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European Integration and Labour Migration*

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Abstract: The present paper studies how European integration might affect the migration of workers in the enlarged EU. Unlike the reduced-form migration models, we base our empirical analysis on the theory of economic geography *à la* Krugman (1991), which provides an alternative modelling of migration pull and push factors. Parameters of the theoretical model are estimated econometrically using historical migration data. Our empirical findings suggest that European integration would trigger selective migration between the countries in the enlarged EU. In the Baltics, Lithuania would gain about 7.25% of the total work force. In the Visegrád Four, the share of the mobile labour force would increase the most in Hungary, 8.35%, compared to the pre-integration state. Our predictions for the East-West migration are moderate and lower than those of reduced-form models: between 5.44% (from the Baltics) and 3.61% (from the Visegrád Four) would emigrate to the EU North. Because migrants not only follow market potential, but also shape the region's market potential, the long-run agglomeration forces are sufficiently weak to make a swift emergence of a core-periphery pattern in the enlarged EU very unlikely.

Keywords: Europeanisation, asymmetric shocks, economic integration, model simulations, immigration policy, EMU, European Monetary Union, political science

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1. Introduction

The recent enlargements of the European Union (2004 and 2007) involving ten Central and Eastern European countries (CEE) and the financial and economic crises at the end of the last decade were unprecedented in how they changed the European migration landscape, as a result of which the context and assumptions around immigration have changed significantly. First, the differences in income and employment opportunities between the old EU Member States and most of the new EU Member States were (and in many regions still are) very large

(Kielyte and Kancs 2002).[1] Second, there was essentially no history of free migration between the Eastern and Western parts of Europe during the decades of separation by the Iron Curtain (Kancs and Kielyte 2010). Third, the new EU Member States from Central and Eastern Europe had undergone a transition from a centrally-planned economy to a market-based economy (Kancs 2007). Finally, the migration push and pull factors have changed significantly due to the financial crisis of 2007-2010 – potentially the most serious that the world economy has ever faced (Kancs 2011). Whereas in the new EU sending countries the migration push factors have increased, in the old EU receiving countries the pressure to limit immigration has grown for the second time since the EU enlargement, challenging one of the key fundamental principles upon which the Single European market was founded.[2]

These specific circumstances partly explain the sensitivity of the migration issue among policy makers and the general public across Europe, which traditionally stems from the apprehension of the potential economic, social, cultural and political consequences of migration. The extension of free movement rights to the 75 million of NMS citizens is a particularly sensitive topic, which is still sparking intense debates. Concerns about labour markets and welfare systems have received particular attention (Vink 2002; Forte 2010).

The free movement of workers constitutes a fundamental principle of the European Union, as stated in Article 39 of the Treaty establishing the European Community. According to the Treaty, the freedom of movement has to be equally granted to all EU citizens. Nevertheless, transitional periods of up to seven years were implemented, which restricted access of citizens from the new EU Member States to the labour markets in the old EU Member States. Only a few old EU Member States opened their labour markets with no or short transitional measures. Given this institutional variation and other important factors, such as geographic, linguistic or cultural distances, the recent EU enlargements have had heterogeneous effects on migration flows across Europe.

The extension of free movement rights to the enlarged EU has generated a large body of literature that attempts to predict the size and impacts of potential labour migration in the enlarged EU. The predictions of early migration studies, most of which were based on reduced-form migration models, are inconclusive, predicting emigration between 0.5% and 15% of the NMS's population (Straubhaar 1993).

Confronting these predictions with the observed migration flows during the first two decades since the fall of the Wall, we note that NMS were indeed characterised by sizable migration flows of several million people over the last twenty years (Boeri and Brücker 2005, European Commission 2008). Most of these migration flows, however, took place within Eastern Europe, and less than 1% of the total NMS's population has emigrated to Western Europe (European Commission 2007). The huge discrepancy between the model-based predictions and the observed migration is not surprising, given that most of the early migration studies were based on reduced-form models, where ex-ante values of key explanatory variables, such as wages and employment, have to be set by the researcher a priori. According to Russo

(2008); Kielyte (2008); and Schoellman (2009), a priori fixing of explanatory variables in transition economies, such as NMS, where these variables are subject to dynamic changes, is both empirically and theoretically problematic. First of all, migration itself affects wages, income, employment, and cost of living (Borjas 1994, Krugman 1991). This implies that, without a general equilibrium feedback mechanism (Accinelli et. al. 2010 and Martins 2010), it is hardly possible to predict when the relocation of labour force will stop or even reverse. For example, GDP per capita, which is one of the main explanatory variables in empirical migration models, has increased in most NMS considerably faster than was typically assumed in reduced form models.

These notable deviations between the reduced form model-based predictions and the observed migrations patterns in NMS suggest that the reduced-form approach is not a reliable tool for studying migration behaviour in small and open transition economies, which dynamically adjust to changes in labour market conditions. Instead, a different methodological framework is required, which does not rely on ex ante predetermined values of explanatory variables.

The choice of the framework depends, among others, on whether bilateral or net migration flows are of interest. Since our focus is sending regions in the NMS, the determination of net migration flows is sufficient. Therefore, following Crozet (2004), Kancs (2005), Pons et al (2007), Hering and Paillacar (2008) and Paluzie et al (2009), the current study adopts an alternative - economic geography - approach for predicting the direction and size of potential labour migration in the CEE accession countries. According to the New Economic Geography (NEG) (Krugman 1991), migrants not only follow market potential, they also affect market potential. In addition to its empirical success (Crozet 2004; Kancs 2005; Pons et al 2007