefficients are calculated in the usual way and measure inequity of distribution of labour income and and unemployed persons among employees and labour force respectively, ignoring inequity within the regions (15 counties + Tallinn in Estonia; 33 NUTS4 regions in Latvia; as shown in Lithuania). LFS unemployment is used for Estonia, registered unemployment for Latvia and Lithuania. Gross migration includes also inter-city, urban-rural and rural-urban moves within regions.

Table 2. Net effect of migration in the Baltic countries during the transition period

Estonia		
	1989	**2000**
Share of urban population [a]	68.9%	67.4%
Capital city [a]	30.5%	29.2%
Dissimilarity index [b] (15 counties + Tallinn)	2.6%	
Moved between municipalities, 1989-2000 [a]	17%	
Moved between counties, 1989-2000 [a]	8.8%	

Latvia		
	1989	**2001**
Share of urban population [a]	69%	68%
Capital city [a]	34%	32%
Dissimilarity index [b] (26 districts + 7 main cities)	2.9%	
Moved between municipalities, 1989-1999 [c]	9.5% (with basic education – 7.5%; Latvians – 13.4%; Russians – 4.6%; other ethnicity – 3.9%)	

Lithuania		
	1989	**2001**
Share of urban population [a]	67.7%	66.9%
Capital city [a]	15.7%	15.6%

Notes: [a] Based on latest Census data. [b] Minimal proportion of population which has to change residence in order to make the second distribution identical to the first one. [c] NORBALT 2 survey data.
Sources: Official publications of National Statistical offices and own calculation.

Table 3. Unemployment rates and real wage growth, Baltic countries, 1990-2001

Percent

	Unemployment, EE		Unemployment, LV		Unemployment, LT		Real wage growth		
	LFS [a]	Registered	LFS [a]	Registered	LFS [a]	Registered	EE [b]	LV [c]	LT [c]
1990	0.6								
1991	1.5		0.6	2.1		0.3	-39.0	-32.0	-29.0
1992	3.7		3.9	5.8		1.3	-42.8	-30.9	-38.0
1993	6.6	4.5	8.7	6.5		4.4	6.6	4.3	-38.6
1994	7.6	5.1	16.7	6.5		3.8	9.8	12.2	14.8
1995	9.7	5.1	18.1	7.1	17.1	6.1	6.3	-2.6	3.2
1996	9.9	5.5	20.6	6.9	16.4	7.1	1.4	-8.8	3.3
1997	9.6	5.1	15.1	9.2	14.1	5.9	7.6	3.6	13.4
1998	9.8	4.7	14.1	9.1	13.3	6.4	6.4	5.3	12.8
1999	12.2	6.7	14.3	7.8	14.1	8.4	4.2	2.9	4.9
2000	13.6	6.6	14.4	7.8	15.4	11.5	6.1	3.0	-5.1
2001	12.6	8.0	13.1	7.7	17.0	12.5	6.8	3.5	0.6

Notes: [a] ILO definition since (for Latvia since 1995). [b] Gross wages. [c] Net wages.
Country abbreviations: EE – Estonia, LV – Latvia, LT – Lithuania.
Sources: Official publications and websites of national statistical offices.
Source of wage index for 1991 (Estonia), 1991-1994 (Latvia), 1991-1995 (Lithuania) is OECD (2000).

Table 4. Regional disparities in gross average wages.

A. Estonia, (15 counties and Tallinn, percent of national average[a])

	Standard deviation/average		Min and Max		
Year	weighted	non-weighted	Poorest district	Tallinn	Gini index[b]
1992	14.3	20.0	71.9	121.1	0.108
1993	14.6	20.8	71.5	125.7	0.113
1994	14.4	19.6	67.9	122.7	0.109
1995	12.4	17.1	73.4	120.0	0.094
1996	11.9	16.5	74.9	118.8	0.091
1997	12.6	18.9	73.1	122.9	0.103
1998	12.9	19.5	73.3	122.7	0.105
1999	14.2	21.7	72.4	125.1	0.117
2000	13.9	20.3	70.9	122.3	0.111

B. Latvia (7 main cities and 26 districts, percent of national average [a])

	Standard deviation/average		Min and Max		
Year	weighted	non-weighted	Poorest district	Riga	Gini index[b]
1992	22.3	21.6	60.4	118.5	0.115
1993	29.5	33.2	57.4	117.4	0.134
1994	23.5	25.2	59.5	114.8	0.113
1995	20.0	21.7	61.3	113.3	0.100
1996	21.1	22.0	61.6	114.1	0.102
1997	21.0	20.8	61.9	114.7	0.108
1998	20.3	18.3	60.0	115.5	0.107
1999	20.2	16.6	59.9	116.0	0.107
2000	20.1	16.1	61.3	115.8	0.107

C. Lithuania (10 counties [c], percent of national average [a])

	Standard deviation/average		Min and Max		
Year	weighted	non-weighted	Poorest district	Vilnius county [d]	Gini index[b]
1995	11.7	14.5	78.8	112.9	0.062
1996	11.9	13.8	76.9	112.5	0.062
1997	10.7	13.7	78.0	112.7	0.059
1998	10.7	13.9	77.8	114.1	0.063
1999	11.3	15.7	78.1	115.3	0.070
2000	11.1	15.0	78.9	115.1	0.070
2001	11.7	16.2	76.8	116.6	0.074

Notes: [a] Except for Gini. [b] Ignoring inequality within regions. [c] Disparities in Lithuania are of course more pronounced when 60 municipalities are considered. Poorest district is at about 70% of average, while Vilnius city went down from 192% to 173% between 1997 and 2000; weighted standard deviation in the same period declined from 20% to 16% of national average wage. [d] Utena county had higher wage index (114.3) in 1995.
Sources: Official publications of national statistical offices and own calculation.

Table 5. Disparities in unemployment rates.

A. Estonia (15 counties and Tallinn, LFS unemployment)

	Standard deviation				Unemployment rates by main cities and districts		
	(% of national average unemployment rate)		percentage points				
Year	weighted	non-weighted	weighted	non-weighted	Min	Max	Gini index
1989	74.4	50.6	0.3	0.4	0.4	1.4	0.253
1990	58.6	39.5	0.3	0.4	0.3	1.5	0.197
1991	56.0	35.3	0.5	0.8	0.1	2.8	0.167
1992	33.2	26.1	1.0	1.2	1.3	5.5	0.143
1993	38.8	33.0	2.2	2.6	3.5	12.5	0.174
1994	38.9	28.6	2.2	3.0	3.4	13.8	0.153
1995	47.6	37.5	3.7	4.6	4.3	19.4	0.194
1996	36.7	32.8	3.3	3.7	6.5	16.8	0.169
1997	26.7	23.4	2.3	2.6	4.7	14.6	0.125
1998	22.2	23.0	2.3	2.2	6.1	14.7	0.117
1999	28.6	30.1	3.7	3.5	9.1	21.1	0.144
2000	27.4	27.0	3.7	3.7	9.2	22.8	0.137

B. Latvia (7 main cities and 26 districts, registrered unemployment)

	Standard deviation				Unemployment rates by main cities and districts		
	(% of national average unemployment rate)		percentage points				
Year	weighted	non-weighted	weighted	non-weighted	Min	Max	Gini index
1992	44.4	56.5	0.9	1.2	0.7	6.5	0.200
1993	63.2	71.1	3.7	4.1	3.0	18.8	0.316
1994	89.7	100.1	5.8	6.5	2.1	25.3	0.437
1995	81.6	98.6	5.3	6.4	2.0	26.0	0.387
1996	73.7	87.6	5.3	6.3	2.9	27.8	0.345
1997	73.4	84.2	5.1	5.9	3.0	27.9	0.362
1998	56.2	59.7	5.2	5.5	4.8	28.2	0.288
1999	55.7	59.1	5.1	5.4	4.8	27.2	0.285
2000	62.6	67.8	4.9	5.3	3.7	25.6	0.314
2001	63.0	68.1	4.9	5.2	3.6	26.5	0.315

B. Lithuania (46 districts, registrered unemployment)

	Standard deviation				Unemployment rates by districts		
	(% of national average unemployment rate)		percentage points				
Year	weighted	non-weighted	weighted	non-weighted	Min	Max	Gini index
1993	54.9	52.0	2.4	2.3	1.9	12.7	0.271
1994	67.7	60.6	2.6	2.3	1.3	13.5	0.306
1995	49.4	45.0	3.1	2.8	3.0	18.1	0.225
1996	45.9	36.1	3.2	2.5	3.3	16.9	0.183
1997	39.6	32.5	2.3	1.9	2.7	12.0	0.176
1998	43.0	39.2	2.8	2.5	3.1	16.5	0.210
1999	39.2	37.8	3.2	3.1	4.2	18.4	0.202
2000	37.5	36.4	4.3	4.2	7.3	23.7	0.198

Sources: Official publications and websites of national statistical offices and own calculation.

Table 6 Relationships between unemployment, wage and population density across regions. Estonia[a] and Latvia[b]

Prais-Winsten regressions, heteroskedastic panels corrected standard errors[c]

	Estonia				Latvia			
Dependent var. →	unemployment		wage (log)		unemployment		wage (log)	
Regressors	coef.	*z*	coef.	*z*	coef.	*z*	coef.	*z*
unemployment rate (log) [a]			-0.068	-2.47**			-0.114	-11.73***
population density (log)	-0.201	-1.65*	0.082	32.83***	-0.915	-7.61***	0.061	23.49***
rho (AR1)	0.715		0.552		0.778		0.574	
other controls (not reported)	year dummies, constant				year dummies, constant			
time period	1989-2001		1992-2000		1992-2000		1992-200	
R-squared	0.508		0.988		0.300		0.985	
k	13		11		10		11	
Wald chi2(k-1)	408.0		11589.7		492.6		2676.0	
Number obs.	208		144		297		297	

Notes: [a] Tallinn and 15 counties. [b] 7 main cities and 26 districts.
[c] Observations weighted by mid-period population. *, **, *** - significant at 10%, 5%, 1% level respectively.
Sources: Official publications of national statistical offices and own calculation.

Table 7. Net migration flows by main cities and districts: Latvia, 2001. Deviation of previosly published data from the revisions based on Census 2000

Underestimated by:	25-50%	70-100%	100-200%	200-300%	max=633%
Number of regions	4	2	2	2	1
Overestimated by:	10-20%	22-30%	40-90%	125-150%	max=978%
Number of regions	4	4	10	3	1

Source: Central Statistical Bureau of Latvia and own calculation

Table 8. Internal migrants by purpose of migration. Latvia, 1989-1999

Percent

	Location of new residence				
Purpose	*Whole country*	*Riga*	*Big city*	*Small city*	*Rural*
Purchase or change of apartment	15.4	2.5	30.0	17.1	16.0
Change or find job	22.1	30.0	10.0	23.2	20.8
Studies	6.4	15.0	20.0	6.1	1.6
Family reasons	47.9	42.5	35.0	47.6	52
Other	8.2	10.0	5.0	6.1	9.6
Total	100	100	100	100	100

Source: NORBALT-2 project data (provided by Central Statistical Bureau of Latvia) and own calculations.

Table 9. Migrants by purpose of migration.

Latvia, 2001

Percent

Purpose of migration	Location of new residence				
	Whole country[a]	*Whole country*[b]	*Cities and towns*[b]	*Rural area*[b]	Riga[b]
Children moving to live with parents	31.4	31.1	28.7	35.3	21.2
Restitution of house ownership or acquisition of own house or flat	15.2	14.8	15.6	13.5	17.7
Studies	11.1	10.9	14.8	4.0	25.9
Intention to live together with spouse	7.2	7.9	7.6	8.5	6.3
Sub-tenants	7.7	7.8	8.3	6.7	11.9
Parents mowing to live with children	3.6	3.8	4.1	3.4	4.9
Change of job	3.3	3.4	3.2	3.6	2.0
Acquisition of municipal flat	2.1	2.0	2.3	1.5	2.1
Exchange of dwellings	1.5	1.5	1.2	1.9	0.9
Starting a job after graduation	0.04	0.04	0.02	0.07	0.0
Other	16.9	16.8	14.1	21.6	7.0
Total	100	100	100	100	100

Notes: [a] Internal migration. [b] Total immigration, including immigration from abroad.
Source: Central Statistical Bureau of Latvia, 2002a.

Estonia [a], 1998

Percent

Purpose of migration	Location of new residence			
	Whole country	Urban	Rural	Tallinn
Desire to change housing or living conditions	24.0	22.9	26.1	14.4
Starting or terminating studies	16.8	20.2	9.8	27.3
Moving out from or back in with parents or other relatives	13.7	11.7	17.8	8.4
Moving in with or out from partner	12.3	11.4	14.4	12.9
Change of job or job seeking	9.8	11.0	7.6	16.7
Starting or terminating military service	8.0	9.7	4.9	12.1
Restitution of real estate ownership to respondent or former owner of respondent's residence	3.1	3.6	2.3	0
Starting a job after graduation	1.9	2.3	1.1	2.3
Job or studies of other family members	1.1	0.9	1.5	0.8
Other	9.3	6.3	14.5	5.1
Total	100	100	100	100

Notes: [a] Internal migration.
Source: LFS 1999 data and own calculation.

Table 10. Wage and unemployment differentials and migration between largest Latvian cities and adjacent districts

	Population, end of 2000		Migration in 2001: City - district: % of total outflow from the city	Migration in 2001: City - district: Outflow per 1000 population: Total	Migration in 2001: City - district: Outflow per 1000 population: Net	Migration in 2001: District-city: outflow per 1000 pop.	Unemployment differential district – city, percentage points: Registered		Unemployment differential district – city, percentage points: LFS		Gross average wage differential city – district by job location, percent	
City	City	Nearby district	(a)	(b)	(c)	(d)	1993	2000	1997	2000	1992	2000
Riga	756.6	144.9	28.8	2.5	1.9	5.9	2.9	2.9	1.5	2	24	15
Dau	114.5	42.5	39.8	4.8	1.1	10.1	3.0	6.7	7.2	7.3	45	13
Liep	88.5	46.5	39.6	3.6	-0.6	8.0	2.5	0.2	3.3	0.7	41	24
Jelg	64.5	37.3	35.1	5.7	0.5	8.9	-0.1	3.4	2.3	2.5	33	15
Vent	43.9	14.6	31.6	2.1	-2.7	14.5	0.9	2.4	4.1	4.5	115	108
Rez	38.7	43.2	49.9	12.0	5.3	6.0	8.7	14.2	16.4	16.9	33	22

Notes: Cities mentioned in the table are: Riga, Daugavpils, Liepaja, Jelgava, Ventspils, and Rezekne.
Source: Central Statistical Bureau of Latvia and own calculation.

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Table 11. Relationships between regional labour market and demographic indicators. Latvia, 1992-2000

Prais-Winsten regression with panel-corrected standard errors [a]

Dependent var. →	unemployment		wage (log)		mortality rate		marriage rate		divorce rate	
Regressors	coef.	*z*	coef.	*z*	coef.	*z*	coef.	*z*	coef.	*z*
unemployment rate [b]			-0.010	-9.48***	0.140	6.7***	0.031	5.29***	0.015	2.17**
wage [c] (log)					-2.256	-4.23***	0.861	4.00***	0.951	3.71***
population density (log)	-0.915	-7.61***	0.067	26.00***	0.010	0.22	0.175	8.95***	0.226	12.38***
rho (AR1)	0.778		0.665		0.594		0.375		0.209	
other controls (not reported)	year dummies, constant									
R-squared	0.300			0.989	0.825		0.925		0.886	
k	10			11	12		12		12	
Wald chi2(k-1)	492.6			2220.0	811.4		4038.6		3945.4	

Notes: [a] Observations weighted by mid-period population. *, **, *** - significant at 10%, 5%, 1% level respectively
[b] Registered unemployment by 7 main cities and 26 districts. [c] Gross monthly wages.
Source: Central Statistical Bureau of Latvia and own calculation.

Table 12 Determinants of inter-regional migration in Latvia, 1993-2001

Linear regressions with panel-corrected standard errors

	outflows				inflows				net inflows			
	coef.	*z*	coef.	*z*	coef.	*z*	coef.	*z*	coef.	*z*	coef.	*z*
unempl. rate [a]	0.111	2.71***	0.200	3.9***	0.098	1.59	0.265	3.61***	-0.014	-0.33	0.076	1.54
wage (log) [b]	-3.122	-2.87***	-3.953	-2.24**	3.102	2.07**	6.907	2.66***	5.912	4.72***	11.425	5.16***
density (log)	-1.605	-25.2***	-1.622	-20.0***	-2.190	-24.17***	-2.097	-17.70***	-0.597	-9.80***	-0.478	-5.75***
mortality [c]	0.313	2.98***	0.276	1.69*	0.325	2.15**	-0.311	-1.07	0.067	0.61	-0.608	-2.60**
marriage rate [c]					4.165	7.53***	5.586	6.35***	2.785	6.77***	4.175	6.44***
divorce rate [c]	1.563	4.28***	1.057	1.60								
year93	3.180	5.37***			1.671	1.89*			-1.509	-2.46***		
year94	4.010	6.73***			2.546	2.86***			-1.466	-2.37***		
year95	3.675	6.14***			2.514	2.81***			-1.163	-1.88***		
year96	3.759	6.25***			2.686	2.99***			-1.071	-1.72***		
year97	3.768	6.25***	3.767	6.76***	2.737	3.04***	2.738	3.08***	-1.028	-1.65***	-1.026	-1.59
year98	3.685	6.09***	3.684	6.59***	2.665	2.95***	2.666	2.99***	-1.019	-1.63***	-1.017	-1.57
year99	2.944	4.85***	2.944	5.25***	2.048	2.26**	2.049	2.29***	-0.899	-1.43***	-0.897	-1.38
_cons	21.897	39.98***	21.987	36.35***	24.940	30.68***	24.441	27.01***	3.108	5.56***	2.472	3.95***
Periods	1993-99,2001		1997-99,2001		1993-99,2001		1997-99,2001		1993-99, 2001		1997-99,2001	
R-squared	0.573		0.614		0.532		0.523		0.253		0.323	
k	13		9		13		9		13		9	
Wald chi2(k-1)	1302.7	(0.0000)	821.1	(0.0000)	998.5	(0.0000)	510.4	(0.0000)	240.3	0.0000	167.5	(0.0000)
Number obs.	264		132		264		132		264		132	

Notes: Dependent variables: outflow, inflow and net inflow (inflow less outflow) per 1000 population. Number of regions: 33.

[a] unexplained by density. [b] unexplained by density and unemployment. [c] unexplained by density, wage and unemployment

All regressors except year dummies are lagged one year and considered as predetermined variables. We use registered unemployment and gross monthly wages. Heteroskedasticity across panels is allowed. Observations weighted by population.

*, **, *** - significant at 10%, 5%, 1% level respectively.

Table 13. Determinants of individual migration decisions. Estonia, 1997-1999 (logit model [a])

	Population, aged 15-59				Employees, aged 15-59			
	Mean	**Coef.**	**t-value [b]**	**Marg. effect**	**Mean**	**Coef.**	**t-value [b]**	**Marg. effect**
Education (vs basic or less)								
higher	0.147	2.033	5.56***	0.030	0.187	0.168	0.36	0.002
postsecondary professional	0.099	1.867	5.16***	0.026	0.118	0.223	0.49	0.003
secondary comprehensive	0.304	1.353	5.54***	0.014	0.298	-0.632	-1.64	-0.005
secondary vocational	0.173	1.150	3.34***	0.011	0.196	-0.455	-1.06	-0.004
vocational after basic	0.087	1.809	5.54***	0.024	0.093	0.590	1.36	0.008
Female	0.510	-0.409	-2.61***	-0.006	0.499	-0.056	-0.21	-0.001
Ethnic minority	0.344	-0.304	-1.22	-0.004	0.352	-0.340	-0.78	-0.003
Age	36.60	-0.223	-4.11***	-0.002	39.2	-0.199	-2.38**	-0.001
Age squared (coef. ×100)	1497	0.190	2.77***		1651	0.159	1.49	
Marital status[a] (vs married)								
single	0.278	0.240	1.17	0.003	0.176	0.365	1.28	0.003
separated	0.119	0.778	2.53**	0.013	0.130	1.036	2.80***	0.012
Labour force status and job location [c]								
inactive	0.248	0.859	3.74***	0.013	0.000			
employed, commute to another county	0.052	1.745	5.81***	0.049	0.080	1.835	5.35***	0.032
employed, commute within county from rural to urban or from urban to rural	0.060	-0.064	-0.16	-0.001	0.092	0.117	0.28	0.001
jobseeker	0.085	0.284	0.89	0.004	0.000			
Residence [c]								
rural	0.316	-0.692	-3.96***	-0.002	0.279	-1.096	-3.6***	-0.004
Tallinn	0.294	-0.118	-0.21	-0.008	0.319	0.348	0.38	-0.007
Harju county (excl. Tallinn)	0.090	0.942	1.50	0.023	0.095	1.299	1.3	0.025
Labour market by residence [c]								
unemployment rate, lagged	0.099	-0.035	-1.17	0.000	0.099	-0.073	-1.32	-0.001
log average wage, lagged	0.082	-3.574	-2.22**	-0.050	0.082	-4.092	-1.49	-0.037
Year 1997	0.259	-0.830	-1.71*	-0.013	0.267	-1.139	-1.31	-0.012
Year 1998	0.259	-1.052	-3.62***	-0.015	0.263	-0.894	-1.74*	-0.010
Constant		28.940	2.16**			34.479	0.81	
# observations	25694 (393 migrants, Prob=0.015)				14727 (124 migrants, Prob = 0.0096)			

Notes. [a] Dependent variable: y = 1 if respondent has changed county of residence between during a year; otherwise y=0. [b] t- values are based on robust standard errors (possibly correlated within households). [c] In January of the corresponding year (1997, 1998 or 1999). *Source:* calculation based on LFS 1998-2000.

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The cyclical output behaviour during the last decade with deep recessions followed by shallow recoveries had a devastating effect on people income and living standard. The questions are whether these negative effects were evenly distributed across regions and whether the labour mobility played some role in mitigating them. The evidence shows that the regional differences are in place and that the labour mobility is responsive to them. However, poverty might be a serious constraining factor for labour mobility. The poverty not only limits the role of labour mobility in mitigating the regional disparities but also induces the labour mobility to strengthen the disparities in regional labour markets.

Keywords: Migration, regional adjustment, inequality, poverty
JEL Categories: J61, R23

Determinants of regional mobility in Romania

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May 2003

Introduction

It is a stylised fact that labour mobility rates in Europe are very low compared to the US. Evidence provided by Decressin and Fatas (1995) suggests that regional demand shocks cause different reaction in the labour market of Europe compared to the US. European labour markets adjust namely through changes of unemployment and participation rates and less through labour market mobility, relative to the US. The reason for low mobility has been focused on institutional factors like unemployment benefit system and the importance of the structure of home ownership. The main argument is that both unemployment benefit system and home ownership make workers more geographically attached. If the argument applies to Romanian regional mobility, since 90% of the households live in their own house being geographically attached but the unemployment benefit is not generous to enhance the geographical attachment, then we expect adjustments to take place both through changes in labour participation rates and labour mobility. Indeed, over the last decade there was a considerable decline of labour participation rate and slightly larger migration rates than in other Central European countries (Fidrmuc, 2002).

In Romania, the income has a considerable role in determining labour mobility. During the past, decade Romania experienced an economic evolution of the boom and bust type marked by major fluctuations of output and persistent inflation. This economic performance had devastating effects on people income and jobs. In 2000, the average real monthly net wage was 67% of this wage in 1991. The regional wage differences increased over the period. While the regional maximum wage declined to 84% of the

maximum regional wage in 1991, the regional minimum wage declined to 57% of the minimum regional wage in 1992. The increasing poverty in some regions might constraint emigration (Faini and Venturini, 1994) and limits the role of the labour mobility alleviating regional disparities.

This paper is an attempt to analyse whether the regional labour mobility complies with the predictions of the migration models, namely whether the expected income gains guide the labour reallocation process. More specifically the paper focuses on the determinants of the mobility (push and pull factors) across Romanian counties in the light of the predictions of migration models.

Section 1 discusses the prediction of the labour mobility models. Section presents the data set. Section 3 provides evidences for the evolution of regional disparities and of the labour mobility responsiveness. Section 4 presents the econometric method used to test the mobility models predictions in Romanian market and interprets the results. Section 5 concludes.

1. Predictions of migration theories

The reason people move is to improve their expected lifetime income. Therefore, migration is motivated by expected earnings differential (Harris and Todaro, 1970) between home and destination regions adjusted by the probability to get that job with the expected wage in the destination regions. The first prediction of this theory is that in order labour mobility to occur regional earnings differentials should be in place. In that case, regions with high wage and job creation rates will be destination regions, while regions with low wage and high job destruction rates will be origin regions. Labour mobility increases wages, decreases the skill base in emigration regions, and depresses wage in immigration regions. Inward migration enables resident workers to gain occupational flexibility and generates increased activity in region from additional demand. Outward migration reduces unemployment pressure, provides inward financial

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flows from remittances and returned migrants. In this way, labour mobility fulfils its role of equilibrating the unbalanced regional labour markets.

Leaving the region of residence is costly. Therefore, only enough wealthy people can afford to leave. The wage in the home region can limit the emigration either when it is low or when it is high. The second prediction is that there might be a non-linear relationship between wage and emigration (Faini and Venturini, 1994).

The costs of migration might be reduced when the actual migrants follow the former migrants from the home region. Bauer and Zimmermann (1995) suggest that migration may become a self-perpetuating process because the costs and risks of migration are lowered by social and information network. In this case, there would be a persistency of the emigration on the one hand and immigration on the other hand in certain regions. The third prediction is that there might be labour absorbing and labour shedding regions.

2. The data set

I use two distinct data sets. One is a balanced panel of 41[2] regions with time series of up to 10 years (1991-2000) comprising for each region the inflow and outflow rates, net monthly real wages, registered unemployment, number of active firms, dwelling stock per inhabitant (the full description of the data set is given in Annex 2). The source of both data sets is the National Statistical Institute (INSSE). The other data set comprises place to place migration rates for 1995 and 2000 offering information on intra-regional and inter-regional labour mobility.

The size of the regions (counties) varies, therefore all regional indicators used in the econometric models are normalised by the size of the population in the region. The smallest regional labour market (230 thousand inhabitants) accounts for about 1% in the total employment, total labour force or total working age population. The largest region (865 thousand inhabitants), when excluding the capital region (with 2.2million

[2] Since 1996, the 42nd region, Ilfov, is added. This region represents the capital proximity included before in the capital region. During this analysis, the old classification with 41 regions is applied.

inhabitants), is almost four times the size of the smallest region; while the capital region is 10 times the size of the smallest region.

The fact that instead of labour migration I use population migration, which measures the change in residence regardless whether it is related to labour or non-labour migration, might generate systematic biases ending up in fixed effects. A person acquiring anything other than a permanent residence status is not included in the data. Moreover, the data focus on migration rather than persons, thus the actual number of migrants may be lower than the figures indicate as many migrants can change their permanent residence more than once a year.

3. Regional distribution of strain

The regional differences in earnings and employment availability are essential for inducing people to move. Therefore, this section analyses the evolution of regional labour markets disparities during the last decade. The consequences of the economic evolution of boom and bust type marked by major fluctuation of output and inflation during the 90s were declining employment and earnings and rising unemployment.

3.1 Employment

During the period 1992-2000, while the working age population increased slightly in all regions both labour force and employment declined to 85% of their level in 1992. The regional deviations from the country average unemployment rate, country average employment and country average working age population have been declining (indicated by declining variation coefficients) witnessing a regional convergence over time.

The consequence of the declining labour force was a declining participation rate across regions. In 1990, the regional participation rates ranged between 63% and 90%, while in 2000 it ranged between 53% and 76%. The gap between the lowest and the highest participation rate maintained over the whole period. The increasing regional coefficients of variation of the participation rates, although small, indicate increasing deviations of regional participation rates from the country mean (Fig. 2). The low correlation

coefficients over the period (Table A.3) indicate on the other hand that the deviations were not persistent and the regional participation rates were flexible. The labour participation was an important adjustment mechanism which accompanied the impressive dis-employment process (Boeri, 2000) during the period. While the regional unemployment rates were converging, the regional participation rates were diverging.

3.2 Unemployment

The unemployment rate[3] during the period fluctuated around 11% (Table A.1). The regional disparities have been shrinking over the period via the decline of the unemployment rate in the highest unemployment regions and the rise of unemployment rates in the lowest unemployment regions. The decline of the correlation coefficients between the unemployment rate across regions indicates diversity of the unemployment dynamics across regions (Table A.4).

At first sight the pattern of unemployment rate seems to be determined by the output pattern: recession, recovery and recession again. However, given that the output recovery between 1993 and 1996 did not take place with job creation, the declining unemployment rate in regions indicates flows out of the labour force. Many factors contributed to the flows out of the labour force. Firstly, in 1994-1995 was the second large retirement wave (the first was in 1992 of non-agricultural workers). In 1994 retired more than half a million of workers, especially farmers, and in 1995 more than a quarter of million. In 1995 the total employment declined approximately by the number of retired persons in 1994. Secondly, 1995 coincides with the end of maximum payment period (27 months, 9 months with unemployment benefit and 18 months with means tested unemployment allowance) for those becoming unemployed at the creation of the unemployment benefit scheme at the end of 1991. Third, in 1995 a record number of persons (116 thousands, compared to 12 thousands in 1994 when the scheme was initiated, 88.8 thousands in 1996 and 71 thousands in 1997) were granted allowances for vocational integration and therefore the large fall in the number of recipients of the unemployment benefits. A part of jobs freed by retirement were matched with new entrants in the labour market receiving allowance for vocational integration. This policy

[3] It is the registered unemployment rate at the end of the year.

mix can explain the fall of unemployment in 1995, the large flow out of the labour force and the fewer job losses than actually would result from the massive retirement.

The comparison of regional deviations of unemployment rates from the country mean between 1992 and 2000 (Fig. 1) shows that besides the regions which more or less kept their status of high unemployment regions (first quadrant) or low unemployment regions (third quadrant), there are winners (second quadrant) and losers (fourth quadrant) among regions. The winners (second quadrant), regions situated at western border (Caras Severin, Satu Mare) or regions in North East (Bacau, Vrancea), have succeeded to turn from above average unemployment in 1992 to below average unemployment in 2000. The losers (the fourth quadrant) are the regions, which have turned from below average unemployment rate in 1992 to above average unemployment rate in 2000. These regions are the mining (Gorj, Hunedoara) and heavily industrialised regions (Prahova, Brasov).

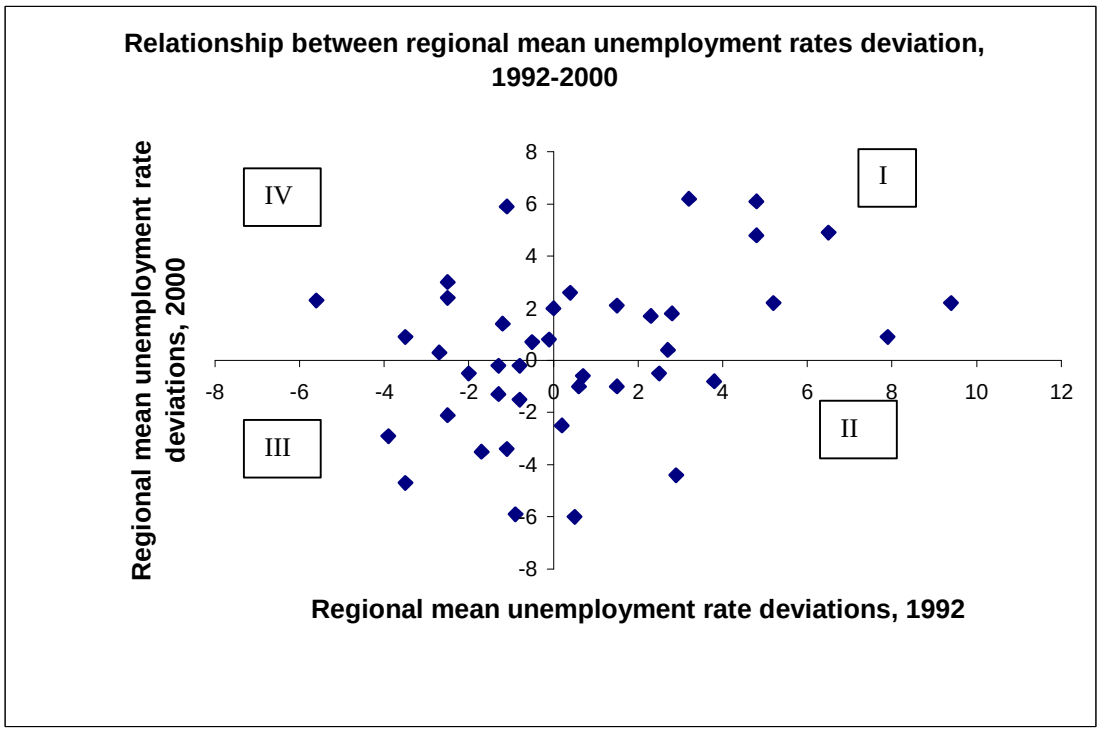

Fig. 1 Regional mean unemployment deviations

3.3 Wages

The average monthly real net wage has been declining over the period. In 2000, the average monthly net real wage (in 1993 prices) was 67% of the wage in 1991. The regional wage differences increased over the period. While the regional maximum wage declined to 84% of the maximum regional wage in 1991, the regional minimum wage declined to 57% of the minimum regional wage in 1991 (Table A.1). The average monthly expected wages, the monthly wages adjusted by the employment rate, declined as well. In 2000, the average monthly net real expected wage was 62% of the 1991 level. The regional differences widened over the period. The regional maximum net real wage declined to 76%, while the regional minimum net real wage declined to 53% of the 1991 level. The increasing regional variation coefficients for both real and expected wage (Fig. 2) indicate the increasing wage disparities among regions. By moving from the lowest wage region to the highest wage region, one could expect to get on average a double wage.

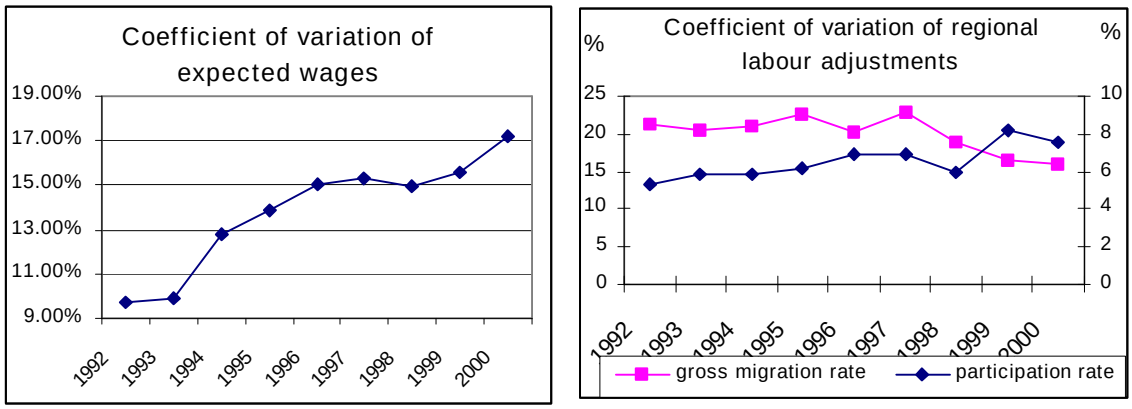

Fig. 2 Evolution of wage, mobility and labour participation regional disparities

3.4 Regional labour mobility

The regional mobility seems to respond to the increasing wage and job differential among regions. The mean annual gross migration rate[4] was always above 2% over the analysed period and the variation coefficients were declining especially after 1998, when the newly elected government started the implementation of the much delayed restructuring of loss making state owned enterprises. The rising divergence across regions concerning the labour participation rate indicates that the burden of adjustment was taken by the supply of labour. The authorities have implemented a costly programme to reduce the labour force in

[4] The gross migration rate of a region is the sum of inflow rate and outflow rate of that region. The inflow rate represents the share of immigrants in the population of the region. The outflow rate represents the share of emigrants in the population of the region.

the mining sector through severance payments and many public companies were transformed into commercial companies. Privatisation accelerated in 1997 (1300 companies were sold in 1997 against a total of 3000 between 1990 and 1996). However, most of the public enterprises sold were small to medium sized.

The simple average of net immigration rates[5] was negative (-0.03) until 2000, meaning that on average the regions were emigration regions. On average, each year 165 persons emigrated from a region with 550 thousand inhabitants. In 2000, the simple average of net migration rates became zero, meaning that on average the inflows equal the outflows.

Table 1 presents more information about the changes in mobility regimes of regions during the analysed period. The second and fifth columns of the table report the cumulative change in the annual emigration/immigration status. A positive number indicates that the region was most of the time an emigration region, while a negative number indicates that the region was most of the time an immigration region. The third and the sixth columns indicate the number of changes of the migration status for each region during the period. A zero indicates that the region did not change its migration status since 1991.

Table 1 Regional changes from net immigration to net emigration (1991-2000)

County	Cumulative changes[1]	Number of changes	County	Cumulative changes[1]	Number of changes
Alba	-10	0	Harghita	-10	0
Arad	10	0	Hunedoara	1	1
Arges	-4	1	Ialomita	4	1
Bacau	-4	2	Iasi	-2	1
Bihor	10	0	Maramures	-6	1
Bistrita-Nasaud	-10	0	Mehedinti	-2	3
Botosani	-10	0	Mures	8	1
Brasov	8	2	Neamt	-6	1
Braila	-1	2	Olt	-10	0
Buzau	-10	0	Prahova	-10	0
Caras-Severin	-8	1	Satu-Mare	-8	2
Calarasi	0	1	Salaj	-2	3
Cluj	10	0	Sibiu	6	1
Constanta	10	0	Suceava	-6	1
Covasna	-4	3	Teleorman	-6	2
Dambovita	-2	1	Timis	10	0
Dolj	2	2	Tulcea	-6	1

[5] The net immigration rate of a region is the difference between the inflow rate and the outflow rate of that region.

Galati	-10	0	Vaslui	-6	1
Giurgiu	0	1	Valcea	-10	0
Gorj	0	2	Vrancea	-10	0
			Bucharest	4	2

[1] The three possible states of the region mobility are numbered as follows: the stationary state (zero net migration) 0, emigration (negative migration rate) –1 and immigration (positive migration rate) 1.

There are 5 immigration (Arad, Bihor, Cluj, Constanta, Timis) counties and 10 emigration counties (Alba, Bistrita-Nasaud, Botosani, Buzau, Galati, Harghita, Olt, Prahova, Valcea, Vrancea) over the last decade, proving the existence of persistently receiving and sending regions. The differences in the average wage between immigration and emigration counties are not large (Table 2). But it should be notice that the emigration counties belong to the second lowest quartile of the wage distribution. The emigration counties are not those with the lowest wage. This is an evidence for possibility of non-linear effect of wages on emigration. People should be wealthy enough to afford mobility.

Table 2 Emigration and immigration regions

	1991	**1992**	**1993**	**1994**	**1995**	**1996**	**1997**	**1998**	**1999**	**2000**
Monthly real wage										
Immigration counties	89.35	73.19	58.82	56.86	58.66	64.82	50.31	61.48	66.69	59.05
Emigration counties	85.05	71.01	56.12	52.47	56.61	60.89	48.00	62.47	63.71	58.27
Quartile 1	82.38	68.54	55.20	49.12	52.65	56.11	44.63	55.47	58.79	52.55
Mean	87.1	73.1	58.3	54.4	57.5	62.7	49.5	62.8	65.6	58.8
Monthly expected real wage										
Immigration counties	87.45	68.40	53.98	51.10	53.61	60.99	45.59	56.64	60.22	53.89
Emigration counties	82.01	63.63	48.60	45.28	48.85	55.95	42.79	54.12	54.83	50.78
Quartile 1	80.33	61.82	47.89	43.26	45.56	49.97	39.48	49.35	51.67	47.27
Mean	84.2	66.6	52.0	48.4	51.9	58.6	45.0	55.8	57.7	52.4

Under the assumption that regions choose their migration status each year, the evolution of these choices can be considered as a Markov process according to which the choice in one year depends on the choice in the previous year. More specifically, there is a probability p_{ij} that a region chooses migration regime i in year t+1 while its migration regime in year t was j. The transition matrix, $P=\{p_{ij}\}$ indicates the probability of moving from one migration regime to another over time.

Table 3 Transition matrix

	Immigration in t	Emigration in t

Immigration in t+1	0.84	0.16
Emigration in t+1	0.16	0.84

Source: own computation based on RNCS and GUS data

From the transition matrix (Table 3), we can infer the followings. Both migration regimes have the same degree of persistency. The relative stability of the current migration status suggests that the network migration plays a considerable role in adjustment to labour market condition disparities.

4. Empirical analysis of regional labour mobility

This section investigates the determinants of regional mobility and in particular the responsiveness of immigration to the pull factors of the destination region, and the responsiveness of emigration to the push factors of the home region. The dependant variables are annual gross and net migration flows normalised by the population so that they measure migration rates. Gross inflows and outflows rates are positively correlated over the period (the coefficient of correlation is 0.65). This implies that if some variables is both pull and push factor, than the coefficient estimated for net migration rate may be biased; therefore the estimation results for both gross and net migration rates are presented.

I attempt to test the three predictions of the mobility models.

Firstly, I concentrate on the impact of the regional average real wages; unemployment and employment rate proxied by the number of active firms normalised by the population of the region and the cost of migration proxied by the number of dwellings normalised by the population. In order to alleviate the endogeneity problem between migration flows, unemployment and wages; the latter two are lagged one year.

Secondly, I analyse the non-linear relationship between wages and migration flow rates. In doing so, I insert as exogenous variable separately the negative mean deviation rate

(representing the poor regions) and the positive mean deviation rates (representing the rich regions).

Thirdly, I analyse the presence of the persistency of migration, by including among the explanatory variable the lagged migration flow rates. The advantage of the dynamic panel approach is that allows migration rate to adjust over time to the desired rate. The smaller the adjustment coefficient (the coefficient of the lagged dependent variable), the longer it takes to reach equilibrium.

Fourthly, I analyse the presence of network effect on migration based on place to place migration rates in 1995 and 2000.

4.1 Poverty, unemployment and migration

Given the panel data at hand, I use four different estimation techniques. The first is OLS on the full panel. The second is the within estimation that takes into account the regional fixed effects, the focus being on the time series dimension in the data. The third, between estimation, explores the cross sectional dimension by using only the regional means over time. The fourth, random effects estimation is preferred over fixed effects estimation if the time invariant region specific variables are uncorrelated with the explanatory variables. When the true model is the random effects model, OLS will yield consistent estimates but the standard errors will be underestimated. In most cases, I report (Table 5) the results of either fixed or random effect model according to the results of the Hausmann test (the null hypothesis of a true random effects model within estimation).

Estimating the dynamic panel with fixed effects might biased the estimates (as the lagged dependent variables tends to be correlated with the error term). Then I perform an instrumental variable estimation using as an instrument the two lagged migration flow rates.

Wage and expected employment opportunity are crucial factors in shaping the behaviour of potential migrants (Lucas, 1997). The traditional human capital model of migration is built upon the utility maximising individual who evaluates the level of

utility at different locations and chooses the optimal location. If there are costs related to migration, an individual will decide to migrate if the net gain from moving exceeds the migration costs. With uncertainty in the home region and the uncertainty in the possible destination regions the decision of migration will be mainly determined besides the earnings possibilities also by the unemployment rate which indicates the difficulty to get a job.

Migration might be the consequence of a spatial matching process, where location specific job offers are matched with job searching workers. In that case, the unemployment has structural features and the high correlation between the inflows and outflows for the same region can be explained by workers heterogeneity. A mixture of individual and aggregate supply and demand factors explains migration. The individual supply factors are the skills, the age, the experience; the regional supply factors are the local unemployment rate, local costs of living, and local wage rate. The individual demand factors are the characteristics of jobs and the number of jobs. The regional demand factors are the range of specialities for which vacancies are created. We incorporate the regional demand factors partly in the regional fixed effects and partly in the annual dummies.

Higher wages in other regions increase the gain from search in those regions and raise emigration. Since higher wage regions coincide with higher unemployment rate regions, the probability for a successful job search in these regions is low and reduces the gain coming from potential high wages. Therefore, it can happen that high wage regions are not attractive to migrate. The smaller the number of dwellings per population the higher the cost of immigration in that region.

The estimation regressions used to test whether the Romanian labour mobility functions as the migration models predict are

$$\text{inflow rate}_{it}=c_0+c_1X_{it}+?_t+?_I+?_{it}$$
$$\text{outflow rate}_{it}= c_0+c_1X_{it}+?_t+?_I+?_{it} \quad (1)$$
$$\text{netinflow rate}_{it}= c_0+c_1X_{it}+?_t+?_I+?_{it}$$

where X_{it} are the chosen determinants of labour mobility specific to regions and changing over time: the absolute value of negative mean real wages deviations for poor region (denoted by Poor), the positive mean real wage deviations for rich region (denoted by Rich), the unemployment rate, the stock of dwellings per 1000 inhabitants and the number of active firms per inhabitants in the regions. The time dummies ($?_t$) and regional dummies should be included in the model (F statistics allow to reject the restricted model without time dummies). The results of the estimations are presented in Table 4.

The pull factors, which significantly determine the immigration rates, are wages, housing and the entrepreneurship in the region. Both rich and poor regions attract immigrants. Better housing conditions attract immigrants as well as the presence of more active firms. The push factors, which significantly determine emigration rates, are wages and unemployment. Higher wage encourages emigration (the coefficient of Rich is 0.009), while lower wage encourages it less (the coefficient of Poor is 0.005). There is the risk for labour mobility to not fulfil the adjustment role where is the most necessary due to the poverty. High unemployment encourages emigration. The determinants, which significantly influence the net inflow rates, are unemployment and entrepreneurship. The higher the unemployment rate the lower the net immigration rate, while the higher the entrepreneurship the higher the immigration rate. All these findings confirm the predictions of the migration models and the presence of non-linear effect of wages on mobility.

The results from the dynamic panel show a persistent labour mobility and enforce the previous results with some exceptions. The sign of the coefficients remains but the significance level fades away for some determinants. The significant pull factor is low wage; the significant push factors are wages, unemployment and entrepreneurship. Not only that the low wage regions do not encourage people departure, it seems that they attract people. This finding is just a confirmation of the peculiarity of the Romanian labour mobility from urban (with relative high wages) to rural areas (with relatively low wages) beginning with 1995 and from industrial to agricultural employment occurring over the whole decade. A more intensive entrepreneurship encourages emigration. This finding seems odd but is also the consequences of the peculiarity of the Romanian

labour mobility stressed above. In addition, it might indicate the congestion effect, which induces people to leave. The only significant determinant of net immigration is the passed net immigration.

The advantage of the dynamic panel approach is that it allows the migration rate to adjust over time. The smaller the adjustment coefficient (1 minus the coefficient of the lagged dependent variable), the longer it takes to reach the equilibrium. The adjustment coefficient is 0.29 for the immigration, 0.24 for the emigration and 0.23 for net immigration. This implies that the equilibrium might be reached in about 3.5 and 4.5 years, two times longer than in European Union (Nahuis and Parikh, 2002).

4.2 Network effect

The place to place migration data for 1995 and 2000 published in the Demographic Yearbook allows the study of the network effect on migration. According to this data, migration of each county takes place either inside the county or outside. The outside migration is a migration either in neighbouring regions or non-neighbouring regions. In 1995 on average 20% of the emigration of each county was toward neighbouring counties, while 24% of the emigration was towards non-neighbour regions. The bulk of emigration was intra regions. In 2000, the share of emigrants inside the county in total emigration increased to 62%, the share of emigrants toward neighbour counties declined to 18% and the share of emigrants toward non-neighbour counties declined to 20%.

The most preferred destination regions for the emigrants in 2000 remained the same as in 1995 with few exceptions. While, Hunedoara, a mining region does not belong anymore to the most preferred destination regions in 2000, Prahova, an oil industry region, becomes more popular as a destination region in 2000.

The estimation regression used to test whether the place to place labour mobility functions as the migration models predict is

$$Mig_{ij}^{2000}=c_0+c_1X_i+c_2X_j+c_3Mig_{ij}^{1995}+?_{ij} \quad (2)$$

where Mig_{ij}^{2000} represents the share of migrants from county j into county i normalised by the population of the destination county in 2000, X_i indicates the characteristics of

the receiving region, X_j indicates the characteristics of the sending region and Mig_{ij}^{1995} is the share of migrants from county j into county i normalised by the population of the destination county in 1995. The network effect is measured by the coefficient of the last independent variable. A positive and significant coefficient indicates a persistent network effect. The set of characteristics of sending and receiving regions includes the wages, the unemployment rate, the dwelling stock normalised by the county's population, the number of firms normalised by the county's population and a fixed effect embodying all other unspecified region characteristics. The unemployment rates and the wages are lagged by one year. The results of the estimation are presented in table below.

Table 5. Place to place migration estimates

Estimators	**Coefficients (T-statistics)**
constant	-0.087 (-2.63*)
Mig_{ij}^{1995}	0.87 (20.32*)
Fixed effects of sender region	-0.00005 (-0.88)
Fixed effects of receiver region	-0.0001(-1.77)
Wage receiver	0.0009(1.22)
Wage sender	0.00017(2.02*)
Unemployment rate receiver	-0.0002(-0.1)
Unemployment rate sender	0.00016(0.8)
Private firms receiver	-0.021(-3.13*)
Private firms sender	-0.011(-1.47)
Dwelling stock receiver	0.0001(2.61*)
Dwelling stock sender	0.0001(2.72*)
R^2 adjusted	0.91

The estimates are OLS heteroskedasticity robust. Number of observations 1641.

Source: own computations

The network effect is strong. The migration flows in 2000 kept their pattern from 1995. The receiver region influences significantly the migration through the density of dwelling stock and active enterprises to population. The higher the density of dwelling stock the higher the immigration rate, while the higher the density of active firms the lower the immigration rate. As in the dynamic panel estimation, again we obtain a congestion effect namely that more firms in a region deter immigration in that region. The sender region influences significantly the migration through the dwelling stock and wages. The higher the wages and the dwelling stock the higher the emigration rate. This is an evidence for the fact that only the wealthy people can afford to move.

5. Conclusions

The first decade of transition toward market economy imposed much strain on the Romanian economy, depressing employment and raising poverty. The strain was not uniformly distributed among regions. Despite the declining differences in regional unemployment rates, the differences in regional wages increased. The regional labour mobility reduced and seems to be responsive to the traditional pull and push factors. However, the poverty might be a serious constraining factor for labour mobility to play a role in solving the regional disparities. I found that poor regions do not encourage emigration but encourage immigration. This finding is the consequence of the peculiarity of Romanian labour mobility from urban to rural areas, from industrial to agricultural employment.

The labour mobility seems to play a role in straightening the disequilibria in regional labour markets rather that to contribute to the alleviation of the imbalances.

The migration seems to be of network migration type. There are emigration and immigration regions, which kept their status over the analysed period. Both the emigration and immigration status of counties seems to be persistent.

Table A.1 Statistics on Labour Market developments and migration

	1990	1991	1992	1993	1994	1995	1996	1997	1998	1999	2000
Labour force participation rate											
Mean	70.9	69.7	72.9	74.0	73.5	68.9	75.8	75.0	65.1	64.0	63.9
Min	62.8	58.9	62.7	61.7	64.4	59.1	66.8	64.5	56.6	47.2	53.1
Max	89.9	82.5	81.3	81.7	82.7	78.6	87.3	90.8	72.9	77.6	75.5
Max/min	1.35	1.4	1.3	1.3	1.3	1.3	1.3	1.4	1.3	1.6	1.4
Coefficient of variation (%)	5.3	6	5.3	5.9	5.8	6.2	6.9	6.9	6.0	8.2	7.6
Unemployment rate											
Mean		3.3	9	11.1	11.3	9.8	6.7	9.2	11	12.1	10.81
Max		6.2	17.8	22.9	24.1	17.3	13.1	15	18.7	21.3	16.7
Min		1.2	2.8	4.2	3.9	3.9	2.3	4	5	6	4.5
Max/min		5.2	6.3	5.4	6.2	4.4	5.7	3.7	3.7	3.5	3.71
Coefficient of variation (%)		41	36	35	35	34	41	31	31	27.6	28.2
Average monthly nominal wage (thousand lei)											
Mean	3.3	7.3	19.8	58.3	136.8	203.8	307.8	604.4	995.4	1429.5	2006.8
Max	3.9	9.4	25.6	79.8	185.1	280.9	400.7	748.7	1294.3	2083.3	2751.8
Min	3	6.5	16.1	47.6	116.2	165.9	249.3	490.9	825.1	1183,2	1673.6
Max/min	1.3	1.4	1.6	1.7	1.6	1.7	1.6	1.5	1.6	1.8	1.64
Coefficient of variation (%)	4.9	7	9.4	9.9	10.9	11.1	11.8	10.9	10.9	12	12
Average monthly real wage (thousand lei in 1993 prices)											
Mean	152.9	87.1	73.1	58.3	54.4	57.5	62.7	49.5	62.8	65.6	58.8
Max	182.3	112.6	95.7	79.8	78.9	78.3	87.6	69.8	87.3	95.0	94.5
Min	139.5	78.4	60.5	47.6	45.9	44	49.1	34	48.6	51.3	44.6
Max/min	1.3	1.4	1.6	1.7	1.7	1.8	1.8	2	1.8	1.9	2.1
Coefficient of variation (%)	5.2	7.4	9.7	9.9	12.7	13.3	15.1	15.3	15.0	15.6	17.2
Average monthly expected real wage (thousand lei in 1993 prices)											
Mean		84.2	66.6	52.0	48.4	51.9	58.6	45.0	55.8	57.7	52.4
Max		107.5	90.5	76.4	75.7	70.4	79.3	60.7	76.0	84.2	82.4
Min		74.2	53.4	39.8	35.8	41.2	45.3	30.7	42.5	44.1	39.6
Max/min		1.4	1.7	1.9	2.1	1.7	1.7	2.0	1.8	1.9	2.1
Coefficient of variation (%)		7.9	11.9	12.9	15.3	14.7	15.5	15.2	15.2	16.1	17.4
Gross migration rate (immigration rate+emigration rate,%)											
Mean	2.32	2.35	2.52	2.05	2.31	2.55	2.57	2.68	2.41	2.44	2.19
Max	3.21	3.72	3.69	2.99	3.26	4.15	3.74	4.22	3.79	3.89	3.58
Min	1.53	1.10	1.18	1.01	1.12	1.44	1.32	1.50	1.38	1.24	1.04
Max/min	2.1	3.39	3.12	2.96	2.92	2.88	2.83	2.81	2.75	3.13	3.46
Coefficient of variation (%)	17.78	23.23	21.38	20.48	21.14	22.50	20.23	22.94	21.38	21.01	20.23
Net immigration rate (immigration rate-emigration rate,%)											
Mean	-0.12	-0.10	-0.08	-0.05	-0.04	-0.02	-0.02	-0.01	-0.02	-0.01	0.00
Max	1.33	1.35	1.28	0.68	0.55	0.51	0.44	0.55	0.58	0.46	0.49
Min	-0.97	-0.98	-0.80	-0.52	-0.42	-0.37	-0.40	-0.77	-0.63	-0.48	-0.35
Max-min	2.3	-1.38	-1.61	-1.31	-1.31	-1.37	-1.09	-0.71	-0.92	-0.95	-1.38
Coefficient of variation	-3.9	-4.84	-5.56	-4.93	-5.21	-8.19	-10.72	-13.69	-8.26	-13.52	-712.83

Correlation coefficients (inflow rate, outflow rate)		0.09	0.25	0.46	0.71	0.85	0.82	0.82	0.76	0.83	0.79

Table A.2 Persistence in real wage differences across regions, 1992-2000

	1992	**1993**	**1994**	**1995**	**1996**	**1997**	**1998**	**1999**	**2000**
1991	0,93	0,94	0,82	0,79	0,95	0,91	0,91	0,91	0,92
1992		0.94	0.78	0.73	0.78	0.73	0.65	0.61	0.59
1993			0.82	0.68	0.72	0.64	0.61	0.61	0.61
1994				0.79	0.78	0.73	0.78	0.74	0.71
1995					0.95	0.90	0.83	0.76	0.76
1996						0.91	0.84	0.76	0.75
1997							0.91	0.82	0.78
1998								0.91	0.88
1999									0.92

Table A.3 Persistence of regional participation rates differentials, 1992-2000

	1993	**1994**	**1995**	**1996**	**1997**	**1998**	**1999**	**2000**
1992	0.65	0.71	0.47	0.4	0.30	0.41	0.25	0.34
1993		0.72	0.46	0.41	0.47	0.47	0.50	0.52
1994			0.75	0.64	0.58	0.61	0.56	0.62
1995				0.86	0.63	0.67	0.54	0.60
1996					0.73	0.75	0.65	0.70
1997						0.70	0.67	0.61
1998							0.81	0.84
1999								0.88

Table A.4 Persistence of unemployment disparities across regions, 1992-2000

	1992	**1993**	**1994**	**1995**	**1996**	**1997**	**1998**	**1999**	**2000**
1991	0.84	0.89	0.90	0.85	0.90	0.81	0.91	0.93	0.93
1992		0.89	0.8	0.72	0.61	0.53	0.46	0.38	0.35
1993			0.9	0.76	0.59	0.47	0.45	0.37	0.38
1994				0.85	0.71	0.59	0.56	0.49	0.48
1995					0.9	0.74	0.67	0.6	0.6
1996						0.81	0.72	0.65	0.61
1997							0.91	0.82	0.80
1998								0.93	0.91
1999									0.93

Table A.5 The Persistency of labour mobility

	92	**93**	**94**	**95**	**96**	**97**	**98**	**99**	**00**
Inflow rates									
91	0.90	0.77	0.68	0.41	0.65	0.48	0.53	0.59	0.64
92		0.88	0.76	0.52	0.66	0.40	0.49	0.56	0.55
93			0.88	0.60	0.71	0.51	0.60	0.62	0.60
94				0.73	0.83	0.70	0.74	0.74	0.68
95					0.73	0.71	0.67	0.65	0.49
96						0.75	0.76	0.80	0.72
97							0.85	0.79	0.64
98								0.83	0.75
99									0.83
Outflow rates									
91	0.82	0.73	0.68	0.65	0.61	0.64	0.6	0.53	0.53
92		0.92	0.86	0.83	0.77	0.69	0.66	0.63	0.6
93			0.93	0.82	0.80	0.71	0.68	0.64	0.63
94				0.85	0.87	0.74	0.74	0.71	0.68
95					0.85	0.72	0.68	0.69	0.59
96						0.83	0.81	0.84	0.77
97							0.95	0.86	0.78
98								0.92	0.84
99									0.9

Annex 2 Description of the data set

Indicators	Definitions
Registered regional unemployment rate	Share of unemployment in total labour force of the region, the end of the year
Real monthly net wages	Nominal monthly net wages deflated by the regional price index (based to 1993)
Regional price index	The simple average of price indices of the main products sold on the agro-food markets
Regional dwelling stock rate	The dwelling stock normalised by the number of inhabitants in the region
Regional inflow rate	Share of immigrants in the population of destination region
Regional outflow rate	Share of emigrants in the population of origin region
Regional net inflow rate	Difference between inflow and outflow rates
Regional active firm rate	Percentage of active firms in the population of regions
Rich	Positive deviation from the mean real wage normalised by the mean real wage
Poor	Absolute value of negative deviation from the mean real wage normalised by the mean real wage

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Table 4 Determinants of regional migration: 1991-2000

	Inflow rate		Outflow rate		Net inflow rate		Inflow rate		Outflow rate		Net inflow rate	
Unemployment rate lagged	0.0069	(1.71)	0.029	(7.07*)	-0.02	(-7.32*)	0.004	(1.71)	0.006	(2.59*)	-0.001	(-1.1)
Rich (Lagged)	0.007	(4.48*)	0.009	(5.6*)	-0.0014	(-1.08)	0.0019	(1.85)	0.002	(2.83*)	-0.001	(-1.67)
Poor (lagged)	0.006	(2.77*)	0.005	(2.54*)	0.001	(0.62)	0.003	(2.26*)	0.002	(2.07*)	0.0004	(0.52)
Firms rate	0.39	(4.37*)	-0.12	(-1.26)	0.42	(5.64*)	0.076	(1.25)	0.12	(2.47*)	-0.08	(-2.12*)
Dwelling per 1000 inhabitants	0.001	(2.72*)	0.0008	(1.26)	0.0004	(0.76)	0.0007	(1.74)	0.0005	(1.52)	0.0001	(0.41)
Migration rate (lagged)							0.71	(22.71*)	0.76	(25.65*)	0.77	(37.3*)
Constant	0.32	(1.41)			-0.38	(-1.94*)	0.09	(0.58)	0.06	(0.46)	0.01	(0.95)
Year dummies	yes		yes		yes		yes		yes		yes	
Region fixed effects	No		Yes		No		No		No		No	
Region random effects	Yes		No		Yes		Yes		Yes		Yes	
R^2 (within)	0.05		0.14		0.12		0.59		0.68		0.8	
R^2 (between)	0.66		0.61		0.22		0.84		0.87		0.74	
R^2 (overall)	0.28		0.28		0.22		0.66		0.73		0.82	
Hausmann test (p-value)	10.32	(0.66)	23.5	(0.03)	5.89	(0.94)	5.33	(0.98)	5.05	(0.98)	6.52	(0.95)

Number of observation: 369 (41 regions). The dependant variables are the gross inflow and outflow rates and the net inflow rate, as percentages of the region's mid year population. T statistics are reported in parentheses. Coefficients on year dummies are not reported.

Where Have All the Migrants Gone? Reconciling Falling Migration Rates with Rising Regional Disparities during Transition[∇]

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Abstract

We investigate the potential reasons behind the fall in migration that occurred on the background of rising regional disparities in the Czech Republic in the course of the 1990s. We consider two alternative explanations: First, responses of migrants to wage differentials and other factors affecting migration may have changed. Second, determinants of migration other than wages may have changed so as to countervail rising wage disparities. We find that the decline in migration can be fully explained by changes in migrants' behavior. The impact of wage differentials on migration flows has increased, but this was countered by increasing importance of distance as barrier to migration and lower impact of unemployment and vacancy rates.

JEL – Classification: F22, J61, P23

Key Words: Migration, Unemployment, Regional Shocks

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1 Introduction

At the outset of transition, the Czech Republic inherited a very egalitarian regional earnings distribution. In 1990, average wage in the richest district exceeded that in the poorest one by 28%. By 1998, this gap grew to 76%. Regional differences in unemployment rates changed in a similar fashion. In 1990, district-level unemployment rates ranged between 0.1% and 1.9%. In 1998, the lowest rate was 1.6%, while the highest climbed to 15.6%. In the presence of such dramatic increases in regional disparities, potential gains from migrating from depressed to more prosperous regions should have grown; one would thus expect migration to have risen. Yet, in 1998 the migration rate was in fact 15% lower than in 1992. Falling migration rates in the face of increasing regional disparities in transition are, however, not specific to the Czech Republic. Fidrmuc (2003) observes similar patterns in Poland and Slovakia. Despite this apparent puzzle, the literature has so far largely focused on documenting and explaining regional disparities in transition economies (see: Profit, 1999, Boeri and Scarpetta,1996, Burda and Profit, 1996, Gorzelak, 1996) without giving much consideration to inter-regional migration.

This paper contributes to filling this gap by using place-to-place migration data at the level of Czech districts from 1992 to 1998. While a number of studies investigate migration in the context of developed countries (se for example Wall, 2001; Juarez 2000, Crozet, 2001 and Daveri and Faini, 1999), the Czech Republic moved from being a planned economy to becoming an OECD member and a candidate country of the European Union during the period analyzed. We explore the factors behind the unexpected decline in migration, assessing two alternative explanations. First, variables affecting migration behavior other than wages may have countervailed the increased migration incentives from wage divergence. Second, the behavior of migrants, and in particular their response to wage and unemployment differentials, may have changed – an explanation which seems particularly relevant in the context of the substantial changes experienced in the candidate countries of the European Union.

In the next section we show that the decline in migration rates in the Czech Republic was associated with an increasing share of net migration, reduced long distance migration and

a higher share of urban-suburban migration. In section three we present a model, which serves as guidance for our empirical investigation. Section four presents the data used. In section five then we estimate a place-to-place migration model for the overall time period as well as for two separate time periods (1992 to 1994 and 1996 to 1998) and perform the Oaxaca – Blinder decompositions of the decline in migration. We find the decline in migration between 1992 and 1998 is entirely due to parameter changes. In particular wage differentials have become more important in shaping migration and distance was a more important deterrent to migration in 1998 than in 1992. By contrast access to jobs as measured by the vacancy and unemployment rates has become less important. This leads us to conclude, in section six, that most of the fall in migration in the Czech Republic in the 1990's was due to changes in the behavior of migrants.

2 The Puzzle and Some Stylized Facts

The place-to-place migration data used in this study are based on the register of residents and were obtained from the Czech statistical office. The data exclude moves from and to other countries (including Slovakia), thus separation of Czechoslovakia has no effect on findings. They pertain to 76 districts (77 after 1996) (called *okresy* in Czech). In 1996, however, the district of Jesenik was newly created from parts of Sumperk and Bruntal; we thus exclude these districts from estimation, to provide estimates on a consistent set of regions. Figure 1 reports the share of migrants as a percentage of the country's population and the coefficient of variation of average regional wages. This simple comparison of regional mobility with the regional variation in wages clearly documents the fall in migration that occurred on the background of rising regional disparities in the Czech Republic.

{Figure 1 around here}

An inspection of the migration data (Table 1) reveals that the decline in overall migration was primarily due to a reduction in long-distance moves. Migration flows involving a distance of more than 100 kilometers declined steadily from 1992 onwards with the decline

being more pronounced with increasing distance. In 1998 moves over less than 50 kilometers were 50% above their 1992 levels, while those over a distance of more than 200 kilometers were 43% below the 1992 value. This suggests that matching of workers and jobs across space has become more difficult in the course of transition in the Czech Republic.

{Table 1 around here}

Gross migration may be a misleading indicator of migratory behavior, however, because, as in most empirical migration data, net migration flows only account for a fraction of total gross flows in the Czech Republic. For instance, in 1992, 1563 people migrated from the suburban districts of Prague East and Prague West to the city of Prague while 2023 migrated in the opposite direction.[1] In Table 2, we decompose migration into net and gross flows. Falling gross migration rates have been primarily accompanied by decreasing churning flows, so that net flows as a percentage of population and as a percentage of total flows increased. Since most macro-economic models focus on net rather than gross migration as an equilibrating device for regional disparities, this suggests that the early phases of transition may have been characterized by excessive churning. The level of net-migration, however, remained low throughout transition. Even in 1998 only 22% of the bilateral migration flows were net-migration flows while 78% were churning flows.[2]

{Table 2: Around here}

The high share of churning flows as well as falling long distance migration may be due to residential choices of migrants. A change of the place of residence is not necessarily associated with a change of employment. For instance one can move from a city to a suburb without changing the place of employment. Such migration is obviously not motivated by income or unemployment disparities between two regions, but is mainly due to better living conditions in the receiving region. In the Czech Republic such moves can be isolated by separating migration between the four “city districts” of Prague, Brno, Plzen, and Ostrava and their respective suburban districts (Prague West and Prague East for Prague; Plzen South and

Plzen North for Plzen; Brno venkov for Brno; and Opava, Frydek-Mystek, Novy Jicin and Karvina for Ostrava.). Movements within these urban regions have become increasingly important in total Czech migration (Table 3), accounting for between a quarter and a fifth of total migration. Furthermore, although throughout the period of observation the "city districts" were characterized by higher wages and lower unemployment rates than their respective environs, they started to lose population as of 1994 (with the exception of Ostrava[3]). This was particularly pronounced in Prague where by 1998 three times as many migrants moved from Prague to the suburbs than in the opposite direction.

{Table 3 around here}

3 The Model and Estimation

Descriptive statistics thus suggest that falling gross migration in the Czech Republic has been associated with an increasing share of net migration, reduced long distance migration and a higher share of urban-suburban migration. While this is suggestive of some potential explanations for falling migration rates, it does not provide us with definitive answers. We therefore construct a simple model of place-to-place migration to find out which factors underlie mobility flows. Consider an individual (n) residing in region *i* and deciding in which region $j \in \{1...J\}$ to live. Each potential destination region is associated with a certain utility that derives from the expected earnings, Y_j, and region specific amenities, A_j. Furthermore, assume that moving from region *i* to *j* is associated with migration costs, or disutility, C_{ij}. Finally, we assume that the individual's utility function contains also a random component, μ_i^n, which can either be thought of as capturing heterogeneity in taste (as in Wall, 2001) or as a random draw from a distribution of moving costs (as for instance in Burda and Funke, 1993) The expected utility of a person currently living in region *i* and contemplating to move to region *j* is thus given by:

$$U_{ij} = U(A_j, Y_j, C_{ij}, \mu^n{}_j)$$

with $C_{ij}=0$ if $i=j$. The individual will chose the location, which yields the highest utility. The probability P_{ij} of moving from region i to j is thus given by:

(2) $$P_{ij} = P\{U_{ij} = \max(U_{i1},...U_{iJ})\}$$

We assume that the utility function can be log linearised such that $U_{ij} = \alpha_1 \ln A_j + \alpha_2 \ln Y_j + \alpha_3 \ln C_{ij} + \varepsilon_i^n$, with $\varepsilon_i^n = \ln(\mu_i^n)$. As shown by McFadden (1973) under the provision that the random components, ε, are all independently identically Weibull distributed, the probability of an individual moving from region i to j is given by:

(3) $$P_{ij} = \frac{e^{\alpha_1 \ln A_j + \alpha_2 \ln Y_j + \alpha_3 \ln C_{ij}}}{\sum_{j \in \{1...J\}} e^{\alpha_1 \ln A_j + \alpha_2 \ln Y_j + \alpha_3 \ln C_{ij}}}$$

To move from micro level to aggregate migration we follow Fields (1979) and consider the log probability of a move from region i to region j (P_{ij}) relative to the probability of staying (P_{ii}). Using equation (3), it follows that $\ln(\frac{P_{ij}}{P_{ii}}) = \alpha_1(\ln A_i - \ln A_j) + \alpha_2(\ln Y_i - \ln Y_j) + \alpha_3 \ln C_{ij}$. Note that the expected number of moves (M_{ij}) from i to j is equal to $N_i P_{ij}$ (with N_i the resident population in the sending region), so that the above can be rearranged to:

(4) $$\ln(M_{ij}) = \ln(M_{ii}) + \alpha_1(\ln A_i - \ln A_j) + \alpha_2(\ln Y_i - \ln Y_j) + \alpha_3 \ln C_{ij}$$

This model thus suggests that when estimating equation (4), the coefficient on $\ln(M_{ii})$ should be unity and sending and the receiving region effects should be symmetric. Both these predictions may be too strong, however. For instance, Hunt (2000) argues that if aside from migration individuals have the possibility to commute this may lead to more people remaining resident in their region than in a model which assumes that the individuals live where they work. Furthermore, the symmetry of sending and receiving region effects is based on the assumption of symmetric information of agents about conditions in receiving and sending regions and perfect capital markets. If there are information asymmetries about sending and receiving region characteristics, the coefficient of the sending region variable will differ from that of the receiving region. If, by contrast, financial markets are imperfect, current income will play an important role in financing the move, which will lead to wages at the origin having a higher value than at the destination (see Vanderkamp, 1971). Finally, Fields (1979)

argues that empirical models allowing sending and receiving region coefficients to differ yield higher explanatory power than when parameters are constrained. These considerations suggest that equation (4) should be generalized to:[4]

$$\ln(M_{ij}) = \alpha_0 \ln(M_{ii}) + \alpha_{11} \ln A_i - \alpha_{12} \ln A_j + \alpha_{21} \ln Y_i - \alpha_{22} \ln Y_j + \alpha_3 \ln C_{ij} \quad (5)$$

For simplicity and to avoid problems associated with the logarithm of zero (see below) we rewrite this as $M_{ij} = e^{\theta Y_{ij}}$

In estimating equation (5), it has become customary to include fixed effects to control for time invariant characteristics of regions such as the various amenities or the psychological and financial costs associated with migration – all of which are difficult to measure. Two specifications have been used: First, bilateral fixed effects can be included for every sending and receiving region pair. In this case (5) can be written as:

$$M_{ijt} = e^{\theta Y_{ijt} + \sum_{j=1}^{J} \sum_{i \neq j} \phi_{ij} + \sum_T \tau_t + \varsigma_{ijt}} \quad (6)$$

where ϕ_{ij} is a set of *Jx(J-1)* fixed effects for each sending and receiving region pair, τ_t a fixed effect for each time period and ζ_{ijt} the error term. Alternatively fixed sending and receiving region fixed effects can be chosen. In this case (5) can be reformulated as:

$$M_{ijt} = e^{\theta Y_{ijt} + \sum_{j=1}^{J} \varphi_j + \sum_{i=1}^{J} \omega_i + \sum_T \tau_t + \varsigma_{ijt}} \quad (7)$$

with φ_j and ω_i standing for a set of *J* fixed effects for each region when it is the sending (ω_i) or receiving (φ_j) region, respectively. Under specification (6) time invariant measures (such as distance or contingency effects) and under specification (7) time invariant variables for individual regions (such as the area) cannot be identified separately. We estimated both models and compared the model fit. Although the bilateral fixed effects specification leads to a substantial increase in the log likelihood of the estimates, (which is, however, to be expected when including around 5500 more parameters) the Schwartz information criterion slightly favors equation (7). For this reason results concerning (6) were relegated to the appendix and are discussed only to clarify the robustness of the results.

{Table 4 around here}

An additional problem is posed by the fact that many bilateral migration flows in our data are zero or very low (see Table 4). As we use a rather fine regional grid, it is not at all surprising that pairs of small and distant regions often have zero or very low bilateral migration flow. Estimating equation (7) by OLS would ignore that gross migration flows between two regions cannot become negative as well as the count data structure of the data. This would result in both biased and inefficient estimates (see Greene 1997). We thus estimate a negative binomial regression model (Cameron and Trivedi, 2001)[5] by assuming that the observed migrant flow M_{ij} is drawn from a Poisson distribution with parameter $\lambda_{ij} = e^{\theta Y_{ijt} + \sum_{j=1}^{J} \varphi_j + \sum_{i=1}^{J} \omega_i + \sum_{T} \tau_t} \xi_{ij}$ where $\xi_{ij} = e^{\varsigma_{ij}}$ is a random individual unobserved effect, which is gamma distributed with mean 1.0 and variance δ. The distribution of migrant flows M_{ij} conditional on Y_{ij} and ξ_{ij} is thus given by: $f(M_{ij} \mid Y_{ij}, \xi_{ij}) = \frac{e^{-\lambda_{ij}} \lambda_i^{M_{ij}}}{M_{ij}!}$. As shown by Cameron and Trivedi (1986), under these assumptions the unconditional distribution of migration flows ($f(M_{ij} \mid Y_{ij})$) is a form of the negative binomial which has an expected number of moves between two regions ($E(M_{ij})$) of $e^{\theta Y_{ij}}$ and variance $e^{\theta Y_{ij}}(1 + \delta e^{\theta Y_{ij}})$ with δ as the over-dispersion parameter. The derivative of $E(M_{ij})$ with respect to any element (k) of Y_{ij} is thus given by $\frac{\partial E(M_{ij})}{\partial Y_{ij}^k} = \theta^k E(M_{ij})$ and in the case of a double logarithmic specification as (4) can be interpreted as a standard elasticity (i.e. the expected percent change in migration given a certain percentage ceteris paribus change in the dependent variable).

4 Determinants of Migration

Data on regional developments for this analysis were taken from various issues of the regional statistical yearbooks of the Czech Republic. We focus on four sets of variables, closely related to inter - regional migration:

First, to capture differences in expected life-time earnings in the two localities we consider the differences in average wages between sending and receiving regions as well as differences in unemployment rates. Inclusion of these variables is motivated by standard

migration theory such as Harris and Todaro (1970), which argues that the wage level can be considered a proxy for income when employed while the unemployment rate measures the probability of finding employment. Unemployment rates, however, may be considered an imperfect proxy for the probability to find employment. For this reason, we follow Jackman and Savouri (1992) and include also the vacancy rate in a region (as percentage of total employment) as an additional indicator of labor market tightness.

Second, since a substantial part of migratory movements in the Czech Republic may be associated with housing motives, we use indicators to measure housing availability in the regions. Unfortunately, data on housing prices and the housing stock used in much of the literature (see Westerlund, 1997, Jackman and Savouri, 1992, Cameron and Muellbauer, 2001) are not available for the Czech Republic. We therefore proxy housing availability with construction indicators (see also Decressin, 1994). Specifically, we use the number of dwellings per inhabitant completed over the last three years as an indicator of housing stock.

Third, as measures of the potential costs associated with migration from a region to another, we employ the distance between these two regions, measured as the road distance between the district capitals in kilometers (obtained from the ANWB Route Planner (www.anwb.nl). Distance has proven to be the uniformly the most important in explaining place to place migration patterns in many countries (see Fields, 1979). In addition since short distance migration is high in the Czech Republic and some authors (see e.g. Crozet, 2001) found adjacency effects important in explaining interregional migration, we include a dummy variable, which takes on the value one if two regions are adjacent to each other and zero otherwise. Furthermore, Jackman and Savouri (1992) argue that labor migrants may find it difficult to move across sectors (for instance agricultural workers will face difficulties finding employment in industry and industrial workers may encounter problems when attempting to find employment in services). Therefore, we also control for the difference in structural specialization between districts as a further indicator.[6] Finally, a dummy variable taking on the value of one if the flow is between Moravia and Bohemia was included to account for the potential cultural differences between these two regions, which may increase psychological moving costs.

Finally, since regional development in the Czech Republic was closely associated with sectoral developments (see Scarpetta and Huber, 1995) we also include the share of agricultural and industrial employment in the sending and receiving region as control variables.

Table 5 reports summary statistics for these data. They reflect the findings of the empirical literature on regional development in the Czech Republic. Aside from declining migration rates, the Czech Republic experienced also declining employment. The average district lost about 2.000 employees from 1992 to 1998 with the lowest employment levels reached in 1996 and followed by a partial recovery. This decline was primarily due to declining employment in industry and agriculture, whereas service employment increased. The unemployment rate, however, remained below the 10% mark throughout the transition period and was very low until 1996. Low unemployment rates were accompanied by high vacancy rates, which also started to decline only after 1996. Furthermore, the construction of new apartments fell substantially until 1996 and remained low until 1998.

{Table 5 around here}

5 Results

Results for the full sample

Estimating equation (7) for the entire time period (see Column 1 of Table 6) points to the relatively low importance of labor market conditions in determining migration. Only the vacancy rate is significant – an increase in the vacancy rate of the receiving region by 1% increases bilateral migration by 0.07%. Given that migration flows from all districts should increase by 0.07%, this effect is economically significant. However, neither unemployment nor wages (in sending or receiving regions) significantly affect migration, although wage in the receiving region and unemployment in the sending region do have the expected signs. Interestingly, wage in the sending region appears with a positive (albeit not significant) coefficient, which might indicate that liquidity constraints are a barrier to migration. Housing

availability in the receiving region has the expected effect and an increase in the number of completed dwellings per inhabitant (over the last three years) by 1% raises the bilateral migration flow by around 0.06%.

Sectoral specialisation has a significant impact on migration in the Czech Republic. A high share of agricultural employment in the receiving region significantly reduces migration, while the share of industry had a negative but insignificant impact. People thus tend to migrate to regions with a high share of service sector employment, which accords with our finding that the service sector was the only sector to expand employment in the time period from 1992 – 1998.

The uniformly most important variables determining migration, however, are the various distance measures. On average, bilateral migration flow falls by 1.2% for each 1% increase in the distance between regions. Migration between adjacent regions is on average 2.6 times (exponential of 0.959) higher than among similar non-adjacent regions whereas migration between two regions is lower by 24% in case one of them is in Bohemia and the other in Moravia. Finally, migration is higher between regions that differ more strongly in terms of the sectoral composition.[7]

Furthermore, we find that time dummies are jointly significant and become increasingly more negative each year from 1992 to 1995. Interpreting the coefficients on year dummies as measuring "autonomous migration", this was around 17% below the 1992 level in 1993, 32% lower in 1994, and 42% lower in 1995. After 1996, autonomous migration stabilized at about 50% of the 1992 level.

{Table 6 around Here}

Results for Sub-Periods

The time pattern of migration discussed above suggests that the declining migration rate is largely a phenomenon specific for the pre-1996 period and thus associated with the early transition period. This decline in early transition could be attributed either to changes in the explanatory variables or due to changes in the behavior of migrants (i.e. changes in the

estimated parameters of the model). The latter possibility seems particularly relevant in the context of transition economies because of the on-going dramatic institutional changes during transition. Transition is also likely to bring about important restructuring and learning processes both on the side of individuals and firms. This too may have led to changes in migrants' behavior.

To explore the possibility of a changing pattern of migration, we re-estimated (7) for two separate time periods (1992 to 1994 and 1996 to 1998).[8] We find indeed that several coefficients have changed substantially. In particular, migrants have become more sensitive to wage differentials and less sensitive to differences in labor-market tightness. While wages in the receiving and sending regions remain insignificant for 1992 – 1994, in the sub-period 1996 to 1998 a 1% increase in the receiving-region wage increases migration by around 1%. By contrast, the significant effect of the vacancy rate in the receiving region disappears in the second period. Furthermore, unemployment, which although insignificant has the correct signs in the 1992-94 regression, appears with the wrong signs (positive in the receiving and negative in the sending region) in the 1996-98 regression, although they are still not significant. This suggests that at the outset of transition, when uncertainty about the eventual outcome of the reform effort was relatively high, Czechs were apparently more concerned about employment prospects than potential earnings gains.

Furthermore, distance becomes a more important deterrent to migration in the later period, thus pointing to increasing problems of spatial matching in the Czech Republic. The elasticity of migration with respect to distance increased from 1.14 to 1.2. Although this change may seem small in absolute terms, the two coefficients are significantly different from each other. The impact of structural factors (employment in industry and agriculture) has changed considerably too – share of agricultural employment in the receiving region in particular seems to discourage migration in the early years but encourage it later.

A Decomposition of Flows

To assess the relative importance of parameter changes and changes in explanatory variables we perform decomposition in the spirit of Oaxaca (1973). Starting from equation (7) and denoting as $(\hat{\theta}_{92/94}, \hat{\varphi}_{92/94}, \hat{\omega}_{92/94})$ as the estimated parameters for the period 1992 to 1994

and as $(\hat{\theta}_{96/98}, \hat{\varphi}_{96/98}, \hat{\omega}_{96/98})$ those for the time period 1996 to 1998, the difference in the forecasts of the sum of log of migration over all regions for the two sub-periods may be written as:

$$(8)\quad \sum_i \sum_j (\ln \hat{M}^{98}_{ij} - \ln \hat{M}^{92}_{ij}) = \left\{ \sum_i \sum_j [\hat{\theta}_{96/98}(Y_{ij98} - Y_{ij92})] \right\} + \left\{ \sum_i \sum_j [(\hat{\theta}_{96/98} - \hat{\theta}_{92/94}) Y_{ij92}] - \sum_j (\hat{\varphi}_{j96/98} - \hat{\varphi}_{j92/94}) + \sum_i (\hat{\omega}_{i96/98} - \hat{\omega}_{i92/94}) \right\}$$

where the first term on the right hand side of (8) in compound brackets measures the change in migration which would have occurred if parameters had stayed constant at the (96/98) values throughout and only the values of variables had changed. The second term by contrast gives the predicted change in migration if variable values had been at their 1992 levels and only parameters had changed.[9] Furthermore, since the problem is linear we can further decompose the first effect for each of the k variables in the Y_{ijt} such that: $CiV^k = \sum_i \sum_j \theta^k_{96/98}(Y^k_{ij98} - Y^k_{ij92})$ with CiV^k the change in variable effect for this subgroup of variables.[10]

Performing this decomposition (table 7 column 1) we predict a reduction in the sum of log migration of 1632 relative to an actual decrease of 1354. Therefore, although our model slightly overestimates the decline in migration the overall fit seems satisfactory. Furthermore, results indicate that changes in behavior (parameter changes) were the most important factor responsible for falling migration in the Czech Republic whereas changes in determinants of migration in fact worked in the direction of increasing migration. If coefficients had been at their 1998 level in 1992, migration should have been lower in 1992 than in 1998. A substantial part of this change was due to increasing wage differentials. Of the total predicted increase due to variable changes of 3974 over 95% can be explained by the combined effect of sending and receiving region wages, and a further 10% are due to increasing regional disparities in unemployment rates and vacancy rates, while changes in dwellings and differences in employment structure actually worked to reduce migration.

{Table 7 around here}

Robustness of Results

Our results thus suggest that the decline in migration in the Czech Republic in the period 1992 to 1998 was primarily due to changes in the behavior of migrants – specifically, changes in their response to factors determining migration. Although wage disparities have become more important for migratory movements, distance has become a stronger deterrent to migration and unemployment and vacancy rates have become insignificant. These results are robust to including bilateral rather than sending and receiving region fixed effects (results obtained when estimating equation (6) are reported in Table A1 in the Appendix). The results with bilateral fixed effects are very similar to those reported above. In particular in all specifications the stylized facts of increased significance of wage differentials, reduced significance of unemployment and vacancy rates as well as a lower coefficient on distance between regions hold. Furthermore, performing the Oaxaca decompositions yields similar results as above (see column 2 of Table 7). Migration would have increased rather than decreased if parameters had remained at their 1992/1994 levels, with most of this predicted increase accounted for by wage divergence. Increasing unemployment and vacancy rate disparities would have contributed to increasing rather than decreasing migration and the effect of dwellings construction should have reduced migration. The only variable on which results disagree is the sectoral specialisation.[11]

6 Conclusions

This paper explores potential explanations of the falling intensity of migration that occurred in the Czech Republic (and, similarly, in other transition economies) despite increasing regional disparities. We show that the decline in the extent of migration between 1992 and 1998 is primarily driven by falling long-distance migration. By contrast, short distance migration remained more or less stable and migration between cities and their environs has in fact increased. Furthermore, while gross migration has fallen, net migration has increased. These stylized facts suggest that declining migration reflects increased problems of spatial matching between job opening and workers.

When analyzing determinants of bilateral migration between 1992 and 1998, we find evidence of important changes in the behavior of migrants, which can fully account for the decline in migration in the Czech Republic. Although wage disparities have become more effective in inducing inter-regional migration, the impact of labor-market tightness (measured by vacancy and unemployment rates) on migration has weakened. Moreover, distance has become a stronger barrier to migration over time.

These results suggest that as the Czech Republic moved from central planning to market, spatial matching between workers and jobs has become increasingly difficult. Other potential explanations are rising migration costs and liquidity constraints. Given that Czech migration rates are already very low even by European standards, this development is worrying. In a market economy, migration plays a crucial role by reducing economic disparities among regions. Future research should therefore focus on identifying the deterrents to mobility at the aggregate and individual level alike.

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ENDNOTES

[1] Such churning can result from individual heterogeneity in skill levels and occupation, preferences or life cycle position (e.g. students migrating to places of education) and differences in the structure of regional labour demand (see Fields, 1979). Also, spatial search models (Jackman and Savouri, 1990, Molho, 2001) predict churning as a result of stochastic matching.

[2] Net migration can be calculated by: $N = \frac{1}{2}\left[\frac{\sum_i |O_i - M_i|}{\sum_i POP_i}\right]$ where O_i and M_i stand for outflows and inflows, respectively, and POP_i is the population in region i. This leads to the following relationship between gross and net flows $\left[\frac{\sum_i (O_i + M_i)}{\sum_i POP_i}\right]\left[\frac{\sum_i |O_i - M_i|}{\sum_i (O_i + M_i)}\right] = \left[\frac{\sum_i |O_i - M_i|}{\sum_i POP_i}\right]$ with the first term in brackets on the left hand side being the gross migration rate and the second the share of net flows in total flows.

[3] This exception may be due to regions bordering on the town (Opava, Karvina, Novy Jicin, and Frydek Mystek) not being typical suburban districts but having a high share of industrial employment themselves.

[4] The hypothesis of $\alpha_{11}=\alpha_{12}$ and $\alpha_{21}=\alpha_{22}$ can be rejected for all significant variables in our specifications.

[5] The negative binomial distribution, is derived from Poisson distribution, this is appropriate since the expected number of migrants from region i to j is binomially distributed which can be approximated by a Poisson distribution with $\lambda_{ij}=N_iP_{ij}$ if N_i is large. It was chosen since in raw data indicates over-dispersion (i.e. the variance of migration is larger than its mean).

[6] This is measured as the sum of absolute differences of the shares of agriculture, industry and services between two regions

[7] We tested whether the over-dispersion parameter (δ) was significant. This was the case for each and every specification. The null of sending and receiving region fixed effects jointly equalling zero can be rejected at all conventional significance levels.

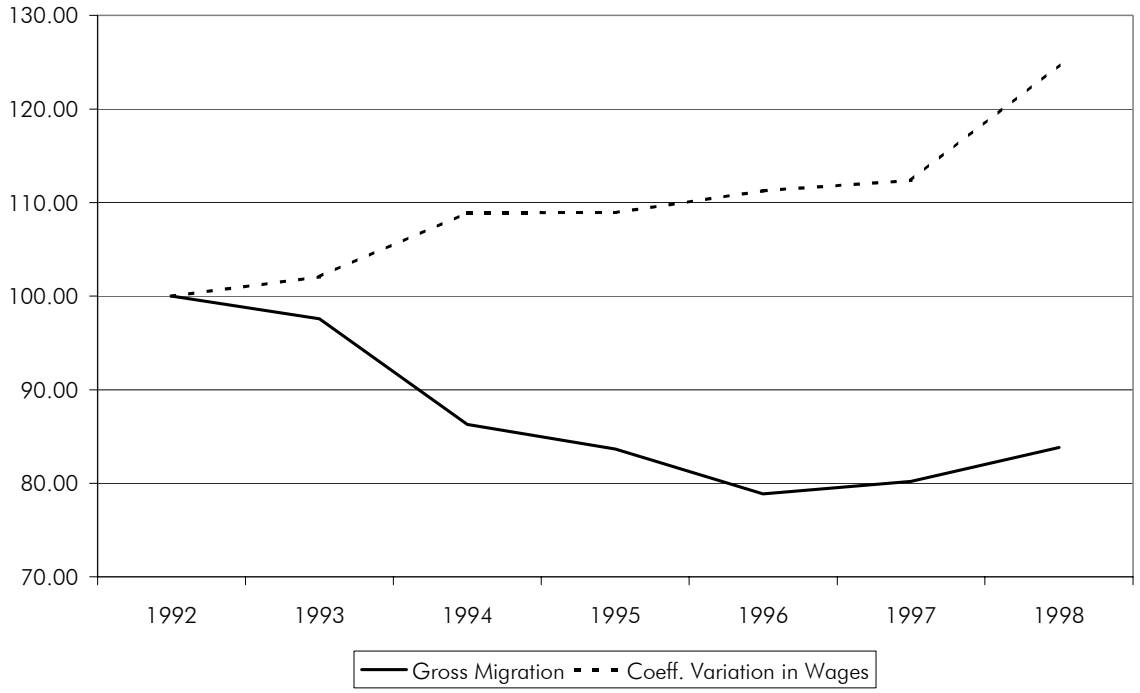
[8] We omit the year 1995 since for some of our estimation results we find a significant change in this year and for others not (see appendix). Results are, robust to adding 1995 to both the first or the second period.

[9] This decomposition assumes that the 1996/98 coefficients are undistorted (see: Oaxaca and Ransom, 1994). This is plausible, since as shown above post 1996 migration rates did not change significantly

[10] The effect of changes in parameters can not be further decomposed since results would depend on choice of base categories for dummies and standardisations of variables (see: Jones, 1983)

[11] In addition we also experimented with including environmental variables (NO_X, SO_2 and solid waste emissions), population as well as population density and the number of schools as proxies for amenities and congestion effects in the regression. Also the number of licensed enterprises per 100 inhabitants was included to proxy for the size of the newly formed private sector and indicators of the population structure (the share of female population, the share of handicapped unemployed and the share of unemployed school leavers) were included to correct for potential differences in search intensities of the populations of the sending region. These variables were insignificant in regressions for sub-periods. In the overall regression only environmental variables were significant but had the wrong sign, since aside from amenities they also proxy for industrial production decline in a region. Inclusion of these additional variables, however, had no effect on the qualitative findings presented above.

Figure 1: Development of Gross Migration Rates, Coefficient of Variation of Wages and Unemployment Rates across 74 districts in the Czech Republic



Note: 74 regions (okresy), excluding Sumperk, Bruntal and Jesenik.

Table 1: Place to place migration in the Czech Republic by distance and year

Distance[a)]	1992	1993	1994	1995	1996	1997	1998
<50	9204	15133	13599	13574	12749	13506	14009
50 to 100	15758	14680	13194	12628	11881	11943	12432
100 to 200	14250	10621	9443	9063	8427	8389	8522
200 to 300	5913	4602	3851	3715	3460	3436	3508
300 to 400	2364	1888	1712	1557	1437	1502	1583
400 to 500	1674	818	699	651	645	629	621
Total	49162	47741	42498	41188	38699	39403	40774

Note: The table reports the total number of moves between regions for 74 regions (okresy) excluding Sumperk, Bruntal and Jesenik a) Measured in Kilometres between district (okres) capitals

Table 2: Decomposition of Total Gross floss in the Czech Republic

	Gross Flows	Net Flows	Share of Net flows in Gross Flows
1992	0.56	0.05	9.82
1993	0.63	0.07	10.42
1994	0.47	0.05	11.13
1995	0.44	0.06	12.83
1996	0.42	0.06	13.73
1997	0.43	0.08	18.44
1998	0.44	0.10	21.96

Note: All figures are a percentage of total population for 74 regions (okresy) excluding Sumperk, Bruntal and Jesenik

Table 3: Migration in the main urban regions

	Prague		Plzen		Brno		Ostrava		Total moves in
	Suburbs to City	City to Suburbs	Suburbs to City	City to Suburbs	Suburbs to City	City to Suburbs	Suburbs to City	City to Suburbs	Agglomerations
1992	1563	2023	1121	1091	1189	1090	2505	2895	13477
1993	1778	2028	990	982	1046	1117	2044	2588	12573
1994	1481	2004	763	1040	873	1045	1819	2106	11131
1995	1359	2209	795	968	815	1283	1784	1838	11051
1996	1274	2250	649	991	796	1183	1694	1985	10822
1997	1128	2607	631	1079	811	1458	1569	1991	11274
1998	1055	3075	584	1307	785	1341	1641	2179	11967

Note: The environs of the respective cities were defined as follows Prague: Prague East and Prague West; Plzen: Plzen South, Plzen North and Rokycany; Brno: Brno-venkov; Ostrava: Novy Jicin, Opava Karvina, Frydek Mystek.

Table 4: Distribution of Observations by Number of Migrants

Number of migrants	No of Observations	Frequency	Cumulative Frequency
0	5226	12.77	12.77
1-10	25763	62.93	75.70
11-100	8553	20.89	96.59
101-1000	1373	3.35	99.95
>1000	22	0.05	100.00
Total	40937	100.00	

Note: 74 regions (okresy) excluding Sumperk, Bruntal and Jesenik

Table 5: Means and Standard Deviations of regression variables by year

Variable	1992	1993	1994	1995	1996	1997	1998
Migration	1447	1378	1222	1185	1116	1139	1179
	(1254)	(1287)	(1203)	(1283)	(1236)	(1320)	(1486)
Population	135727	135967	135962	135931	133966	133814	133701
	(137697)	(137952)	(137637)	(137413)	(136303)	(135748)	(135105)
Employment	45086	45060	43246	41100	39346	44701	43366
	(57427)	(49307)	(48465)	(49067)	(48912)	(57462)	(55565)
Employment in Agriculture	6583	4057	4113	2741.63	3798.63	2755.08	2516
	(2721)	(1885)	(1928)	(1450)	(1890	(1508)	(1356)
Employment in Industry	20870	22059.20	20960.74	15788.18	14820.06	17160.95	16670
	17978	(17938.69)	(16382.93)	(11621.31)	(10975.49)	(12276.76)	(11423.00)
Nominal Wages	4376	5557.53	6509.84	7669.11	9072.39	10001.01	10827
	(343)	(442.08)	(549.60)	(652.03)	(888.93)	(1000.87)	(1054.00)
Unemployment rate	2.90	3.90	3.38	3.12	3.79	5.63	7.81
	(1.40)	(1.93)	(1.72)	(1.65)	(1.90)	(2.51)	(3.04)
Vacancies	1044	710	1008	1159	1091	809	489
	(2101)	(1566)	(1632)	(1603)	(1316)	(835)	(591)
Dwellings completed	1585	1413	1105	782.17	538	503	621
during the last 3 years	(2045)	(2109)	(1831)	(1400)	(947)	(625)	(822)
Flow from Moravia to Bohemia [a)]	0.44	0.44	0.44	0.44	0.44	0.44	0.44
Neighbor [a)]	0.06	0.06	0.06	0.06	0.06	0.06	0.06

Note: a) Indicator variables standard deviation is given by sqrt(mean*(1-mean)), all data for 74 regions (okresy) excluding Sumperk, Bruntal and Jesenik

Table 6: Estimation results for the equation 7

	1992-1998	1992 – 1994	1996 - 1998
ln (staying population)	1.215***	1.189***	1.151***
	(0.096)	(0.172)	(0.202)
ln (distance)	-1.172***	-1.143***	-1.204***
	(0.009)	(0.014)	(0.014)
Neighbour	0.959***	0.971***	0.940***
	(0.016)	(0.025)	0.025
Moravia – Bohemia	-0.267***	-0.283***	-0.263***
	(0.011)	(0.017)	0.017
structural difference	0.020***	0.020***	0.026***
	(0.005)	(0.009)	(0.008)
ln wage in sending region	0.241	-0.141	-0.217
	(0.154) [a)]	(0.307)	(0.473)
ln wage in receiving region	0.206	0.162	1.001**
	(0.157) [a)]	(0.327)	(0.493)
ln unemployment rate receiving region	0.001	-0.070	0.081
	(0.021)	(0.045)	(0.054)
ln unemployment rate sending region	0.029	0.017	-0.016
	(0.019)	(0.040)	(0.046)
ln vacancy rate in receiving region	0.071***	0.072**	0.005
	(0.014) [c)]	(0.028)	(0.024)
ln vacancy rate in sending region	0.001	-0.013	-0.021
	(0.014) [c)]	(0.027)	(0.024)
ln housing availability in sending region	0.001	-0.027	-0.017
	(0.016) [c)]	(0.045)	(0.036)
ln housing availability in receiving region	0.060***	-0.015	0.027
	(0.016) [c)]	(0.053)	(0.036)
ln industrial employment share in sending region	0.011	0.169*	0.039
	(0.058)	(0.102)	(0.140)
ln industrial employment share in receiving region	-0.067	-0.069	-0.186
	(0.057)	(0.102)	(0.141)
ln agricultural employment share in sending region	0.006	0.006	0.012
	(0.018)	(0.048)	(0.027)
ln agricultural employment share in receiving region	-0.045***	-0.104*	0.050**
	(0.018)	(0.049)	(0.027)
y98	-0.688***		
	(0.205)		
y97	-0.679***		0.075
	(0.187)		(0.068)
y96	-0.641***		0.143
	(0.165)		(0.147)
y95	-0.541***	-0.271	
	(0.125)	(0.186)	
y94	-0.380***	-0.118	
	(0.091)	(0.113)	
y93	-0.188***		
	(0.057)		
Log Likelihood	-120109	-61064	-67672
No- Observations	37807	16203	16203

Notes: Data on 74 regions (okresy) excluding Sumperk, Bruntal and Jesenik. Values in brackets are standard errors of the estimate, specification includes fixed effects for each sending and each receiving region as in (7) these are not reported, the log-likelihood of an estimation with only sending and receiving region fixed effects is -131572 and its Pseudo R2 0.04*** (**) (*) signify significance at the 1%, 5% and 10% level, respectively. [a) b) c)] Indicate that for the respective variable the coefficient of the sending region variable differs significantly from that of receiving regions at the 10%, 5%, 1% level respectively.

Table 7: Results of a Decomposition of the decline in Migration

	Baseline model[a)]	Bilateral fixed effects[b)]
Parameter Changes	- 5607.51	-5676.47
Variable Changes Combined Effect of		
Population of sending district	15.18	11.32
Structural differences	5.14	2.17
Sending and receiving region wages	3835.18	3464.24
Sending and receiving region unemployment rates	373.03	421.74
Sending and receiving vacancy rates	47.86	23.08
Sending and receiving region dwellings	-51.09	-114.95
Sending and receiving region industry share	106.95	424.23
Sending and receiving region agriculture share	-357.46	-3.46
Total Variable Change	3974.79	4228.38
Total Predicted Change (variables and parameters)	- 1632.72	- 1448.09
Actual Change	- 1335	- 1335

Note: The table reports predicted increase in log of migration from 1992 to 1998. a) see table 6 for full model b) see table A1 in the appendix for results with bilateral fixed effects.

Appendix: Table A1: Estimation results for an Alternative Model with bilateral fixed effects

	Overall Time Period	**1992 –94**	**1996 – 98**
ln (staying population)	0.711***	0.897***	0.858***
	(0.034)	(0.066)	(0.073)
structural difference	0.011	0.026*	0.011
	(0.008)	(0.014)	(0.014)
ln wage in sending region	0.143	0.080	-0.402
	(0.088) [c)]	(0.209)	(0.283) [c)]
ln wage in receiving region	0.332	0.355*	1.214***
	(0.197) [c)]	(0.211)	(0.248) [c)]
ln unemployment rate receiving region	-0.075***	-0.132***	0.060*
	(0.014) [b)]	(0.029) [c)]	(0.031)[a)]
ln unemployment rate sending region	0.028**	-0.009	0.022
	(0.013) [b)]	(0.030) [c)]	(0.030)[a)]
ln vacancy rate in receiving region	0.071***	0.076***	0.018
	(0.011) [c)]	(0.020) [b)]	(0.017)
ln vacancy rate in sending region	-0.010	-0.019	-0.009
	(0.011) [c)]	(0.020) [b)]	(0.018)
ln in housing availability in sending region	0.004	-0.011	-0.004
	(0.012) [c)]	(0.036)	(0.025)
ln housing availability in receiving region	0.049***	-0.037	0.028
	(0.012) [c)]	(0.034)	(0.025)
ln industrial employment share in sending region	0.009	0.254***	-0.086
	(0.037) [c)]	(0.067)	(0.091)
ln industrial employment share in receiving region	-0.189***	-0.298***	-0.509***
	(0.037) [c)]	(0.065)	(0.088)
ln agricultural employment share in sending region	-0.012	-0.027	0.001
	(0.012) [c)]	(0.027) [c)]	(0.019)
ln agricultural employment share in receiving region	-0.110***	-0.179***	0.002
	(0.011) [c)]	(0.026) [c)]	(0.018)
y98	-0.982***		
	(0.121)		
y97	-0.979***		0.143
	(0.111)		(0.141)
y96	-0.897***		0.328
	(0.099)		(0.287)
y95	-0.790***		
	(0.073)		
y94	-0.512***	-0.448***	
	(0.055)	(0.122)	
y93	-0.260***	-0.219***	
	(0.034)	(0.071)	
log Likelihood	-80146	-24028	-25998
No- Observations	37807	16203	16203

Notes: Values in second row are standard errors of the estimate, specification includes bilateral fixed effects *** (**) (*) signify significance at the 1%, 5% and 10% level, respectively. [a)] [b)] [c)] Indicate that for the respective variable the coefficient of the sending region variable differs significantly from that of receiving regions at the 10%, 5%, 1% level respectively

Appendices (not for Publication)

Appendix 2: Results for further variables & excluding the Moravia-Bohemia variable

Aside from the results reported in the main text we experimented with a number of additional variables which could be deemed important in migration. In particular to proxy for differences in regional amenities between regions various indicators on the differences in emission of hazardous wastes between different locations. Emission of solid waste, SO2 and NOx in tons per square kilometre were employed. To capture differences in amenities associated with the provision of public infrastructure the number of upper secondary education institutions per inhabitant as were included. Finally, the number of licensed enterprises was employed as an additional proxy for expectations of future development, since literature suggests that enterprise formation is high where expectations of the future are good.

Table A1.1. displays the descriptive statistics for these variables and documents increasing private sector activity as measured by the number of licensed private enterprises – a fact which results from the substantial number of new start-ups registered at the beginning of transition, and decreasing emissions of hazardous wastes, which can in part be attributed to declining industrial production and in part to increased investments in environmental quality.

Table A1.1: Means and Standard Deviations of regression variables by year

Variable	1992	1993	1994	1995	1996	1997	1998
No of licensed Entrepreneurs	13298 (23450)	14915 (22920)	12692 (17584)	16362 (29901)	16531 (22770)	16213 (22400)	19729 (26396)
Emission of Solid Wastes (tons per square kilometre)	9.10 (24.19)	7.13 (20.26)	5.81 (15.69)	4.27 (12.26)	2.64 (7.98)	2.35 (7.52)	1.40 (4.34)
Emission of SO2 (tons per square kilometre)	28.37 (68.58)	24.15 (59.70)	22.37 (56.54)	19.74 (54.96)	18.74 (52.33)	16.08 (42.78)	12.55 (31.70)
Emission of Nox (tons per square kilometre)	10.83 (25.35)	9.77 (22.46)	7.54 (17.49)	4.66 (10.65)	4.52 (10.82)	4.04 (9.85)	3.56 (8.75)
Number of upper secondary schools	11.35 (10.50)	11.91 (13.18)	14.02 (16.31)	16.39 (19.73)	18.34 (21.66)	15.27 (20.58)	14.55 (19.17)

Results concerning the impact of environmental variables on migration show that higher NOx emissions as well as higher solid waste emissions in the receiving region lead to higher immigration and higher emissions of SO_2 in the sending region lead to lower emigration. Thus on net, migration was from less to more polluted regions rather than in the opposite direction. This may be explained by potential co-linearities with other important aspects of regional development in the Czech Republic. In particular in the early phases of transition urban regions and agglomerations developed substantially better than other regions. To the extent that pollution captures such agglomerations, this could explain results. Also the reductions in emissions in the Czech Republic to some degree reflect the economic development in industry, again this may lead to measurement problems, since it was often argued that the absence of restructuring in the early phases in transition kept unemployment artificially low. The unexpected sign in emission could reflect production losses – and thus hidden

unemployment – rather than differences in environmental quality. The differences in the number of schools per inhabitant between sending and receiving regions and the number of private enterprises per inhabitant, remained insignificant.

Table A1.2: Full Estimation results for the full observation Period (including environmental variables, school availability and privatization indicators)

	Overall Period		1992-1994		1996-1998	
	Coefficient	Std. Error	Coefficient	Std. Error	Coefficient	Std. Error
ln (staying population)	1.273***	0.108	1.119***	0.203	0.886***	0.255
ln (distance)	-1.172***	0.009	-1.148***	0.014	-1.204***	0.014
Neighbour	0.959***	0.016	0.973***	0.025	0.940***	0.025
Moravia – Bohemia	-0.267***	0.011	-0.281***	0.017	-0.263***	0.017
structural difference	0.020***	0.005	0.021***	0.009	0.025***	0.008
ln wage in sending region	0.217	0.156[a)]	-0.118	0.315	-0.399	0.480
ln wage in receiving region	0.166	0.158[a)]	0.150	0.339	0.789**	0.317
ln unemployment rate receiving region	0.000	0.021	-0.077*	0.046	0.083	0.054
ln unemployment rate sending region	0.025	0.019	0.036	0.042	0.009	0.052
ln vacancy rate in receiving region	0.074***	0.014[c)]	0.071**	0.028	0.006	0.025
ln vacancy rate in sending region	0.000	0.014[c)]	-0.015	0.028	-0.009	0.025
ln in housing availability in sending region	0.004	0.016[c)]	-0.019	0.046	-0.010	0.036
ln in housing availability in receiving region	0.065***	0.016[c)]	-0.022	0.053	0.031	0.036
ln in industrial employment share in sending region	0.012	0.059	0.192	0.104	0.098	0.142
ln in industrial employment share in receiving region	-0.053	0.058	-0.057	0.104	-0.181	0.143
ln agricultural employment share in sending region	0.013	0.018	-0.002	0.049	0.014	0.027
ln agricultural employment share in receiving region	-0.041**	0.018	-0.089*	0.049	0.039	0.027
Ln in nox emissions (sending region)	-0.029**	0.011[c)]	-0.007	0.021	-0.043*	0.025
(Ln in nox emissions (receiving region)	-0.020*	0.011[c)]	-0.038*	0.022	0.009	0.025[a)]
Ln in solid waste emissions (sending region)	-0.025***	0.009[b)]	-0.028	0.019[a)]	-0.013	0.018[a)]
Ln in solid waste emissions (receiving region)	-0.005	0.009[b)]	-0.019	0.019[a)]	-0.013	0.019
Ln in so2 emissions (sending region)	0.006	0.009[b)]	-0.008	0.020	0.012	0.017
Ln in so2 emissions (receiving region)	0.024***	0.009[b)]	0.034	0.021	0.028	0.017
ln in school provision (sending region)	0.016	0.024	0.046	0.053	0.070	0.047
ln in school provision (receiving region)	0.021	0.028	0.050	0.059	-0.103	0.071
ln in small scale enterprises (sending region)	-0.018	0.033	0.028	0.046	-0.148	0.101[b)]
ln in small scale enterprises (receiving region)	0.007	0.032	-0.037	0.045	-0.145	0.095[b)]
y98	-0.680***	0.210			0.003	0.075
y97	-0.668***	0.190			0.059	0.151
y96	-0.641***	0.167	-0.311	0.194		
y95	-0.535***	0.126	-0.134	0.119		
y94	-0.370***	0.092				
y93	-0.169***	0.058				
log Likelihood	-106246		-47169		-43862	
Pseudo R2	0.22		0.22		0.23	
No- Observations	37807		16203		16203	
Schwartz IC	-184021		-60993		-58606	

Notes: Values in second row are standard errors of the estimate, specification includes sending and receiving region fixed effects *** (**) (*) signify significance at the 1%, 5% and 10% level, respectively. [a) b) c)] Indicate that for the respective variable the coefficient of the Sending region variable differs significantly from that of receiving regions at the 10%, 5%, 1% level respectively.

The main findings in the paper are confirmed by these additional estimates, however. The stylized facts of increased significance of wage differentials, reduced significance of unemployment and vacancy rates as well as

a lower coefficient on distance between regions hold. This is also the case for specifications in which the dummy variable for migration between Moravia and Bohemia was excluded (see Table A2.3)

We also included additional characteristics of the sending regions, since we were concerned that if certain groups of the population are less mobile than others and if these groups are not evenly distributed across regions, this may result in biased estimates of the original specification. Since literature suggests that aside from macroeconomic variables, personal characteristics such as sex may have an important impact on the migration decision, we control for differences in the demographic composition of the sending regions population by including in our regressions the share of female population in a region as well as the share of handicapped, and school leavers among the unemployed, in order to control for differences in the search effectiveness of the unemployed of a region.

Table A2.3. Estimation results on (7) excluding dummy variable between Moravia-Bohemia

	Overall Period		1992-1994		1996-1998	
	Coefficient	Std. Dev	Coefficient	Std. Dev	Coefficient	Std. Dev
ln (staying population)	1.175***	0.097	1.153***	0.173	1.143***	0.204
ln (distance)	-1.299***	0.007	-1.279***	0.011	-1.329***	0.011
Neighbour	0.875***	0.016	0.881***	0.025	0.858***	0.024
Structdi	0.030***	0.005	0.032***	0.009	0.034***	0.008
ln wage in sending region	-0.109	0.113	-0.138	0.309	-0.193	0.478
ln wage in receiving region	-0.156	0.114	0.169	0.330	1.018**	0.498
ln unemployment rate receiving region	-0.011	0.020	-0.067	0.046	0.077	0.055
ln unemployment rate sending region	0.014	0.019	0.018	0.040	-0.019	0.047
ln vacancy rate in receiving region	0.070**	0.014	0.072**	0.028	0.005	0.024
ln vacancy rate in sending region	-0.002	0.014	-0.015	0.028	-0.020	0.024
ln in housing availability in sending region	0.009	0.016	-0.031	0.045	-0.018	0.036
ln in housing availability in receiving region	0.069***	0.016	-0.016	0.053	0.024	0.036
ln in industrial employment share in sending region	-0.009	0.058	0.165	0.103	0.042	0.142
ln in industrial employment share in receiving region	-0.095*	0.057	-0.075	0.103	-0.181	0.143
ln agricultural employment share in sending region	0.010	0.018	0.009	0.049	0.019	0.027
ln agricultural employment share in receiving region	-0.044**	0.019	-0.102***	0.049	0.054*	0.027
y93	0.001	0.017	-0.117	0.114		
y94	-0.077***	0.017	-0.271	0.187		
y95	-0.129***	0.026				
y96	-0.097***	0.028			0.140	0.149
y97	-0.053***	0.018			0.075	0.069
y98	-0.038	0.024				
log Likelihood	-106525		-47311		-43991	
No- Observations	37807		16203		16203	

Notes: Values in second row are standard errors of the estimate, specification includes sending and receiving region fixed effects *** (**) (*) signify significance at the 1%, 5% and 10% level, respectively.

These variables remain insignificant. Neither the share of handicapped unemployed and unemployed graduates in total unemployment nor the share of female population has a significant impact on the migration between regions in the Czech Republic. Furthermore, their impact on other variables in the regression remains small (see: Table A2.4).

Finally, we estimated a model where sending and receiving region parameters were restrained to be equal . This model too suggests increased significance of wage differentials, reduced significance of unemployment and vacancy rates as well as a lower coefficient on distance between regions.

Table A2.4. Results including sending region population Characteristics

	Overall Period		1992-1994		1996-1998	
	Coefficient	Std. Dev	Coefficient	Std. Dev	Coefficient	Std. Dev
ln (staying population)	1.223***	0.098	1.157***	0.181	1.129***	0.215
ln share of female population (sending region)	0.664	0.781	1.387	2.955	-4.105	5.689
ln share of handicapped unemployed (sending region)	-0.018	0.025	-0.101	0.044	0.015	0.063
Ln share of unemployed graduates (sending region)	0.005	0.016	-0.001	0.025	-0.025	0.057
ln (distance)	-1.172***	0.009	-1.143	0.014	-1.204	0.014
Neighbour	0.959***	0.016	0.972	0.025	0.940	0.025
Moravia – Bohemia	-0.267***	0.011	-0.283	0.017	-0.263	0.017
structural difference	0.020***	0.005	0.020	0.009	0.026	0.008
ln wage in sending region	0.215	0.158	-0.154	0.314	-0.181	0.495
ln wage in receiving region	0.206	0.157	0.161	0.327	0.996**	0.493
ln unemployment rate receiving region	0.001	0.021	-0.070*	0.045	0.081	0.054
ln unemployment rate sending region	0.021	0.021	-0.011	0.042	-0.012	0.049
ln vacancy rate in receiving region	0.071***	0.014	0.072**	0.028	0.005	0.024
ln vacancy rate in sending region	0.003	0.014	0.001	0.029	-0.015	0.025
ln in housing availability in sending region	0.001	0.016	-0.027	0.045	-0.015	0.036
ln in housing availability in receiving region	0.060	0.016	-0.015	0.053	0.027	0.036
ln in industrial employment share in sending region	0.003	0.058	0.197*	0.104	0.042	0.143
ln in industrial employment share in receiving region	-0.068	0.057	-0.070	0.102	-0.185	0.141
ln agricultural employment share in sending region	0.006	0.018	-0.018	0.049	0.012	0.027
ln agricultural employment share in receiving region	-0.045**	0.018	-0.103**	0.049	0.051*	0.027
y93	-0.180***	0.058	-0.123	0.114		
y94	-0.366***	0.093	-0.255	0.187		
y95	-0.522***	0.128				
y96	-0.615***	0.170			0.141	0.148
y97	-0.652***	0.191			0.073	0.068
y98	-0.658***	0.210				
log Likelihood	-106239		-47173		-43872	
No- Observations	37807		16203		16203	

Notes: Values in second row are standard errors of the estimate, specification includes sending and receiving region fixed effects *** (**) (*) signify significance at the 1%, 5% and 10% level, respectively.

Table A2.5. Results of a model with equal sending and receiving region variables

	Overall Time Period		1992 –94		1996 – 98	
	Coefficient	Std. Dev	Coefficient	Std. Dev	Coefficient	Std. Dev
ln (staying population)	1.144***	0.085	1.132***	0.148	1.109***	0.169
ln (distance)	-1.172***	0.009	-1.144***	0.014	-1.204***	0.014
neighbour	0.960***	0.016	0.971***	0.025	0.939***	0.025
Moravia – Bohemia	-0.267***	0.011	-0.282***	0.017	-0.263***	0.017
structural difference	0.021***	0.005	0.021***	0.009	0.023***	0.008
ln wage differentials	-0.017	0.110	0.123	0.221	0.612**	0.337
ln unemployment rate differentials	-0.014	0.014	-0.039	0.029	0.048	0.035
ln vacancy rate differential	0.035***	0.010	0.043**	0.020	0.013	0.017
ln differentials in housing construction	0.029***	0.011	0.013	0.034	0.022	0.025
ln employment share in industry differential	-0.040	0.041	-0.116	0.072	-0.111	0.099
ln employment share in agriculture differential	-0.026**	0.013	-0.057*	0.034	0.019	0.018
y93	-0.091***	0.014	-0.087***	0.014		
y94	-0.202***	0.014	-0.195***	0.014		
y95	-0.267***	0.014				
y96	-0.323***	0.014			-0.015	0.014
y97	-0.316***	0.014			-0.020	0.014
y98	-0.301***	0.014				
log Likelihood	-106252		-47179		-43874	
No- Observations	37807		16203		16203	

Notes: Values in second row are standard errors of the estimate, specification includes sending and receiving region fixed effects *** (**) (*) signify significance at the 1%, 5% and 10% level, respectively.

Appendix 3: Influence of estimation period

In the main part of the text we omit the year 1995 from estimation. We were concerned that this may have an impact on results. For this reason we experimented with including the year 1995 in both the first and second sub-period in the main part of the paper (see: Table 3.1). This has only little impact on the estimation results.

Table A3.1 Results when changing sub-periods

1992 to 1995			1995 to 1998		
	Coefficient	Std Dev		Coefficient	Std Dev
ln (staying population)	1.226***	0.132	ln (staying population)	1.243***	0.166
ln (distance)	-1.152***	0.012	ln (distance)	-1.199***	0.012
neighbour	0.971***	0.022	neighbour	0.946***	0.021
Moravia – Bohemia	-0.274***	0.015	Moravia – Bohemia	-0.260***	0.015
structural difference	0.016	0.007	structural difference	0.021***	0.007
ln wage in sending region	-0.052	0.252	ln wage in sending region	-0.066	0.311
ln wage in receiving region	0.139	0.263	ln wage in receiving region	0.835**	0.196
ln unemployment rate receiving region	-0.032	0.032	ln unemployment rate receiving region	0.061	0.040
ln unemployment rate sending region	0.012	0.030	ln unemployment rate sending region	-0.008	0.035
ln vacancy rate in receiving region	0.044**	0.019	ln vacancy rate in receiving region	0.030	0.020
ln vacancy rate in sending region	-0.016	0.023	ln vacancy rate in sending region	-0.023	0.020
ln in housing availability in sending region	-0.013	0.031	ln in housing availability in sending region	-0.005	0.025
ln in housing availability in receiving region	0.007	0.035	ln in housing availability in receiving region	0.051**	0.025
ln in industrial employment share in sending region	0.091	0.082	ln in industrial employment share in sending region	-0.024	0.108
ln in industrial employment share in receiving region	0.025	0.082	ln in industrial employment share in receiving region	-0.086	0.107
ln agricultural employment share in sending region	0.011	0.030	ln agricultural employment share in sending region	0.016	0.024
ln agricultural employment share in receiving region	-0.110***	0.030	ln agricultural employment share in receiving region	0.023	0.024
y93	-0.087	0.091	y95	0.187	0.170
y94	-0.178	0.149	y96	0.055	0.096
y95	-0.236	0.210	y97	0.032	0.045
log Likelihood	-62142			-58796	
No- Observations	21604			21604	

Notes: Values in second row are standard errors of the estimate, specification includes sending and receiving region fixed effects *** (**) (*) signify significance at the 1%, 5% and 10% level, respectively.

Finally, we also estimated year by year regressions. In this case we are not able to identify a full set of bilateral variables. Our specification in thus reads $\ln(M_{ij}) = \theta Y_{ij}$ (See tables A3.2). Substantial research (see: Alecke et al, 2001, Egger, 2002, Cheng and Wall, 2001) suggests that the omission of sending and/or receiving region fixed effects results in biased estimates due to omitted variables. The evidence presented in this appendix suggests that this bias is important. Relative to the results reported in the main part of the text a number of coefficients change signs while others lose significance and yet others gain significance. Furthermore, parameters become increasingly instable as we omit or include variables in these specifications. This suggest that not only do the specifications reported result in omitted variable bias, but they also increase the problem of multicolinearity in estimates

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Table A3.1 Results of year by year regressions

	1992		1993		1994		1995		1996		1997		1998	
	Coeff.	Std Dev	Coeff.	Std Dev	Coeff.	Std Dev	Coeff.	Std Dev	Coeff.	Std Dev	Coeff.	Std Dev	Coeff.	Std Dev
ln (staying population)	0.522	0.036	0.701	0.034	0.716	0.034	0.745	0.033	0.789	0.033	0.777	0.034	0.771	0.038
ln (distance)	-1.004	0.025	-1.010	0.024	-1.040	0.025	-1.049	0.024	-1.022	0.024	-1.039	0.024	-1.020	0.024
neighbour	1.116	0.051	1.110	0.049	1.049	0.050	1.101	0.049	1.096	0.049	1.094	0.048	1.147	0.048
Moravia – Bohemia	-0.191	0.032	-0.334	0.031	-0.304	0.031	-0.276	0.031	-0.356	0.031	-0.327	0.030	-0.348	0.030
structural difference	-0.007	0.015	0.037	0.016	0.020	0.016	0.029	0.014	0.056	0.016	0.027	0.013	0.019	0.013
ln wage in sending region	1.182	0.224	0.831	0.238	-0.007	0.232	-0.227	0.236	0.323	0.248	0.335	0.223	-0.330	0.203
ln wage in receiving region	1.118	0.221	1.551	0.234	0.533	0.232	0.941	0.231	1.778	0.241	1.584	0.213	1.240	0.196
ln unemployment rate receiving region	0.014	0.024	-0.013	0.025	-0.017	0.023	0.067	0.022	0.050	0.027	0.116	0.033	0.203	0.040
ln unemployment rate sending region	0.155	0.023	0.156	0.025	0.112	0.022	0.130	0.022	0.205	0.027	0.257	0.032	0.271	0.040
ln vacancy rate in receiving region	-0.139	0.026	-0.140	0.028	-0.131	0.032	-0.016	0.034	-0.103	0.031	-0.010	0.031	-0.074	0.025
ln vacancy rate in sending region	0.056	0.028	0.008	0.029	0.051	0.033	0.059	0.034	0.084	0.031	-0.016	0.030	0.066	0.027
ln in housing availability in sending region	0.070	0.032	-0.007	0.029	-0.095	0.032	-0.122	0.037	0.074	0.037	0.159	0.039	0.131	0.043
ln in housing availability in receiving region	0.065	0.032	0.165	0.028	0.109	0.030	-0.085	0.037	-0.080	0.038	0.080	0.040	0.307	0.041
ln in industrial employment share in sending region	-0.835	0.063	-0.692	0.067	-0.665	0.074	-0.575	0.058	-0.354	0.058	-0.288	0.062	-0.353	0.061
ln in industrial employment share in receiving region	-1.220	0.060	-1.093	0.065	-0.918	0.074	-1.007	0.057	-0.731	0.058	-0.848	0.060	-0.955	0.056
ln agricultural employment share in sending region	-0.224	0.026	-0.139	0.026	-0.152	0.028	-0.117	0.021	-0.098	0.027	-0.111	0.020	-0.162	0.020
ln agricultural employment share in receiving region	-0.473	0.023	-0.358	0.024	-0.402	0.024	-0.275	0.019	-0.188	0.027	-0.190	0.019	-0.228	0.018
constant	-20.689	2.647	-23.878	2.852	-8.353	2.852	-11.452	2.894	-23.327	3.075	-20.758	2.753	-11.181	2.573
log Likelihood														
No- Observations														

Coeff-estimated coefficient, Std. Dev.- Standard deviation of the estimated coefficient

Inter – regional Mobility in Europe: A Note on the Cross – Country Evidence

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Abstract

This paper uses data covering 11 EU countries and 4 candidate countries to explain cross national differences in internal migration. We find that 89% of the variance in gross migration in current member states can be explained by variations in employment protection, international migration and the share of ownership occupied housing. Results concerning net migration rates, suggest that although disparities in unemployment are important determinants of the extent of net migration so are employment protection, long term unemployment and the share of owner occupied housing. When including candidate countries results are less robust.

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

JEL – Classification: P25, J61

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Introduction

A number of recent contributions suggest that migration is low in Europe. Decressin and Fatas (1995), Fatas (2000) as well as Obstfeld and Peri (2000) and Puhani (2001) all find that it may take several years or even decades before regional unemployment disparities are evened by migration. This is somewhat of a puzzle in the light of high regional disparities in Europe. According to economic theory (e.g. Todaro, 1969) migrants move from low expected income to high expected income regions to maximise lifetime utility. Thus migration incentives should increase with rising regional disparities. A number of explanations such as inefficiencies in spatial matching (e.g. Faini et al, 1997), the effects of social transfers on the search incentives of the unemployed (e.g. Fredriksson, 1999), housing market imperfections (e.g. Cameron and Muellbauer, 1998) and cultural differences as reflected for instance in attitudes towards risk (Bentivogli and Pagano, 1999) have been put forward to account for this puzzle.

But even among European countries internal migration varies substantially. In Denmark around 3.5% of the population move across regional borders per year, in Portugal only 0.19%. Furthermore, comparative studies (see Crozet 1999, Fidrmuc 2003, Everdeen 2003, Puhanyi, 2001) find substantial variation in the responsiveness of migration to regional disparities among countries. Empirical investigations on the causes for these differences are rare, however. Bentivogli and Pagano (1999) present the only study we know of, providing an explanation of differences between Europe and the US. They find Europeans are more risk averse than citizen of the US.

This note augments this literature by using data from 11 EU countries (Spain, Italy, Germany, Belgium, Netherlands, Sweden, UK, Finland, Austria, Denmark and Portugal) and 4 member states (Poland, Czech Republic, Hungary, Slovenia). In contrast to previous work we focus directly on the cross country variance in migration in an attempt to gauge the impact of alternative national characteristics such as labour market institutions, black market activity, housing market characteristics and social security systems on internal mobility. Furthermore, we overcome the loss in degrees of freedom resulting from this approach by using methods of bayesian averaging of regressions recently used in the growth literature (e.g. Sala-i-Martin, 1997).

Data

For the EU countries migration data was taken data from the Cronos database. For the candidate countries the primary source of information were regional yearbooks (Hungary, Poland) or regional parts of national statistical yearbooks (Slovenia). For the Czech Republic unpublished data was provided by the Czech statistical office (see

Fidrmuc and Huber, 2003). While the data vary to some degree in scope and content[1], we cover the time period from 1983 to 1999 for most of the EU countries and the 1990's for the candidate countries.

Table 1: Migration indicators by country and year

Country	Region Size (inhabitants)[1)]	Time period available	Gross Migration		Net Migration		Correlation[1)]	Flows between neighbour regions	
			First Year	Last Year	First Year	Last Year		share	Relative[2)]
Germany	6,170.92	1983-1990	1.32	1.06	0.07	0.17	0.35	60.94	2.39
UK	2,576.75	1985-1996	1.58	1.72	0.13	0.10	0.96	60.20	2.11
Belgium	1,133.76	1983-1995	0.92	0.99	0.02	0.06	0.93	45.78	1.83
Spain	2,187,28	1983-1999	0.45	0.60	0.08	0.07	-0.34	31.56	1.76
Italy	2,879.40	1983-1999	0.77	0.50	0.09	0.08	0.85	30.60	1.71
Netherlands	1,308.93	1983-1999	1.67	1.67	0.07	0.07	0.98	63.47	1.90
Finland	858,92	1983-1999	1.23	0.76	0.10	0.08	0.97	65.39	1.63
Portugal	1,144.50	1985-1992	0.19	0.32	0.04	0.07	-0.30	55.91	2.35
Sweden	1,106.38	1983-1999	1.50	1.58	0.06	0.15	0.93	50.62	1.49
Austria	899.19	1995-1999	0.89	0.93	0.05	0.05	0.92	63.33	2.23
Denmark	354.79	1990-1999	3.48	3.41	0.08	0.09	0.87	57.50	1.98
Czech Rep.	1,286.87	1992-1998	0.57	0.48	0.009	0.07	0.73	63.65	1.36
Slovenia	165.92	1996-1998	0.28	0.30	0.02	0.02	0.82	71.81	2.49
Poland	798.12	1992-1997	1.23	1.08	0.06	0.05	0.83	-	-
Hungary	899.19	1992-1999	1.96	2.18	0.16	0.17	0.68	-	-

Notes: 1) the column reports correlation coefficients of net migration rates of regional units for the first and last period of the data set 2) share relative to the share of neighbourhood relationships. – not available

Descriptive analysis suggests that inter regional migration in Europe is ineffective in reducing regional disparities. A substantial part of flows is between neighbouring regions and migration rates are highly correlated over time. The correlation between net migration rates at the beginning and the end of the observation period is between 0.7 and 0.9 in most countries. The only countries where substantial changes to migratory patters occurred are Spain and Portugal. Also between 30% and 70% of all flows are between neighbouring regions. Thus these flows exceed the share of neighbourhood relationships by a factor of between 1.5 and 2.5 (see Table 1).[2] This casts doubts on the efficiency of migration in reducing regional disparities, since high correlations in migration suggest that it reflects a protracted adjustment to regional disparities (see Rappaport, 1999) and migration among neighbouring regions may be primarily motivated by housing motives, with residents of one

[1] See the Appendix for a detailed data description

[2] The share of migration among contingent regions may be influenced by a country's geography. Thus we measure the share of migration among contingent regions relative to the share of contingency relationships in a country. In a country with n regions there are n*(n-1) pairs of sending and receiving regions (migration within the region is not measured). If m of these region pairs are contingent the share of contingency relationships (s) is given by $s = \frac{m}{n(n-1)}$

region moving to another, without changing workplace. Such migration will obviously not contribute to reducing labour market disparities (see: Cameron and Muellbauer, 1998).

Table 2: Descriptive Statistics for variables included

	Mean	Standard Deviation.			Minimum	Maximum
		overall	between	Within		
ln(coeff. of variation in GDP)	-1.627	0.281	0.291	0.139	-2.340	-1.134
ln(unemployment rate)	2.107	0.468	0.444	0.205	1.363	3.015
ln (coeff. of variation in unemployment rates)	0.963	0.595	0.568	0.209	-0.308	1.968
ln (share population aged 20 -35	-1.487	0.058	0.048	0.036	-1.613	-1.379
ln(share population over 44)	-1.646	0.099	0.102	0.051	-1.884	-1.475
ln(share of net immigration from abroad)	0.348	0.668	0.854	0.288	-1.009	2.805
ln(average area of a region)	9.431	1.089	1.132	0.000	7.163	10.847
ln(average population of a region)	7.319	0.863	0.934	0.014	5.109	8.675
ln (share of neighbourhood relationships)	3.181	0.354	0.395	0.000	2.323	3.838
ln(employment protection)	0.930	0.462	0.414	0.068	-0.357	1.386
ln(replacement rate)	3.303	0.985	0.729	0.506	-0.472	4.210
Ln(share of owner occupied housing)	4.054	0.225	0.219	0.040	3.638	4.350
ln(share of black market in GDP)	2.815	0.313	0.338	0.105	2.212	3.318
ln(long term unemployed in % of unemployed)	3.727	0.432	0.406	0.173	2.251	4.298

The data also confirm the finding of low migration rates in Europe. In average less than 1% of the population change region of residence within a year. Most of this migration is due to churning. Net migration rarely exceeds 0.1% of the population.[3] Furthermore, gross migration rates have declined in all candidate countries but Slovenia and a number of member states (Germany, Italy and Finland).The variation among countries is large, however. Gross migration rates range from 1.7% (Netherlands) to 0.19% (Portugal) and net migration rates from almost 0.2% (Germany) to less than 0.01% (Czech Republic).

Migration theory has proposed a number of variables, which could potentially explain this variance. We thus augment the data by information concerning regional unemployment and income disparities (as measured by the coefficients of variation in unemployment rates and per capita GDP). We also include aggregate unemployment rates and shares of long term unemployment in unemployment, since Decressin (1994), Gordon (1985), Jackman and Savouri (1992) and Westerlund (1997) all find that high nation-wide unemployment rates discourage

[3] The gross migration rate is the share of population of a country changing place of residence within a year, the net migration rate is the sum (across all regions) of the absolute values of the difference between in and out migration in a region (see: Fredriksson, 1999). Differences between these two measures are due to churning.

internal migration.[4] As controls for differences in redistributive transfers, which have been considered a further factor reducing migration by some studies (see: Bode and Zwing (1998) for a survey) we use the average replacement rate. This was taken from Blanchard and Wolfers (1998) for the EU and Riboud et al (2002) for the candidate countries. As a proxy for the role of housing markets we use the share of owner occupied dwellings (from Oswald, 1999). This has been found a significant impediment to migration in a number of studies (e.g. Böheim and Taylor, 1999), also to control for potential unmeasured income components resulting from the black market economy, we use the share of the black market economy in % of GDP (from Schneider 2002, and 1999). Furthermore, internal migration may be influenced by international migration balance of a country (Borjas, 1999) or by institutions which impede on job turnover (OECD,1999). We thus use the net international immigration from abroad (including asylum seekers) as well as measures of employment protection (from Blanchard and Wolfers, 1999 and Riboud et al, 2002).

Finally, micro-econometric evidence (e.g. Stark and Taylor, 1991) suggests that demographic factors and geography may play a role in shaping migration. Older people have a lower probability of migrating, because for them the time to earn returns on migration is lower and countries with smaller regions and a higher share of neighbouring regions may have higher migration rates[5]. Thus the share of population aged 20 to 35 and older than 45 and controls for region size and geography (by the average population and area of a region and the log of the share of neighbourhood relationships[6]) are included.

Since data on labour market institutions are available on a five-year basis only, we follow Blanchard and Wolfers (1999) and aggregate all data by forming averages for each indicator for four periods 1983-1984, 1984-1989, 1990-1994 and 1995 to 1999. For housing we take the 1980 value for the first period, the 1985 value for the second period and so on. Descriptive statistics for the resulting data set are displayed in table 2.

Method

We use this data to estimate regressions of the form:

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[4] This can be explained by risk averse workers preferring security in existing employment to migration with uncertain prospects when unemployment is high everywhere, and losses in search effectiveness of long term unemployed (due to human capital losses or discouragement effects).

[5] This last effect is ambiguous, however, since more regions close to each other could also decrease migration if commuting is a substitute to migration

[6] This is defined as in Footnote 3 above

(1) $$\ln(m_{it}) = \lambda_t + \alpha X_{it} + \zeta_{it}$$

where m_{it} are the gross and net migration rates of country i in period t, X_{it} is a vector of explanatory variables for the same country and period, λ_t is a set of period specific intercepts, α are parameters to be estimated and ζ_{it} is an error term. A problem in estimating equation (1) is that there are only around 30 observations available. This leads to issues of multicolinearity and robustness of results across different specifications. We apply the method of Bayesian Averaging of Classical Estimates (BACE) recently proposed by Doppelhofer et al (2000) to overcome such problems. This consists of estimating each and every of the 2^k regressions conceivable in a model with k possible variables included. Doppelhofer et al (2000) show that under the assumption that the marginal prior density of model j (M_j) is normally distributed, choosing the appropriate diffuse prior and assigning equal prior probabilities to all models[7] the expectation of the posterior distribution of parameters can is given by

$E(\alpha \mid y) = \sum_{j=1}^{2^k} P(M_j \mid y)\hat{\alpha}_j$ and its variance as

$$Var(\alpha \mid y) = \sum_{j=1}^{2^k} P(M_j \mid y) Var(\alpha \mid y, M_j) + \sum_{j=1}^{2^k} P(M_j \mid y)\left[\hat{\alpha}_j - \sum_{j=1}^{2^k} P(M_j \mid y)\hat{\alpha}_j\right]^2 \text{ with:}$$

(2) $$P(M_j \mid y) = \frac{T^{-n_j/2} SSE_j^{-T/2}}{\sum_{i=1}^{2^k} T^{-n_i/2} SSE_i^{-T/2}}$$

where T is the number of observations, n the number of regressors included and SSE_i is the sum of squared errors in the regression.

In this setup there are a number of ways to judge the significance of results. In particular Doppelhofer et al (2000) suggest focusing posterior inclusion probabilities for a variable, which can be calculated by taking the sum of equation (2) across all specifications in which this variable is included, and on the sign certainty, which is measured as the percentage of the 2^k coefficient estimates for a variable with the same sign as the expectation of the posterior distribution of the parameters.

Results

The columns labelled (1) in Table 3 reports the posterior mean of the coefficient and its variance after running 16384 regressions for both gross and net migration rates. Since we lack data on housing ownership for candidate countries we estimate specifications for member states and all countries analysed separately. Also we report to

[7] Doppelhofer at al (2000) advise equal priors for all models when the number of potential regressors is small, as in our case.

what degree the posterior inclusion probability is higher than our prior (of 0.5) and estimates where the sign certainty is higher than 0.995 and 0.975 (which can be considered the equivalent to a two sided test for parameter significance at the 1% and 5% level in the standard regression framework).

Focusing first on the EU member states only, suggests that low internal migration in the EU is most robustly correlated with housing variables and employment protection. Furthermore, while regional unemployment disparities are only marginally significant for gross migration, they are robustly correlated with net migration rates. Regional income disparities have no role to play. Three variables (the share of immigration from abroad, employment protection and the share of owner occupied housing) are characterised by both high sign certainty and inclusion probability for gross migration rates. Three further variables are characterised by an increase of the posterior inclusion probability relative to the prior. With the exception of the average population of a region this increase in is modest, however. For the coefficient of variation of unemployment rates the posterior inclusion probability is 0.64 and for the share of neighbourhood relationships it is 0.86. For net migration rates four variables (the coefficient of variation of unemployment rates, employment protection, the share of long term unemployed and the share of owner occupied housing) have both a high sign certainty and an inclusion probability. For one more variable (share of neighbourhood relationships) the inclusion probability increases moderately relative to the prior to 0.60.

We were interested in how much of the variance of internal migration rates across countries can be explained by the robustly significantly variables. For this reason columns labelled (2) in table 3 report results when focusing on variables with an inclusion probability in excess of 0.9. These suggest that the four variables in the gross migration rate equation in total can explain around 89% of the variance in the data and the four robustly significant variables in the net migration equation around 79% for the EU. Furthermore, the parameters of this regression together with those in columns labelled (1) suggest that the share of owner occupied dwellings has by far the largest impact on internal migration rates. Reducing this share by 1% leads to an increase in the net migration rate of a country by 2% and the gross migration rate by between 1.9% to 1.4%. This suggests that housing market imperfections, which cause sales of housing to be associated with substantial capital losses may be a powerful explanation for low migration rates in Europe. A 1% higher employment protection score, by contrast, leads to a reduction of internal gross migration rates by about 1% and of net migration rates by 0.6%. This stronger impact on gross migration rates is in accordance with the view that employment protection leads to a reduction in migration via reducing job and worker turnover. Finally, both the robustly negative significant impact of long term unemployment and the positive effect of regional unemployment disparities lend some

support to hypotheses, which argue that long term unemployed are less search effective and that regional disparities increase net rather than gross migration.

Table 3: Regression Results

Dependent Variable	Ln(Gross Migration Rate)				Ln(Net Migration Rate)		
	Member States		Candidate Countries		Member States		Candidate Countries
	(1)	(2)	(1)	(2)	(1)	(2)	(1)
ln(coeff. of variation in GDP)	0.086		0.049		0.008		-0.008
	(0.182)		(0.215)		(0.090)		(0.139)
ln(unemployment rate)	0.064		0.081		-0.053		0.042
	(0.132)		(0.235)		(0.115)		(0.153)
ln (coeff. of variation in unemployment rates)	0.178		-0.098		0.810***	0.824***	0.021
	(0.186)$^{+}$		(0.220)		(0.178)$^{++}$	(0.129)	(0.130)
ln (share population aged 20 -35)	0.111		-1.074		0.373		-0.361
	(0.567)		(2.063)		(0.779)		(1.278)
ln(share population over 44)	0.105		0.082		-0.466		0.051
	(0.433)		(0.632)		(0.660)		(0.480)
ln(share of net immigration from abroad)	0.292***	0.322**	0.311**	0.104	0.000		0.136
	(0.118)$^{++}$	(0.120)	0.179^{++}	(0.163)	(0.107)		(0.154)$^{+}$
ln(average area of a region)	0.026		-0.126		0.035		0.114
	(0.068)		(0.146)$^{+}$		(0.075)		(0.130)$^{+}$
ln(average population of a region)	-0.438	-0.356***	-0.080		0.023		0.092
	0.098^{++}	0.064	(0.149)		(0.084)		(0.144)
ln (share of neighbourhood relationships)	-0.353		-0.672		-0.176		-0.359**
	(0.236)$^{+}$		(0.538)$^{+}$		(0.219)$^{+}$		(0.463)$^{+}$
ln(employment protection)	-1.156***	-0.939***	-0.835**	-0.808***	-0.514***	-0.513***	-0.174**
	(0.154)$^{++}$	(0.102)	(0.291)$^{++}$	(0.229)	(0.125)$^{++}$	(0.099)	(0.240)
ln(replacement rate)	0.003		0.072		-0.017		0.018
	(0.026)		(0.113)		(0.039)		(0.062)
ln(share of black market in GDP)	0.003		-0.121		0.017		-0.159
	(0.129)		(0.371)		(0.135)		(0.340)
ln(long term unemployment in % of unemployed)	-0.094		-0.565		-0.589**	-0.557***	-0.253
	(0.174)		(0.341)$^{+}$		(0.205)$^{++}$	(0.117)	(0.282)$^{+}$
Ln(share of owner occupied housing)	-1.855***	-1.403***			-2.096***	-2.149***	
	(0.379)$^{++}$	(0.213)			(0.343)$^{++}$	(0.296)	
Candidate Country (base Member state)			-0.492				-0.097
			(0.412)$^{+}$				(0.225)
Nobs	30	30	34	34	30	30	34
R2		0.890		0.340		0.785	
R2 only period dummies		0.088		0.050		0.050	

Notes: all specifications include time dummies which are not reported, Columns labelled (1): values in bracket are the standard deviations of the posterior mean of the variables.*** (**) sign certainty (share of estimated coefficients of the same sign as reported) larger than 0.99, (0.975), $^{++}$ posterior inclusion probability larger than 0.9, $^{+}$ posterior inclusion probability larger than 0.5. Columns labelled (2): Values in brackets are conventional standard errors of the estimate *** (**)variable significant at the 1% (5%) (10%) level.

When extending this analysis to candidate countries results are less robust. We find that in the gross migration equation – as for member states – the share of net migration from abroad and employment protection are characterised by a high posterior inclusion probability and a high sign certainty, but when including these two variables in a regression, only 34% of the variance are explained. Furthermore, in the net migration equation only few variables are characterised by a small increase in posterior inclusion probability. Finally, the dummy variable for candidate countries is characterised by slight increase in the posterior inclusion probability in the gross migration rate equation only.

This lack of robust correlates when including candidate countries may be caused by a number of factors. First, we lack measures of the share of house ownership for the candidate countries, which is one of the most

important influences on migration rates in the EU. This may lead to omitted variables biases in all regressions. Second, in constructing the data for candidate countries we were forced to use data from different sources than in the EU in a number of instances, which may impact on data comparability and thus increased measurement problems and third, candidate countries were characterised by substantial institutional change even in the 1995 to 1999 period included in this regression, which may make results inrobust.

Conclusions

This paper augments the literature on internal migration rates in EU countries by focusing on the cross national variance in internal migration. We find that 89% of the variance in gross migration in current member states can be explained by variations in employment protection, international migration and the share of ownership occupied housing and 79% of the variance in net migration rates can be explained by unemployment disparities, employment protection, long term unemployment and the share of owner occupied housing. Finally, when including candidate countries results are much less robust.

While thus results on the candidate countries thus remain inconclusive, probably to data problems, results for the European Union member states point to a strong role for explanations based on housing market imperfections high long term unemployment rates and excessive employment protection in explaining low migration in Europe. Furthermore, the results suggest that regional unemployment disparities create stronger migration incentives than regional income disparities.

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Appendix 1: Data Appendix

Dependent Variable

The migration data of this study come from the Eurotat REGIO Database for EU countries and regional statistical yearbooks for candidate countries (Poland, Hungary, Slovakia) and the Regional Part of the National statistical yearbooks of Slovenia. Place to place data for the Czech Republic was taken from Fidrmuc and Huber

(2003). We augmented this by the value for the Netherlands provided in Table 2.12 (p53) of the OECD Employment Report 2000 (1980 value of the table is taken for 1983-1984)[8]

Data for the candidate countries was restricted to the post reform period (i.e. from 1990), from a concern that institutional arrangements and economic conditions changed rapidly after the end of socialism and thus pre-transition data would be uninformative about the current situation. Similarly, German data for the years after 1990 was excluded from the analysis, from a concern that the special situation of unification would distort results. Furthermore, in Belgium the NUTS2 regions of Brussels, Vlaams Brabant and Brabant Wallon were formed from the single region of Brabant in 1990. Thus place to place data of the three newly formed NUTS2 regions was reaggregated to a single region so as to provide on comparable regional units for all countries for the complete observation horizon. Finally, in 1989 and 1990 the flows from Alentejo to Lisboa and Centro to Lisboa in Portugal were a factor 10 higher than in all other years. Although we were unable ro determine the reason for this change these flows were omitted from a fear of the data resulting from an inputting error.

Table 1: Data Sets used Countries, time periods and nature of the data

Country	Regional Units	Nature	Time Period	Number of Regions	Average Area (square kilometres)	Average Population per Region (2000)
Germany	NUTS1	Place to Place	1975-1990	11		6.170,916
Belgium	NUTS2	Place to Place	1975-1995	9	3.391	1.133,756
Spain	NUTS2	Place to Place	1979-1994	18	28.044	2.187.283
Italy	NUTS2	Place to Place	1975-1995[a)]	20	15.066	2.879,400
Netherlands	NUTS2	Place to Place	1986-1995	12	2824	1.308,933
United Kingdom	NUTS2	Place to Place	1985-1996	2	152265	2.576,750
Finland	NUTS2	Place to Place	1981-1996	6	50755	858917
Portugal	NUTS2	Place to Place	1985-1992	7	13.129	1-444,500
Sweden	NUTS2	Place to Place	1980-1996	8	51367	1.106,375
Austria	NUTS2	Place to Place	1995-1999	9	9318	899,188
Denmark	NUTS3	Place to Place	1990-1999		2873	354,787
Czech Republic	NUT3	Place to Place	1992 – 1998	8	9857	1.286,867
Poland	Voivodships	Emi- and Immigration	1992 -1998	49	6.381	789.122
Hungary	NUTS 3	Net Migration	1992 – 1998	20	4.631	

a) 1981 missing

Regional Disaggregation

The regions of the countries considered vary substantially in size. For Germany and the U.K. the data is available only on NUTS1 level, while for all other European member states data is available at NUTS2 or NUTS3 disaggregation. But even the size of regional units at the same level of regional disagregation varies considerably. In terms of population the largest NUTS 2 regions are in Italy with 2.6 million Inhabitants and the smallest in Denmark with 860 thousand. In terms of area the largest NUTS2 regions are in Sweden with an area

[8] OECD (2000) and Eurostat Data were compared for differences, in general this was small. Estimations were conducted excluding data from other sources. This led to no changes in qualitative results.

of in average over 51.000 square kilometres and the smallest regions are found in the Netherlands with just above 2.800 square kilometres. This is of relevance because measured migration across regional entities will depend on the size of the region, since the larger a region the higher the probability that a move is within borders (and thus unmeasured) rather than across borders.

One way to assess the role of using regions of different size is to compare NUTS1 and NUTS2 level internal migration. Moving the level of regional analysis from NUTS2 to NUTS1 in Spain, Italy, Portugal, Finland and the Netherlands, has strong effects on the measured internal migration rates in Finland and Portugal only. The reason is that in these countries there is only one single mainland NUTS1 region, all other NUTS1 regions are islands (the Alands in Finland, the Acores and Madeira in Portugal). Since these islands are remote from the European mainland, migration rates are low. Effects are much less dramatic in Spain and Italy. Here internal migration rates fall by less than 0.1 percentage points when moving from NUTS2 to NUTS1 level. This relatively modest fall may be explained by regional structure: In these countries a number of NUTS1 regions (6 in Italy[9] and 2 in Spain[10]) have no NUTS2 level subregions. Thus aggregation does not remove as many migratory flows. The Netherlands, finally, are an intermediate case. Here the move from NUTS2 to NUTS1 level analysis reduces internal migration rates by about 0.6 percentage points. Similarly, net migration rate data suggests that when moving to NUTS1 level analysis reductions in net migration rates depend heavily on the member state considered.

Table A2.1:

Country	Regional Unit	Gross Migration		Net Migration		Share of Churning Flows	
		First Year*	Last Year*	First Year	Last Year	First Year	Last Year
Germany	NUTS1	1.32	1.06	0.07	0.17	5.53	16.46
United Kingdom	NUTS1	1.58	1.72	0.13	0.10	7.96	5.80
Spain	NUTS1	0.39	0.52	0.07	0.04	17.13	7.38
Italy	NUTS1	0.72	0.47	0.09	0.08	12.59	17.61
Netherlands	NUTS1	1.07	1.09	0.03	0.03	2.87	3.15
Finland	NUTS1	0.01	0.003	0.002	0.0002	17.53	5.53
Portugal	NUTS1	0.02	0.03	0.005	0.014	20.00	46.67

Our analysis of internal migration at different levels of regional disagregation, thus confirms that larger regions in general generate lower internal migration rates. But the exact size of the decrease depends substantially on nation specific factors concerning regional division of regions and the geography of countries. This makes us include both measures of region size and measures of the number of regions close to one another (the share of neighbourhood relationships) in the regressions.

[9] These are Lombardia, Emilia-Romana, Lazio, Campania, Sicilia, Sardinia
[10] These are Madrid and the Canaries

Data Sources and Construction for Dependent Variables

Coefficient of Variation in Unemployment Rates and GDP Level, Aggregate Unemployment Rate, Area, Population, Share of Elder in Population, Share of Younger in Population, International Migration.

Data Source:

Eurostat Cronos Database for all countries

Share of long term unemployed in total unemployment

Data Source:

OECD Employment Report, various years

Replacement Rate, Employment Protection:

Data Sources:

Blanchard and Wolfers (1999) for the EU countries

Michelle, Riboud, Carolina Sanchez-Paramo und Carlos Silva-Jauregui (2002) for Candidate Countries

Notes

Data for candidate countries is for the late 1990's only. Thus only the 1995-1999 period was included in the regressions.

Share of Black Market Economy in GDP

Data Sources:

Schneider, Friedrich (2002) for 1990's

Schneider, Friedrich (2002) and sources cited therein for 1980's

Notes:

Data for the Candidate Countries is available for 1999/2000 only. This was taken as the value for 1995-1999

For Member States 1989/1990 data was taken for the period 1985-1989, The average of 1989/90, 1991/92 and 1994/95 data for the period 1990-1994 and the average of 1994-95, 1997/98 and 1999/2000 data was taken for the period 1995-1999

Owner Occupied Housing

Data Sources:

Eurostat Cronos data base for Portugal (share of owner occupied dwellings)

Oswald, Andrew J (1999) for all other countries

Notes:

Data are provided for 1980, 1990. For 1995 and 1985 data were intrapolated (extrapolated) this was done by adding half the change between 1980 and 1990 to 1980 data for 1985 values and to 1990 values for 1995. 1980-84 data were merged with 1980 stock, 1985-89 data were merged with 1989 stock, 1990-94 data were merged with 1990 stock and 1995+ data with the 1995 stock

Robustness checks

Sources were compared for major differences

Regressions were done including housing indicators taken from EUROSTAT rather than Oswald values. Leads to similar conclusions.

Table 6: Data Available as dependent variables

	1983-1984	1985-1989	1990-1994	1995-1999
Germany	Yes	Yes	Yes	
UK		Yes	Yes	Yes
Belgium		Yes	Yes	Yes
Spain	yes	Yes	Yes	Yes
Italy	Yes	Yes	Yes	Yes
Netherlands	-	Yes	Yes	Yes
Finland	-	-	Yes	Yes
Portugal	-	Yes	Yes	-

Sweden	-	-	Yes	Yes
Austria	-	-	-	Yes
Denmark	-	-	Yes	Yes
Czech Rep.	-	-	-	Yes
Slovenia	-	-	-	Yes
Poland	-	-	-	Yes
Hungary	-	-	-	Yes

Appendix 2: Results for Sign Certainty and Posterior Inclusion Probability

	Inclusion Probability				Sign Certainty			
	GRMIG		NETMIG		GRMIG		NETMIG	
	EU	CC	EU	CC	EU	CC	EU	CC
lngdpv	0.346	0.214	0.179	0.165	0.252	0.524	0.134	0.610
lnurate	0.350	0.284	0.336	0.241	0.809	0.831	0.539	0.898
lnuvar	*0.642*	0.333	**1.000**	0.222	0.292	0.900	0.831	0.626
lnysh	0.204	0.370	0.346	0.234	0.422	0.728	0.567	0.759
lnosh	0.228	0.191	0.499	0.177	0.692	0.665	0.261	0.696
lnimsh	**1.000**	**0.994**	**0.972**	*0.822*	**1.000**	**0.991**	0.946	1.000
lnavarea	0.383	*0.583*	0.395	*0.573*	0.116	0.943	0.904	0.962
lnavpop	**0.998**	0.378	0.383	0.443	0.853	0.699	0.822	0.033
lnnrel	*0.862*	*0.789*	*0.600*	*0.585*	0.620	**0.908**	0.818	**0.982**
lnempro	**1.000**	**0.977**	**1.000**	0.481	**1.000**	**1.000**	0.939	**0.994**
lnrrate	0.188	0.441	0.333	0.236	0.734	0.832	0.414	0.760
lnblackm	0.175	0.258	0.194	0.326	0.252	0.748	0.238	0.961
lnltu	0.443	*0.870*	**0.967**	*0.587*	0.940	1.000	**0.949**	1.000
housown	**1.000**		**1.000**		**0.995**		**1.000**	
candidate		0.733		0.293		0.961		0.984

Are East-West Migrants in Germany Favourably Self-Selected?

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1 Introduction

Cumulative net migration flows from Eastern into Western Germany amount to almost 1.3 million people after the fall of the Berlin wall, i.e. from 1989 until the end of 2001. This corresponds to a share of 7.5 per cent of the 1989 population in Eastern Germany. Although net migration rates in the second half of the 1990s are much below those of the initial years after the fall of the Berlin wall, they have accelerated again after 1996. This increase coincides with the end of the convergence of per capita income levels between the West and the East of Germany. The persistent phenomenon of East-West migration in Germany has raised increasing concerns that workers with the highest qualifications and the highest abilities move to the West and that this 'brain drain' will further contribute to sluggish economic growth and divergence of per capita income levels.

In this paper we examine whether migrants from Eastern Germany are indeed favourable self-selected and analyse the determinants of the self-selection process, using individual data derived from social security records. There is meanwhile a sizeable empirical literature which attempts to account for the human capital characteristics of migrants in explaining the patterns of East-West migration in Germany. Following the human capital theory of migration (Sjaastad, 1961), this literature treats migration as an investment, whose returns depend on the human capital characteristics of individuals

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such as age and education. There are three main issues in the empirical literature. First, standard hypotheses of the human capital theory of migration are in principle confirmed, i.e. those individuals who are younger and have less family ties in the source region have a higher propensity to migrate. Moreover, males tend to migrate more than females (Burda and Hunt, 2001; Hunt, 2000; Burda, 1993; Schwarze, 1996).

Second, the hypothesis that "those who emigrate tend to be better educated and possible better workers in unobservable ways than stayers"(Burda and Hunt, 2001, p. 65), is largely, but not unequivocally supported in the empirical literature. In her comprehensive analysis of German East-West migration, Hunt (2000) finds on basis of individual data from the German Socio-Economic Panel (GSOEP) that migrants are disproportionally high skilled if it is controlled for age and gender, while they are disproportionally low skilled if those control variables are not included. Hunt (2000) interpretes this as evidence that in particular the young and high skilled tend to move. Based on an analysis of migration intentions as revealed in the GSOEP, Burda (1993) shows that those with Abitur (A-levels) intend to move more than proportional, while those with an university and other tertiary education degree intend to move less than other education groups (Burda, 1993, p. 460). Similar results can be found in Burda, Härdle, Müller, and Werwatz (1998). In contrast, the results of Schwarze (1996) indicate that years of education are positively correlated with migration intentions as well as with actual migration. Analogously, Pischke, Staat, and Vögele (1994) show on basis of data from the 'Arbeitsmarktmonitor' that East-West commuters possess higher skill levels than stayers.

Third, many studies based on individual data find that the propensity to migrate is *positively* correlated with wage levels in the source region – if wages are significant at all (Hunt, 2000; Burda, 1993; Burda, Härdle, Müller, and Werwatz, 1998; Schwarze, 1996, see). This result is particularly puzzling since emigration rates and regional wage levels are negatively correlated in regressions based on macro data (Hunt, 2000). The positive correlation between individual wages and the propensity to migrate is interpreted in the literature either by a positive correlation between wage levels in the source region and abilities relevant for migration (Burda, 1993), or as indirect evidence for the option value of waiting theory of migration (Burda, 1993; Burda, Härdle, Müller, and Werwatz, 1998). However, migration decisions are based on a comparison, however approximate, between earnings and other relevant factors affecting utility in the destination and sending regions. Without having information on (expected) wage levels of potential migrants in western Germany, it is therefore impossible to draw any inference from the coefficients on wages in the source region. Thus, the empirical literature yields largely

inconclusive results with regard to the factor which is widely acknowledged as one of the most important economic determinants of migration.

In this paper we use a self selection framework in order to analyse whether differences in relative wages and other factors affect the composition of migrants with regard to their human capital characteristics and abilities. The problem of self-selectivity has been discussed extensively in the seminal paper by Andrew Roy (1951) and applied to the migration decision inter alia by George Borjas (1987). In the Roy model the self-selection of individuals depends essentially on the relative returns to their abilities, such that the distribution of income in the locations affects the composition of migrants. As a consequence, if the distribution of income in the receiving region is more equal than in the sending region and if the correlation between incomes in both locations is sufficiently strong, migrants are chosen from the lower tail of the income distribution and vice versa (Borjas, 1987, pp. 551-52).

The strong conclusions from the Roy model, however, are not uncontroversial. The empirical evidence provided for the Roy model in the context of international migration (Borjas, 1987, 1990) has been questioned (Jasso and Rosenzweig, 1990; Chiswick, 2000). Moreover, it can be shown that the consideration of migration costs affects the strong results of the Roy model (Chiswick, 2000). The same holds true if the normality assumptions of the Roy model are relaxed (Heckman and Sedlacek, 1985; Heckman and Honore, 1990). We apply therefore a generalised version of the Roy model to our analysis, which considers the correlation between abilities in the labour market and migration costs, and, hence, allows that migrants might be favourably selected even if the distribution of wages is more equal in the region of destination than in the source region.

The empirical analysis in this paper is based on a switching regression model, which calculates the wages in the host and source regions for migrants and stayers after controlling for self-selection bias (Heckman, 1974, 1979). We hope that this allows to reconcile the paradoxical findings on the correlation between wages and the propensity to migrate in the empirical literature. The switching regression model has first been applied in the context of migration decisions by Nakosteen and Zimmer (1984). This approach considers both, observable human capital characteristics as well as unobserved abilities of individuals in the analysis of the migration decision. This allows to draw inferences about the self-selection of individuals into locations with regard to observed and unobserved abilities.

We use individual data from the 'IAB-Regionalstichprobe', which is a one per cent sample of individuals which are registered by the German social security systems, from 1992 to 1997. The advantage of this data set is that it includes a large number of individuals relative to other data sources, e.g.

the GSOEP. The disadvantage however is that it covers only individuals which have been employed once in Eastern Germany, i.e. young people which move to Western Germany before starting their first job (e.g. students) are excluded from the analysis. This group however has been identified in other studies as one important source of the 'brain drain' in Eastern Germany (Burda and Hunt, 2001; Hunt, 2000). Thus, our analysis is limited only to the migration of those who entered the workforce in Eastern Germany and whose earnings lie below the income ceiling of the German public pension scheme.

The remainder of the paper is structured as follows: Section 2 presents an extended version of Roy's model and discusses its implications for the self-selection of migrants. Section 3 and 4 describe the data base and provide information on the socio-economic characteristics of migrants in the sample. Section 5 presents and discusses the econometric results. Section 6 concludes.

2 Theoretical background

Migrants are not a random sample from the population. Various factors affect the self-selection of migrants since both the benefits as well as the costs of migration are not equally distributed. The Roy model offers a rigorous and theoretically powerful framework to analyse the self-selection of individuals. According to the Roy model, self-selection is driven by comparative advantage of individuals. Individuals with higher abilities tend to move less likely into occupations, or, in our context, into locations, where the variance in the distribution of income is higher and vice versa.

It is meanwhile well understood that the conclusions of the Roy model rely on the assumption that log wages in the host and the source region have a joint normal distribution. A generalised Roy model which imposes no restrictions on the distribution of wages or abilities "produces no interesting refutable empirical hypotheses" (Heckman and Sedlacek, 1985, p. 1082). More precisely, the results of the Roy model turn out to be rather robust if the joint distribution of wages is log-concave, while they are not robust if it is log-convex Heckman and Honore (1990). Nevertheless, in our view the normality assumptions underlying the Roy model seem to be not very demanding and are, hence, used in many empirical applications.

Another aspect seems to be more important to us. In its original formulation the Roy model does not consider any switching costs. As Chiswick (2000) has recently demonstrated, assumptions on the structure of moving costs may have however strong implications for the self-selection of migrants.

We extend therefore the Roy model by assuming that abilities in the labour market and the costs of moving are correlated, which relaxes the strong results of the Roy model. In this more general framework, migrants may be chosen from the upper tail of the income distribution although the distribution of income in the receiving region is more equal than in the sending region.

In what follows, we first present the extended version of the Roy model in order to derive the framework for the empirical analysis and then present the estimation model.

2.1 An extended version of the Roy model

Suppose that w_1 is the wage of residents in the home region (region 1), and w_2 the wage of residents in the host region (region 2). Assume that log wages in region 1 and region 2 have a joint normal distribution, such that

$$\ln w_1 = \mu_1 + \varepsilon_1, \tag{1}$$

where μ_1 is the mean of the log wage in region 1 and ε_1 a normally distributed disturbance with zero mean and variance σ_1^2. Analogously,

$$\ln w_2 = \mu_2 + \varepsilon_2, \tag{2}$$

where ε_2 is normally distributed with zero mean and variance σ_2^2. The Roy model focuses on the impact of selection bias on the disturbances ε_1 and ε_2, which can be interpreted as (unobservable) abilities of individuals.

The original Roy model ignores all switching costs, i.e. an individual from region 1 migrates into region 2 if $w_2 > w_1$. However, it is reasonable to assume that moving costs exist and that they are related to human capital characteristics and other abilities of individuals. Suppose that C represents the pecuniary and and non-pecuniary costs of migration as a proportion of home income. Migration occurs if $\frac{w_2 - w_1}{w_1} > C$, or, approximately, if $\ln w_1 - \ln w_2 > C$. Assume that C is normally distributed with mean τ and disturbance η, $\eta \sim N(0, \sigma_\eta^2)$.

The decision to migrate is then determined by the sign of the index function

$$I^* = \mu_2 - \mu_1 - \tau + \varepsilon_2 - \varepsilon_1 - \eta, \tag{3}$$

i.e. an individual migrates if $I^* > 0$, and stays at home if $I^* \leq 0$.

Define

$$\sigma^* = \sqrt{\mathrm{Var}(\varepsilon_2 - \varepsilon_1 - \eta)}, \quad z = \frac{\mu_2 - \mu_1 - \tau}{\sigma^*}, \quad \text{and} \quad \epsilon = \frac{\varepsilon_1 - \varepsilon_2 + \eta}{\sigma^*}.$$

Thus, migration occurs if $z > \varepsilon$. Under the normality assumptions, the migration rate m is given by

$$m = Pr(z > \epsilon) = \Phi(z), \tag{4}$$

where $\Phi()$ is the cumulative distribution function of the standard normal. Using the standard sample selection formula (Heckman (1976), Heckman (1979)), the (unobserved) wage of a migrant in the source country can be written as

$$E(\ln w_1 | I^* > 0) = \mu_1 - \sigma_{1\epsilon}\lambda(z), \tag{5}$$

and the observed wage in the host country as

$$E(\ln w_2 | I^* > 0) = \mu_2 - \sigma_{2\epsilon}\lambda(z), \tag{6}$$

where $\sigma_{1\epsilon}$ and $\sigma_{2\epsilon}$ are the covariance of ε_1 and ϵ, and the covariance of ε_2 and ϵ, respectively, and

$$\lambda(z) = \frac{\phi(z)}{\Phi(z)}$$

is the inverse of Mills' ratio and $\phi()$ the density of the standard normal.

Thus, whether migrants are better or worse off than the average person in the source and the host country depends on the sign of the second term in equation (5) and equation (6). Since $\lambda(z) \geq 0$, the average migrant is better off than the average person in the source country if $\sigma_{1\epsilon} < 0$, and, analogously, better off than the average person in the host country if $\sigma_{2\epsilon} < 0$ – if we ignore the limiting case that $\lambda(z) = 0$.

An interpretation of these conditions requires that we decompose $\sigma_{1\epsilon}$ and $\sigma_{2\epsilon}$. Using the definition for the covariance, we can rewrite $\sigma_{1\epsilon}$ as

$$\frac{\sigma_1^2 - \sigma_{12} + \sigma_{1\eta}}{\sigma^*}$$

and $\sigma_{2\epsilon}$ as

$$\frac{\sigma_{12} - \sigma_2^2 + \sigma_{2\eta}}{\sigma^*}$$

. Thus, migrants are better off than the average person in the home population if $\sigma_{12} > \sigma_{1\eta} + \sigma_1^2$, or if

$$\frac{\sigma_2}{\sigma_1} > \frac{1}{\rho_{12}} + \frac{\rho_{1\eta}}{\rho_{12}}\frac{\sigma_\eta}{\sigma_1}, \tag{7}$$

where ρ_{12} is the correlation coefficient between ε_1 and ε_2, and $\rho_{1\eta}$ the correlation coefficient between ε_1 and η. Analogously, the migrant is better off than the average person in the host region if $\sigma_2^2 > \sigma_{12} + \sigma_{2\eta}$, or if

$$\frac{\sigma_2}{\sigma_1} > \rho_{12} + \rho_{2\eta}\frac{\sigma_\eta}{\sigma_1}, \tag{8}$$

where $\rho_{2\eta}$ is the correlation coefficient between ε_1 and η.

Ignore first the correlation between the disturbances of the wage equations and the disturbance of the migration costs. In this case the first condition simplifies to

$$\frac{\sigma_2}{\sigma_1} > \frac{1}{\rho_{12}},$$

and the second condition to

$$\frac{\sigma_2}{\sigma_1} > \rho_{12}.$$

We can conceive three cases (see Borjas (1987) for an in-depth discussion): First, migrants are favourably selected relative to both, the average person in the source region and in the region of destination. A necessary (and sufficient) condition for this is $\frac{\sigma_2}{\sigma_1} > \frac{1}{\rho_{12}}$, which implies that $\frac{\sigma_2}{\sigma_1} > 1$. Thus, the inequality of earnings has to be higher in the region of destination than in the source region and the correlation between the disturbances in the income equations has to be sufficiently large for a favourable selection of migrants.

Second, migrants are unfavourably selected relative to both, the average person in the source region and in the region of destination. A necessary (and sufficient) condition for this is $\rho_{12} > \frac{\sigma_2}{\sigma_1}$, which implies that $\frac{\sigma_2}{\sigma_1} < 1$.

Third, migrants are favourable selected relative to the average person in the region of destination, and unfavourable selected relative to the average person in the source region. The necessary (and sufficient) condition for this is $\rho_{12} < \frac{\sigma_2}{\sigma_1} < \frac{1}{\rho_{12}}$, i.e. the inequality of earnings in the region of destination can be in this case both below or above the inequality of earnings in the source region.

A fourth case where migrants are favourable selected relative to the average person in the source region, but unfavourable selected relative to the average person in the region of destination is ruled out, because $\rho_{12} < 1$ by definition.

Consider now the case where the disturbances from the wage equations are correlated with the disturbance from the migration cost equation. More specifically, assume that higher abilities in the labour market are negatively correlated with migration costs, i.e. that $\rho_{1\eta} < 0$ and $\rho_{1\eta} < 0$. As can be seen easily from equation (7) and equation (8), a favourable selection of migrants in the sending and the destination regions requires no longer that the inequality of earnings is higher in the region of destination than in the source region. Thus, a favourable selection of migrants can occur even in cases when the inequality of earnings is higher in the region of destination than in the source region, if a negative correlation between abilities in the labour markets and moving costs exists.

2.2 Estimation

The Roy model as described above can be considered as a switching regression model (Goldfeld and Quandt, 1973) with endogenous switching (Maddala and Nelson, 1975; Maddala, 1983).

Rewrite the wage equations in (1) and (2) as

$$\ln w_{1i} = X_{1i}\beta_1 + \varepsilon_{1i}, \tag{9}$$

and

$$\ln w_{2i} = X_{2i}\beta_2 + \varepsilon_{2i}, \tag{10}$$

where X_i is a vector of regional and personal variables which is observed for each individual i. Suppose that the index function for the ith individual is given by

$$I_i^* = \delta(\ln w_{2i} - \ln w_{1i}) - Z_i\gamma - \eta_i, \tag{11}$$

where $Z_i\gamma + \eta_i = C_i$ is the migration cost, and Z_i is again a vector of regional and personal variables. Identification of the model requires that at least one variable in Z_i is not included in the vector X_i.

It is obvious from the discussion of the Roy model that the index function cannot be estimated in structural form since the term $\ln w_{2i} - \ln w_{1i}$ is endogenous. Following Lee (1978) and Willis and Rosen (1979) the model can be estimated in three steps. In the first step we estimate a reduced form of the migration function. The reduced form of the index function I_i^* is given by

$$I_i^* = \delta(X_{2i}\beta_2 - X_{1i}\beta_1) - Z_i\gamma + \delta(\varepsilon_{2i} - \varepsilon_{1i}) - \eta_i = Z_i^*\gamma^* - \epsilon^*, \tag{12}$$

where Z_i^*, γ^* and ϵ^* are defined suitably. Define $I_i = 1$ if $I^* > 0$ and $I_i = 0$ otherwise. Based on the observations on I_i we can then use the probit Maximum Likelihood estimator to obtain in the first step a consistent estimate for the vector $\widehat{\gamma}^*$.

Wages in region 1 can be observed only for those individuals for which $I_i = 0$ and wages in region 2 only for those individuals for which $I_i = 1$. Estimating the wage equations requires therefore to correct for this selection bias. Using the estimated vector of parameters $\widehat{\gamma}^*$ we can compute the inverse Mills' ratio for migrants and stayers as $\frac{\phi(Z_i^*\widehat{\gamma}^*)}{\Phi(Z_i^*\widehat{\gamma}^*)}$ and $\frac{\phi(Z_i^*\widehat{\gamma}^*)}{1-\Phi(Z_i^*\widehat{\gamma}^*)}$, respectively. Under the normality assumptions, this allows to correct for selection bias and to estimate in the second step the wage equations for stayers in the source region and movers in the region of destination by OLS:

$$\ln w_i = X_i\beta_1 + \sigma_{1\epsilon^*}\frac{\phi(Z_i^*\widehat{\gamma}^*)}{1 - \Phi(Z_i^*\widehat{\gamma}^*)} + u_{1i}, \quad \text{for} \quad I_i = 0, \tag{13}$$

and

$$\ln w_i = X_i\beta_2 - \sigma_{2\epsilon^*}\frac{\phi(Z_i^*\widehat{\gamma}^*)}{\Phi(Z_i^*\widehat{\gamma}^*)} + u_{2i}, \quad \text{for} \quad I_i = 1, \tag{14}$$

which gives us consistent estimates of β_1, β_2, $\sigma_{1\epsilon^*}$, and $\sigma_{2\epsilon^*}$. Furthermore, it is possible to derive consistent estimates for σ_1^2 and σ_2^2 from the residuals of the wage equations and estimated parameters (see Maddala, 1983, pp. 225-26). In our empirical application, we estimated however the reduced form probit model and each of the two Heckman selection equations in one stage using a maximum likelihood estimator (Greene, 1997). The ML function uses the estimated parameters from the reduced form probit model as starting values for the estimation of the Heckman corrected wage equations.

In the final step, we use the 'structural probit method' to obtain consistent estimates of δ and γ. Substituting $\ln \widehat{w}_{1i} = X_{1i}\widehat{\beta}_1$ and $\ln \widehat{w}_{2i} = X_{2i}\widehat{\beta}_2$ for $\ln w_{1i}$ and $\ln\ w_{2i}$, respectively, allows to estimate the structural probit equation. As Lee (1979) has demonstrated, the resulting estimates for γ and δ are consistent.

3 Data

We perform our empirical analysis of the self selection of East-West migrants in Germany using individual data from the 'IAB-Regionalstichprobe'.[1] This data set contains a one per cent sample of all the returns of the social security files of Germany, collected by the Federal Employment Services (Bundesanstalt für Arbeit). All individuals which are recorded by the social security systems have spells in the register where their work history, personal characters, firm characters and regional details are saved. The sample includes almost all employed persons in Eastern Germany, all unemployed and individuals which pause from employment. It does however not cover the self-employed and those who are in education. Moreover, the sample is censored from above, i.e. individuals whose earnings exceed the ceiling for contributions to the public pension scheme and unemployment insurance in Germany are not reported. Since this ceiling is rather high, only a very small group of employees is censored in the Eastern German sample.

The Eastern German sample starts at the beginning of 1992, the Western German sample at the beginning of 1975. The last spells are reported for 1997. The observations of every individual are organised as event data. Every change in the employment situation is collected with the date of its event,

[1] Employee sample, regional file. The IAB-Regionalstichprobe is provided by the German Institute for Employment Research (IAB) at the Federal Employment Services (Bundesanstalt für Arbeit). See Haas (2001) for a short introduction.

but also every year a control return is registered. We use the yearly spells of the 31st of March of every year and transform the event oriented data collection into a panel of yearly observations for the individuals.

It is not trivial to identify East Germans in the data set. For the purpose of our analysis, we defined East Germans as follows: (i) they have their first spell in 1992 or later, since East Germans were not included in the IAB sample before; (ii) they are registered in an East German pension scheme [2] if they are employed, and (iii) they work at a company in Eastern Germany if they are employed. These definitions imply that we do not include those East Germans in our analysis which have migrated to Western Germany before 1992, and those who have never worked during our observation period 1992 - 1997.

On basis of these definitions we distinguish three groups of individuals: *stayers*, which are all individuals which have been registered as employees or unemployed in Eastern Germany for the whole time span from 1992 to 1997; *prospective movers*, which are all individuals which are still registered in Eastern Germany, but will move to Western Germany during the observed time period; *movers*, which are individuals who have a Western spell for the first time, i.e. those who moved during the previous year. Since our regressions are based on a cross-sectional analysis, we do not consider the later spells of East Germans who reside in Western Germany here. By definition, we have observations for the first group over the whole period from 1992 to 1997, for the second group from 1992 to 1996, and for the third group for the period from 1993 to 1997.

The plot in Figure 1 shows that the number of individuals in our sample is slightly diminishing. This is because we do not include individuals where important variables are missing. Some of the individuals may also vanish from the sample due to death, international migration, leaving the labour force or becoming unemployed. Moreover, those who are residing for more than one year in Western Germany vanish from the sample. Stayers number from 95% of the total sample of 1992 to 99% in 1997. In Figure 2, the remaining share of the individuals is splitted into the two remaining groups - prospective movers and movers. By definition, we have only prospective movers in 1992, but their number diminishes over the time and achieves eventually zero in 1997. Numerically, the highest number of movers is achieved in 1993 and it also diminishes until 1997. Also in relative numbers, the share of movers diminishes from 1.7% in 1993 to 1.1% in 1997.

[2] Landesversicherungsanstalt (LVA) Ost, Bundesversicherungsanstalt für Angestellte (BfA) Ost, or Knappschaft Ost.

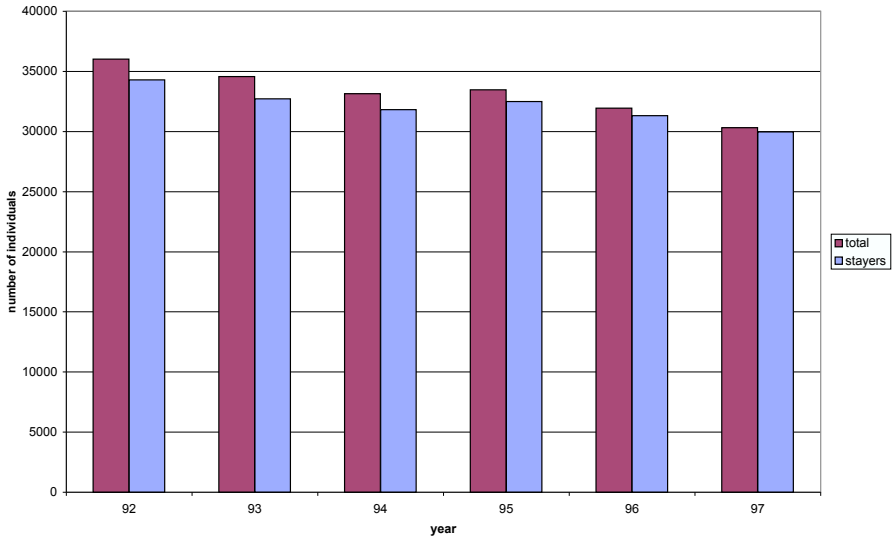

Figure 1: Total number of individuals

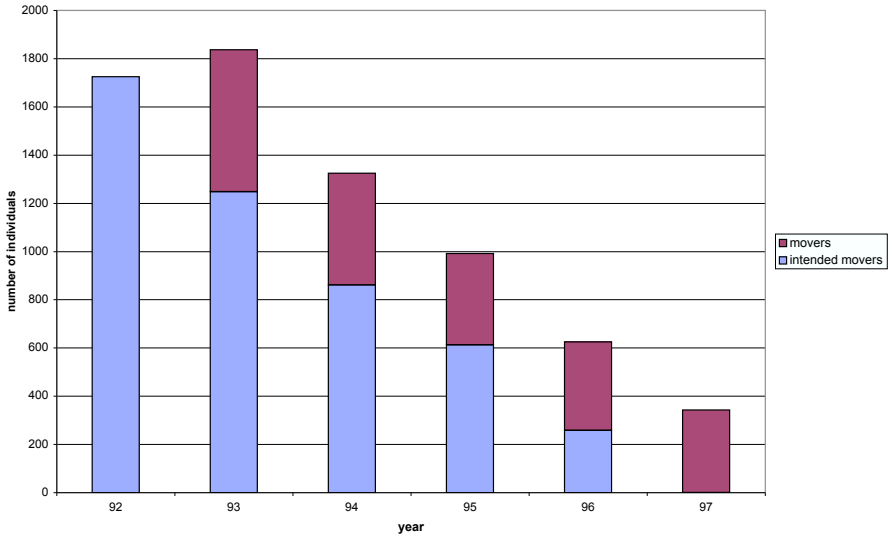

Figure 2: Total number of movers

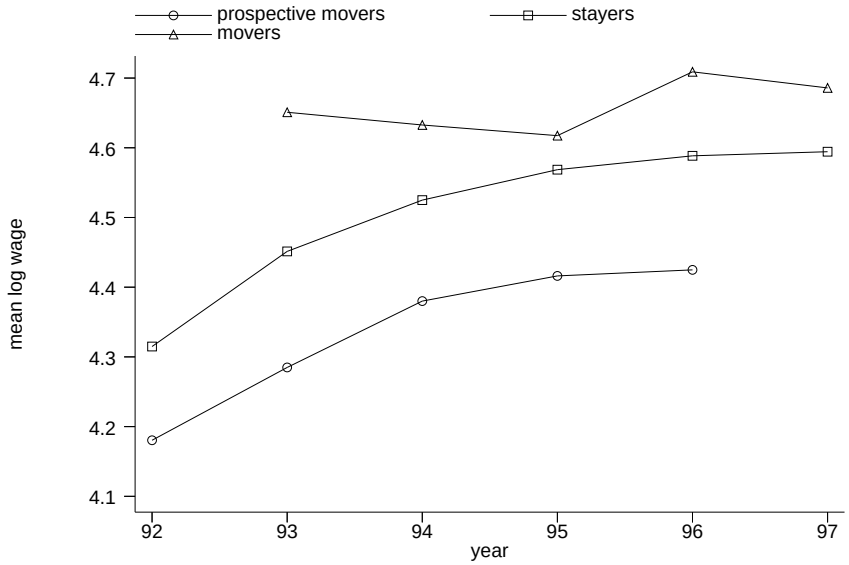

Figure 3: Mean wage

4 First descriptive results

The 'IAB-Regionalstichprobe' contains both variables which refer to the wage level and the employment status of individuals and variables which refer to personal characteristics. The descriptive statistics of the sample provides first interesting insights on the self selection of East-West migrants: at the sample mean, prospective migrants receive lower wages and are more likely to be unemployed than stayers, and they are more likely to be young, unmarried and male than stayers. The results with regard to education indicate that migrants are lower skilled than the sample average. The last result has however interpreted with caution, since our sample does not cover students and young academics from Eastern Germany who have their first employment in Western Germany.

Figure 3 displays the development of the mean wages, divided into the three groups, stayers, prospective movers and movers, as defined above. Wages of prospective movers start well below that of stayers and they receive much the same wage increase than stayers. Note that the lower wage level may reflect the substantial difference in the age of stayers and migrants (see below). Movers receive substantial wage gains, which diminish over time in the course of converging per capita incomes between Western and Eastern Germany.

The mean of the lagged unemployment rate is plotted in Figure 4. Inter-

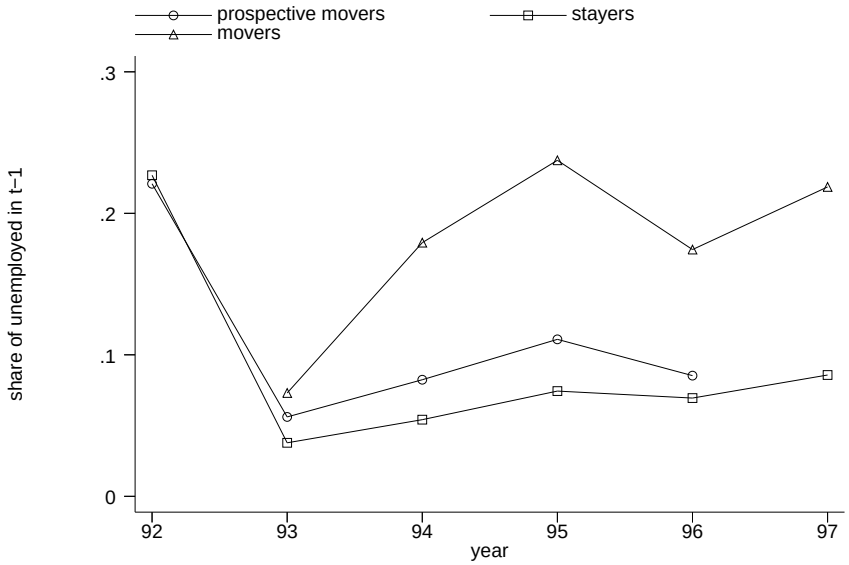

Figure 4: Mean lagged unemployment rate

estingly enough, stayers have a lower unemployment rate than the other two groups, although the difference to the group of prospective movers is not very large. Striking is the large difference in lagged unemployment rates of movers and stayers, i.e. an unemployment event seems to be strongly correlated with East-West migration.

Figure 5 shows the development of the mean age for each of our three groups. The mean age of East German stayers is highest, starting in 1992 with 38 years and ending with 39 years in 1997. The youngest group with an average age of nearly 32 years in 1992 contains the prospective movers, with slightly rising age until 1996. Movers are slightly older than prospective movers with an average age of around 34 years. Over time, movers become younger relative to individuals which will move in the following years, indicating that young individuals move faster than older. Altogether, the descriptive statistics confirms the hypothesis of the human capital theories of migration that young people have a higher propensity to move.

Similar results are found for other personal characteristics (not displayed here): at the sample mean, the share of males among the prospective movers and movers varies between 61 and 66 per cent, while the share of males among the stayers is constant at around 55 per cent. Interestingly enough, the share of males among the prospective movers and movers is declining substantially over time. Moreover, there is a striking difference in the marital status of migrants and stayers: while around 55 per cent of the stayers are married,

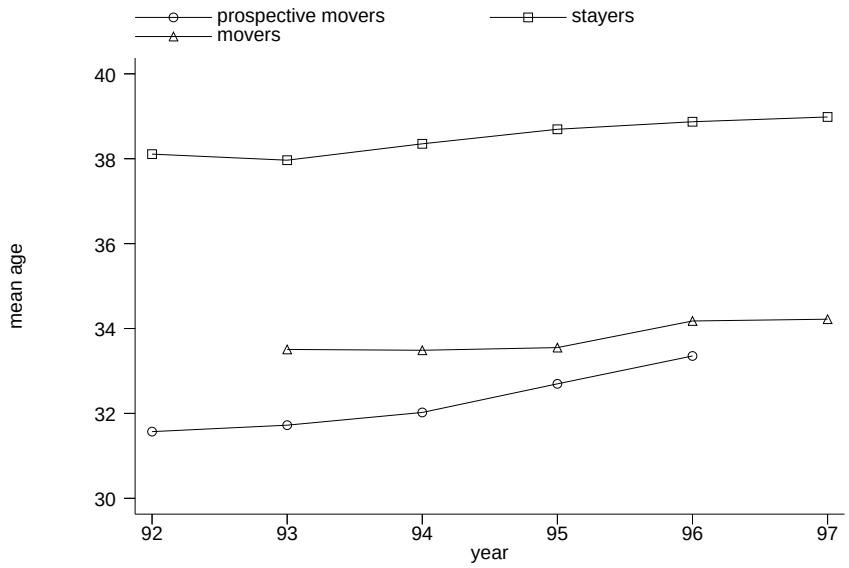

Figure 5: Mean age

less than 40 per cent of the movers are. The share of married individuals among the group of the movers is furthermore declining over time. Once again, these results confirm a standard hypothesis from the human capital theory of migration, i.e. that family ties affect the costs of migration.

The descriptive statistics of the education variables seem to indicate that East-West migrants are slightly less skilled than the average person in Eastern Germany. We distinguish three groups by their highest education degree: First, those who possess no vocational education degree, second those who possess a vocational education degree, and, third, those who possess a degree from a university or a polytechnic school (Fachhochschule). Figure 6 displays the share of individuals without vocational education degree in our three groups of stayers, prospective movers and movers. The share of unskilled is, at between 17 and 22 per cent, relatively high in the group of prospective movers, and relatively high among the group of movers in the beginning, but diminishing very fast. The share of individuals without vocational education degree is, at around 11 per cent, relatively low in the group of stayers, but slightly increasing over time.

In contrast, as Figure 7 shows, the share of individuals with completed vocational training in the group of movers and prospective movers is between 5 and 8 percentage points below that of stayers. Note this education level is predominant in all groups (with the highest share among stayers with above 70%).

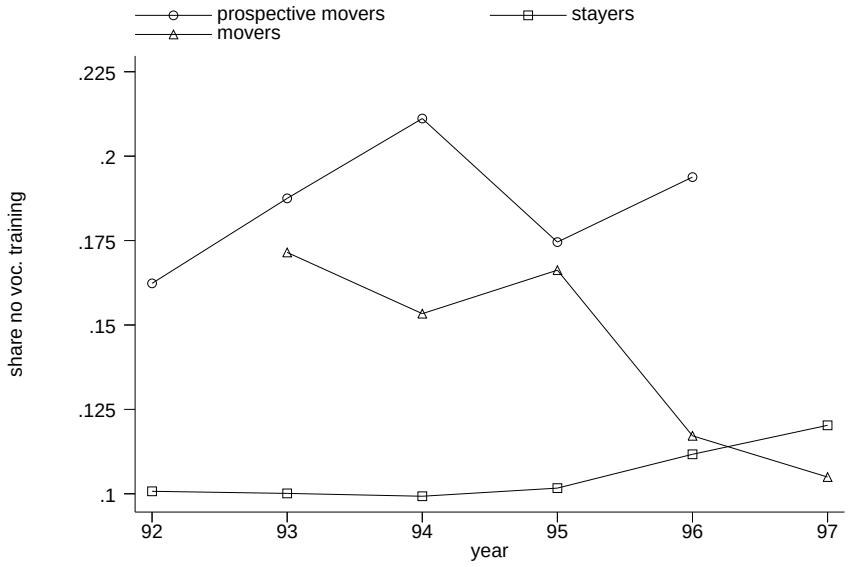

Figure 6: Mean of no vocational training degree

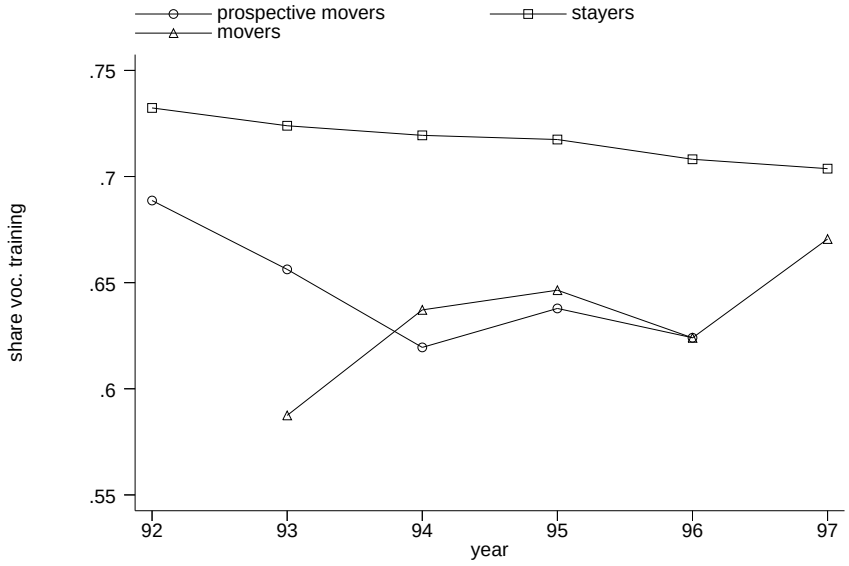

Figure 7: Mean of vocational training degree

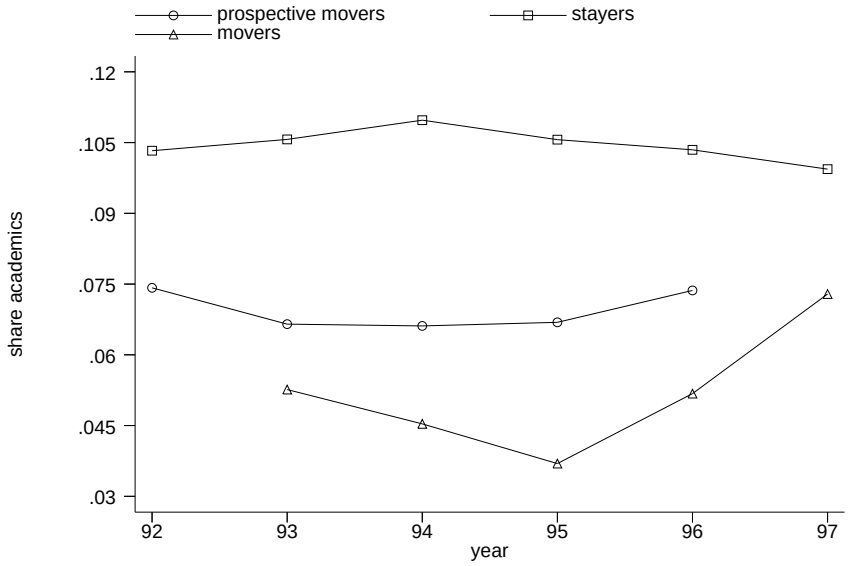

Figure 8: Mean of academic degree

Finally, we observe that the share of individuals with an academic education degree is lower in the group of prospective movers and movers than in the group of stayers. We observe however here that the share of movers with an academic degree is increasing from 1995 on such that it is reasonable to expect that it will cross the share of stayers in a few years (Figure 8). It is moreover worth noting that our sample covers only individuals which have already participated in the Eastern German labour market, i.e. students and those with an academic degree which take up their first job in Western Germany are not considered here.

Summary statistics for all the variables used in our regressions can be found in tables 9 and 10, divided only into years, not into the three groups discussed in this chapter.

5 Regression results

As has been outlined above, the estimation of the switching regression model consists of three steps: firstly, a reduced form probit model is estimated in order to obtain a consistent estimate of the individual probability to move. The results from this estimate are used as starting values for a maximum-likelihood estimation of a heckit selection model of the wage equations. In the final step consistent estimates of the parameters in the wage equations are used for estimating a structural probit model which includes the consistently

estimated wage variables for each individual.

The variables we consider are derived from the human capital theories of migration (Sjaastad, 1961): Beyond the (expected) differential in wages it is assumed that personal characteristics such as age, family ties and education affect the costs and returns to migration, and, hence, the decision to migrate. Moreover, following the traditional approach of Harris and Todaro (1970), it is assumed that employment opportunities affect expected earnings. In order to account for regional and branch differences in economic prospects, we included dummies for the East German Federal States (Bundesländer) and branches. The wage regressions have the traditional Mincer form, i.e. log wages are explained by human capital variables such as education, age, age squared, gender, and by occupational status. Furthermore, branch dummies are included. We do not include marital status in the wage regressions, since this variable is used to identify the model.

5.1 Results from the Heckit regressions

We estimated five cross-sections for the years 1993 - 1997. The results of the Heckman selection ('Heckit') estimates are reported in Tables 1 to 4. The coefficient lambda is the inverse of Mills' ratio as defined in equations (13) and (14). Rho times sigma gives the coefficient on lambda in the wage regressions, where rho is the correlation coefficient between the disturbances of the probit and the wage equation. The sign of rho hence determines whether the unobserved abilities of individuals are positively or negatively correlated with the wage levels. Interestingly enough, we find that the correlation coefficient is positive and significant at the 1% level for movers, and negative and significant at the 1% level for stayers in all five cross sections. Thus, this can be interpreted as strong evidence that East-West migrants tend to be favourably selected with respect to their unobserved abilities.

The education variables have the expected signs and have a stable influence on wages over time in Eastern Germany, with wages steadily rising from those with no training (the control group) to those with a university degree. In Western Germany the relation between wages and education is less stable, which can perhaps be traced back to the relative small number of observations. Generally, the relation among the education indicators is similar between stayers in Eastern and movers in Western Germany.

Workers with completed vocational training receive higher wages than unskilled workers in Eastern Germany, and white collar workers and foremen receive significantly higher wages than workers with vocational training. In Western Germany, we observe that only clerks and foremen earn significantly more than the other two groups. The insignificant difference between skilled

and unskilled workers might be interpreted as evidence for a devaluation of human capital.

Interestingly enough, we observe a difference in the impact of lagged unemployment on wages between Eastern and Western Germany: while lagged unemployment is associated with a substantial wage loss in the regressions of East German stayers, individuals who escaped unemployment by moving to the west do not receive lower wages relative to individuals moving directly from a job.

As expected, we observe that wages increase with age in Eastern Germany. The wage premium of age of movers is slightly below that of stayers. The male wage premium is increasing over time in Eastern Germany, while it is, after a peak in 1993, stable for movers in Western Germany.

5.2 Results from the probit estimates

The probit regressions in reduced form are reported in Tables 5 and 6, and in structural form reported in Tables 7 and 8. In the first step probit (the reduced form probit), one can observe the overall effect of the explanatory variables. The effect is composed by the direct effect and the indirect effect which goes through the wage differential. In the second step probit (the structural probit)the wage variables are included, which allows to analyse the impact of the wage differential and the residual effect of the other variables.

The probit regressions explain the probability of an individual to be in West Germany in year t instead of staying in East Germany. The explanatory variables refer to year t, i.e. they measure the status of a migrant in Western Germany and the status of a stayer in Eastern Germany. The unemployment dummy is of the year t-1, this means that it refers to East German unemployment status before moving to West Germany. Included are only individuals who are employed in year t and who get wages below the income ceiling of the public pension scheme in Germany. All regressions include a large number of individuals, from which only very few decide to migrate (see Figure 2).

In the 1993 regression, the variable $unemployed\_(t-1)$ refers to the unemployment status of 1992 in East Germany which could not be used because of collinearity. We used instead lagged wages for this year, which could not be used in the following years because it was not a valid instrument. In 1993, log wages(t-1) and log wages were unrelated in our data set. As another instrument for the Heckman correction, marital status was used, being correlated with the migration decision, but not with wages. Also a dummy variable for the presence of children was tried, but it turned out that this variable was poorly correlated with migration.

For computing the selection of migrants we also used lagged regional dummies as instruments, because wages in Western Germany are not related to the region where the individual comes from. We used however regional dummies also in the Eastern German wage regressions, since regional differences matter for wages.

In the reduced form probit equation we observe few relations which are stable over time, i.e. that are significant and do not change their sign. The only significant education variable is the category 'unknown education', while we observe in the other education groups no clear pattern. Individuals with training tend to move slightly more in 96 and 97. With regard to the job position, skilled workers tend to move less likely than the unskilled. Among the personal characteristics, the marital status variable has in most cross sections a significant negative impact on migration, while the age variable is in many cross sections insignificant. The male variable has the expected positive sign, but is not in all regressions significant.

The results from the structural probit estimate show that the wage differential has in four out of five regressions the expected positive sign and is significant at the 1 per cent level. In the 1995 regression it has a negative, but insignificant coefficient. Furthermore, lagged unemployment has a positive and highly significant impact on the probability to move. Thus, the economic variables have, generally, in the structural probit regressions the expected signs and are highly significant.

The results with regard to the human capital variables are similar to the reduced form probit. The education variables do not show a clear pattern over time. The coefficient for individuals with an academic degree changed its sign in some of the structural regressions relative to the reduced form regressions, i.e. individuals with a university degree move less likely if we control for the wage differential. The signs and significance of the personal characteristics variables are similar to those in the reduced form probit regressions.

6 Conclusion

In this paper we used a switching regression model in order to examine the question whether migrants from Eastern Germany are favourably self selected. In contrast to studies based on other data sources, we do not find that individuals with higher education degrees tend to have a higher propensity to migrate in our data set. Conversely, the descriptive statistics shows that skill levels of the migrants are below that of the average person which stays in Eastern Germany. Moreover, we find that unemployment events are

correlated with migration. However, these results can be traced back at least partly to the fact that an important group of high-skilled migrants, students and individuals with an academic degree which start their career in Western Germany, are not included in our sample.

The relatively low skill levels of migrants do however not necessarily imply that migrants from Eastern Germany are unfavourably self selected. Conversely, the results from our selection regressions provide strong evidence that migrants from Eastern Germany are favourably selected with regard to unobserved abilities. Thus, migrants tend to earn more than their staying counterparts if we control for observable human capital characteristics. This is again evidence for the hypothesis that migration and abilities relevant for the labour market performance are positively correlated.

Finally, we find that - in contrast to large parts of the empirical literature based on individual data sources in Eastern Germany - the wage differential has a strong positive impact on the propensity to migrate in our structural probit estimates. Moreover, an unemployment event in the period preceding migration turns out to be highly significant in the structural probit regressions. Thus, the results from our switching regression estimates reconcile some of the paradoxical findings in the empirical literature on the impact of wages and other key economic variables on migration. However, our results with regard to the impact of human capital variables are in many regressions insignificant and inconclusive.

Table 1: Heckit East German Wages 1993-1995 with Selection: Stayer

Variable	**Coeff.93**	**(Std.Err.)**	**Coeff.94**	**(Std.Err.)**	**Coeff.95**	**(Std.Err.)**
Dependent variable: log(wage)						
With training	0.216**	(0.008)	0.252**	(0.009)	0.254**	(0.009)
UAS or Univ. degree	0.429**	(0.010)	0.476**	(0.011)	0.494**	(0.011)
Unknown edu	0.206**	(0.010)	0.215**	(0.010)	0.212**	(0.010)
Skilled workers	0.092**	(0.007)	0.096**	(0.007)	0.095**	(0.007)
Clerks and foremen	0.334**	(0.007)	0.355**	(0.007)	0.365**	(0.007)
unemployed_(t-1)			-0.172**	(0.010)	-0.187**	(0.008)
age	0.058**	(0.001)	0.057**	(0.001)	0.058**	(0.001)
age_2	-0.001**	(0.000)	-0.001**	(0.000)	-0.001**	(0.000)
Sex	0.213**	(0.004)	0.230**	(0.005)	0.243**	(0.005)
Brandenburg	0.033**	(0.006)	0.034**	(0.006)	0.039**	(0.006)
Meck.-W. Pom.	0.038**	(0.007)	0.031**	(0.007)	0.031**	(0.007)
Saxony	0.009†	(0.005)	0.000	(0.006)	0.003	(0.006)
Saxony-Anhalt	0.025**	(0.006)	0.017**	(0.006)	0.017**	(0.006)
Agriculture	-0.144**	(0.008)	-0.105**	(0.009)	-0.070**	(0.009)
Goods production	-0.170**	(0.006)	-0.087**	(0.006)	-0.033**	(0.006)
Consumer goods	-0.219**	(0.008)	-0.191**	(0.008)	-0.158**	(0.008)
Trade, transport	-0.134**	(0.007)	-0.123**	(0.007)	-0.105**	(0.007)
Services	-0.036**	(0.006)	-0.025**	(0.006)	-0.008	(0.006)
Intercept	2.841**	(0.025)	2.850**	(0.025)	2.837**	(0.025)
rho	-0.926**	(0.007)	-0.898**	(0.011)	-0.880**	(0.013)
sigma	0.295**	(0.001)	0.309**	(0.001)	0.315**	(0.001)
lambda	-0.274**	(0.003)	-0.278**	(0.004)	-0.278**	(0.005)
N	27233		28744		29422	
Log-likelihood	-6157.237		-7916.511		-8616.306	
$\chi^2_{(1718)}$	19897.658		21438.34		22988.235	

Significance levels : † : 10% ∗ : 5% ∗∗ : 1%

Reference category: No training, Unskilled worker, Female, not married, Thuringia, Building and Construction

Table 2: Heckit East German Wages 1996-1997 with Selection: Stayer

Variable	**Coeff.96**	**(Std.Err.)**	**Coeff.97**	**(Std.Err.)**
Dependent variable: log(wage)				
With training	0.280**	(0.009)	0.280**	(0.009)
UAS or Univ. degree	0.521**	(0.011)	0.533**	(0.012)
Unknown edu	0.225**	(0.011)	0.212**	(0.011)
Skilled workers	0.086**	(0.007)	0.108**	(0.007)
Clerks and foremen	0.374**	(0.007)	0.394**	(0.007)
unemployed_(t-1)	-0.194**	(0.009)	-0.147**	(0.008)
age	0.062**	(0.001)	0.066**	(0.001)
age_2	-0.001**	(0.000)	-0.001**	(0.000)
Sex	0.257**	(0.005)	0.258**	(0.005)
Brandenburg	0.035**	(0.007)	0.037**	(0.007)
Meck.-W. Pom.	0.033**	(0.007)	0.026**	(0.008)
Saxony	0.004	(0.006)	0.001	(0.006)
Saxony-Anhalt	0.022**	(0.006)	0.024**	(0.007)
Agriculture	-0.052**	(0.009)	-0.064**	(0.010)
Goods production	-0.003	(0.007)	0.002	(0.007)
Consumer Goods	-0.147**	(0.009)	-0.134**	(0.009)
Trade, Transport	-0.102**	(0.007)	-0.104**	(0.007)
Services	0.000	(0.006)	-0.006	(0.007)
Intercept	2.722**	(0.025)	2.629**	(0.026)
rho	-0.913**	(0.010)	-0.902**	(0.011)
sigma	0.325**	(0.001)	0.330**	(0.001)
lambda	-0.296**	(0.004)	-0.297**	(0.004)
N	28597		27260	
Log-likelihood	-9132.498		-9154.404	
$\chi^2_{(18)}$	24199.388		24430.915	

Significance levels : † : 10% ∗ : 5% ∗∗ : 1%

Reference category: No training, Unskilled worker, Female, not married, Thuringia, Building and Construction

Table 3: Heckit West German Wages 1993-1995 with Selection: Mover

Variable	**Coeff.93**	**(Std.Err.)**	**Coeff.94**	**(Std.Err.)**	**Coeff.95**	**(Std.Err.)**
Dependent variable: log(wage)						
With training	0.214**	(0.054)	0.287**	(0.062)	0.068	(0.068)
UAS or Univ. degree	0.389**	(0.091)	0.549**	(0.106)	0.205	(0.136)
Unknown edu	0.191**	(0.067)	0.213**	(0.078)	0.070	(0.080)
Skilled workers	-0.133*	(0.057)	-0.098	(0.071)	0.087	(0.063)
Clerks and foremen	0.259**	(0.051)	0.191**	(0.058)	0.364**	(0.062)
unemployed_(t-1)			-0.066	(0.083)	0.099	(0.074)
age	0.035**	(0.011)	0.005	(0.013)	0.060**	(0.014)
age_2	0.000**	(0.000)	0.000	(0.000)	-0.001**	(0.000)
Sex	0.412**	(0.049)	0.251**	(0.052)	0.282**	(0.054)
Agriculture	-0.291*	(0.119)	-0.692**	(0.143)	-0.025	(0.140)
Goods production	0.029	(0.050)	-0.099†	(0.060)	0.156†	(0.083)
Consumer goods	-0.026	(0.064)	-0.202**	(0.072)	-0.151†	(0.084)
Trade, transport	-0.163**	(0.048)	-0.175**	(0.058)	-0.061	(0.066)
Services	-0.144**	(0.050)	-0.156**	(0.057)	-0.097†	(0.058)
Intercept	3.013**	(0.288)	3.716**	(0.320)	2.510**	(0.324)
rho	0.703**	(0.124)	0.538**	(0.230)	0.655**	(0.144)
sigma	0.367**	(0.053)	0.378**	(0.058)	0.438**	(0.063)
lambda	0.258**	(0.082)	0.203†	(0.118)	0.287**	(0.104)
N	27909		29929		30776	
Log-likelihood	-1852.792		-1949.328		-1750.48	
$\chi^2_{(1314)}$	238.236		159.497		139.427	

Significance levels : † : 10% * : 5% ** : 1%

Reference category: No training, Unskilled worker, Female, not married, Thuringia, Building and Construction

Table 4: Heckit West German Wages 1996- Selection: Mover

Variable	**Coeff.96**	**(Std.Err.)**	**Coeff.97**	**(Std.Err.)**
Dependent variable: log(wage)				
With training	0.260**	(0.062)	0.075	(0.087)
UAS or Univ. degree	0.447**	(0.100)	0.435**	(0.116)
Unknown edu	0.190*	(0.078)	0.075	(0.107)
Skilled workers	0.034	(0.060)	0.191**	(0.062)
Clerks and foremen	0.316**	(0.047)	0.441**	(0.062)
unemployed_(t-1)	-0.037	(0.066)	-0.011	(0.071)
age	0.048**	(0.012)	0.038**	(0.014)
age_2	-0.001**	(0.000)	0.000**	(0.000)
Sex	0.283**	(0.052)	0.278**	(0.052)
Agriculture	0.121	(0.299)	-0.156	(0.180)
Goods production	0.079	(0.066)	0.028	(0.081)
Consumer goods	-0.048	(0.073)	-0.250*	(0.100)
Trade, Transport	-0.029	(0.054)	-0.143*	(0.068)
Services	-0.051	(0.052)	-0.164*	(0.064)
Intercept	3.034**	(0.348)	3.307**	(0.338)
rho	0.388**	(0.287)	0.298**	(0.311)
sigma	0.313**	(0.038)	0.351**	(0.034)
lambda	0.121**	(0.104)	0.104**	(0.118)
N	29718		28394	
Log-likelihood	-1716.183		-1714.633	
$\chi^2_{(14)}$	200.267		207.726	

Significance levels : † : 10% ∗ : 5% ∗∗ : 1%

Reference category: No training, Unskilled worker, Female, not married, Thuringia, Building and Construction

Table 5: Probit first step 1993-1995

Variable	**Coeff.93**	**(Std.Err.)**	**Coeff.94**	**(Std.Err.)**	**Coeff.95**	**(Std.Err.)**
With training	0.087	(0.083)	0.104	(0.080)	-0.038	(0.084)
UAS or Univ. degree	-0.091	(0.126)	-0.114	(0.123)	-0.314*	(0.140)
Unknown edu	0.399**	(0.093)	0.325**	(0.089)	0.205*	(0.095)
Skilled workers	-0.460**	(0.064)	-0.425**	(0.064)	-0.214**	(0.068)
Clerks and foremen	-0.175*	(0.069)	-0.199**	(0.067)	-0.060	(0.072)
log(wage)_(t-1)	-0.203**	(0.067)				
unemployed_(t-1)			0.629**	(0.074)	0.573**	(0.064)
age	0.025	(0.017)	-0.022	(0.015)	-0.004	(0.016)
age_2	-0.001*	(0.000)	0.000	(0.000)	0.000	(0.000)
Sex	0.358**	(0.055)	0.198**	(0.052)	0.170**	(0.055)
Marital status	-0.066	(0.047)	-0.133**	(0.048)	-0.187**	(0.051)
Brandenburg	0.118	(0.075)	0.112	(0.071)	-0.048	(0.071)
Meck.-W. Pom.	0.236**	(0.078)	0.079	(0.078)	-0.064	(0.077)
Saxony	0.041	(0.068)	-0.032	(0.066)	-0.209**	(0.065)
Saxony-Anhalt	0.035	(0.077)	0.050	(0.072)	-0.111	(0.071)
Agriculture	0.126	(0.099)	-0.054	(0.100)	-0.177	(0.122)
Goods production	0.193*	(0.081)	0.086	(0.073)	0.100	(0.078)
Consumer goods	0.267**	(0.097)	0.048	(0.095)	0.149	(0.094)
Trade/Transport	0.197*	(0.085)	0.064	(0.076)	0.140†	(0.077)
Services	0.166*	(0.078)	0.027	(0.069)	0.053	(0.073)
Intercept	-1.831**	(0.298)	-1.631**	(0.253)	-1.852**	(0.266)

N	27909	29929	30776
Log-likelihood	-1807.375	-1840.975	-1640.298
$\chi^2_{(19)}$	259.019	269.247	260.177

Significance levels : $\dagger$: 10% $*$: 5% $**$: 1%

Reference category: No training, Unskilled worker, Female, not married, Thuringia, Building and Construction

Table 6: Probit first step 1996-1997

Variable	**Coeff.96**	**(Std.Err.)**	**Coeff.97**	**(Std.Err.)**
With training	0.156†	(0.091)	0.359**	(0.100)
UAS or Univ. degree	-0.086	(0.134)	0.278*	(0.134)
Unknown edu	0.518**	(0.098)	0.575**	(0.109)
Skilled workers	-0.409**	(0.069)	-0.221**	(0.072)
Clerks and foremen	-0.015	(0.069)	0.045	(0.074)
unemployed_(t-1)	0.532**	(0.068)	0.497**	(0.062)
age	0.019	(0.016)	-0.027†	(0.015)
age_2	0.000*	(0.000)	0.000	(0.000)
Sex	0.302**	(0.055)	0.189**	(0.055)
Marital status	-0.178**	(0.051)	-0.250**	(0.052)
Brandenburg	-0.175*	(0.074)	0.000	(0.071)
Meck.-W. Pom.	-0.136†	(0.079)	-0.050	(0.079)
Saxony	-0.176**	(0.064)	-0.208**	(0.067)
Saxony-Anhalt	-0.081	(0.069)	-0.109	(0.073)
Agriculture	-0.228†	(0.120)	-0.307*	(0.138)
Goods production	-0.168*	(0.080)	-0.061	(0.081)
Consumer goods	-0.081	(0.098)	0.076	(0.095)
Trade/Transport	-0.055	(0.074)	0.003	(0.078)
Services	-0.077	(0.068)	0.017	(0.070)
Intercept	-2.288**	(0.274)	-1.761**	(0.266)
N	29718		28394	
Log-likelihood	-1655.633		-1611.148	
$\chi^2_{(19)}$	288.367		231.069	

Significance levels : $\dagger$: 10% $*$: 5% $**$: 1%

Reference category: No training, Unskilled worker, Female, not married, Thuringia, Building and Construction

Table 7: Probability to move 1993-1995, structural results

Variable	**Coeff.93**	**(Std.Err.)**	**Coeff.94**	**(Std.Err.)**	**Coeff.95**	**(Std.Err.)**
log(wage)_(t-1)	-0.141*	(0.060)	-	-		
unemployed_(t-1)	-	-	0.589**	(0.074)	0.557**	(0.073)
wagediff3	1.590**	(0.177)	1.628**	(0.186)	-0.082	(0.269)
Sex	0.013	(0.058)	0.105*	(0.048)	0.111*	(0.050)
Marital status	-0.055	(0.046)	-0.206**	(0.044)	-0.318**	(0.046)
With training	0.069	(0.077)	-0.091	(0.069)	-0.318**	(0.080)
UAS or Univ. degree	-0.058	(0.119)	-0.367**	(0.107)	-0.600**	(0.137)
Unknown edu	0.436**	(0.092)	0.315**	(0.090)	-0.033	(0.102)
Brandenburg	0.177*	(0.075)	0.203**	(0.072)	-0.062	(0.071)
Meck.-W. Pom.	0.308**	(0.078)	0.167*	(0.078)	-0.058	(0.077)
Saxony	0.053	(0.068)	-0.047	(0.067)	-0.219**	(0.066)
Saxony-Anhalt	0.071	(0.077)	0.083	(0.072)	-0.122†	(0.071)
Agriculture	0.307**	(0.101)	0.490**	(0.118)	-0.186	(0.121)
Goods Production	-0.044	(0.084)	0.145*	(0.073)	0.092	(0.081)
Consumer goods	0.055	(0.098)	0.093	(0.095)	0.143	(0.094)
Trade/Transport	0.255**	(0.084)	0.216**	(0.076)	0.164*	(0.076)
Services	0.332**	(0.077)	0.267**	(0.071)	0.080	(0.076)
Intercept	-1.364**	(0.232)	-2.805**	(0.133)	-1.953**	(0.133)

N	27226	28735	29412
Log-likelihood	-1801.162	-1823.7	-1649.4
$\chi^2_{(16)}$	253.337	273.809	212.99

Significance levels : † : 10% * : 5% ** : 1%

Reference category: No training, Unskilled worker, Female, not married, Thuringia, Building and Construction

Table 8: Probability to move 1996-1997, structural results

Variable	**Coeff.96**	**(Std.Err.)**	**Coeff.97**	**(Std.Err.)**
unemployed_(t-1)	0.354**	(0.074)	0.416**	(0.066)
wagediff3	1.292**	(0.278)	0.483†	(0.288)
Sex	0.154**	(0.051)	0.073	(0.051)
Marital status	-0.227**	(0.047)	-0.367**	(0.047)
With training	0.002	(0.079)	0.167	(0.105)
UAS or Univ. degree	-0.069	(0.125)	0.084	(0.120)
Unknown edu	0.509**	(0.098)	0.395**	(0.116)
Brandenburg	-0.136†	(0.073)	0.012	(0.072)
Meck.-W. Pom.	-0.101	(0.079)	-0.038	(0.079)
Saxony	-0.198**	(0.063)	-0.221**	(0.067)
Saxony-Anhalt	-0.067	(0.069)	-0.103	(0.073)
Agriculture	-0.427**	(0.121)	-0.309*	(0.137)
Goods Production	-0.260**	(0.081)	-0.079	(0.081)
Consumer goods	-0.178†	(0.099)	0.121	(0.099)
Trade/Transport	-0.040	(0.074)	0.070	(0.077)
Services	0.078	(0.068)	0.148†	(0.079)
Intercept	-2.463**	(0.135)	-2.410**	(0.167)
N	28587		27255	
Log-likelihood	-1678.591		-1625.331	
$\chi^2_{(16)}$	216.932		176.846	

Significance levels : † : 10% * : 5% ** : 1%

Reference category: No training, Unskilled worker, Female, not married, Thuringia, Building and Construction

Table 9: Summary 93-95

Variable	Mean93	Std. Dev.	N	Mean94	Std. Dev.	N	Mean95	Std. Dev.	N
1 if mover	0.013	0.113	27909	0.012	0.11	29929	0.01	0.101	30776
log(wage)	4.491	0.387	27226	4.553	0.407	28735	4.597	0.42	29412
Without training	0.076	0.266	27909	0.085	0.278	29929	0.083	0.275	30776
With training	0.749	0.434	27909	0.735	0.442	29929	0.735	0.441	30776
UAS or Univ. degree	0.108	0.31	27909	0.109	0.312	29929	0.106	0.308	30776
Unknown edu	0.067	0.251	27909	0.072	0.258	29929	0.076	0.264	30776
Trainees and unskilled	0.144	0.351	27909	0.157	0.364	29929	0.164	0.37	30776
Skilled workers	0.403	0.491	27909	0.396	0.489	29929	0.393	0.488	30776
Clerks and foremen	0.453	0.498	27909	0.447	0.497	29929	0.444	0.497	30776
unemployed_(t-1)	0	0	27909	0.033	0.179	29929	0.059	0.235	30776
log(wage)_(t-1)	4.333	0.398	27909	4.458	0.456	28872	4.509	0.49	29625
age	38.623	10.413	27909	38.708	10.732	29929	39.124	10.879	30776
age_2	1600.134	810.447	27909	1613.471	837.659	29929	1649.057	857.634	30776
Sex	0.568	0.495	27909	0.572	0.495	29929	0.570	0.495	30776
Marital status	0.551	0.497	27909	0.549	0.498	29929	0.556	0.497	30776
Brandenburg	0.178	0.382	27909	0.177	0.382	29929	0.176	0.381	30776
Meck.-W. Pom.	0.123	0.328	27909	0.127	0.334	29929	0.126	0.332	30776
Saxony	0.347	0.476	27909	0.336	0.472	29929	0.339	0.473	30776
Saxony-Anhalt	0.191	0.393	27909	0.194	0.395	29929	0.193	0.395	30776
Thuringia	0.162	0.368	27909	0.165	0.371	29929	0.166	0.372	30776

Table 10: Summary 96-97

Variable	**Mean96**	**Std. Dev.**	**N**	**Mean97**	**Std. Dev.**	**N**
1 if mover	0.011	0.104	29718	0.011	0.105	28394
log(wage)	4.618	0.437	28587	4.624	0.451	27255
Without training	0.086	0.281	29718	0.094	0.292	28394
With training	0.731	0.443	29718	0.727	0.445	28394
UAS or Univ. degree	0.105	0.306	29718	0.102	0.302	28394
Unknown edu	0.078	0.268	29718	0.077	0.267	28394
Trainees and unskilled	0.167	0.373	29718	0.175	0.38	28394
Skilled workers	0.383	0.486	29718	0.377	0.485	28394
Clerks and foremen	0.45	0.497	29718	0.448	0.497	28394
unemployed_(t-1)	0.055	0.228	29718	0.075	0.263	28394
log(wage)_(t-1)	4.552	0.523	28514	4.575	0.551	27288
age	39.449	11.013	29718	39.596	11.176	28394
age_2	1677.483	873.769	29718	1692.745	888.717	28394
Sex	0.559	0.497	29718	0.558	0.497	28394
Marital status	0.556	0.497	29718	0.567	0.495	28394
Brandenburg	0.175	0.38	29718	0.175	0.38	28394
Meck.-W. Pom.	0.127	0.333	29718	0.129	0.336	28394
Saxony	0.34	0.474	29718	0.341	0.474	28394
Saxony-Anhalt	0.192	0.394	29718	0.193	0.395	28394
Thuringia	0.166	0.372	29718	0.161	0.368	28394

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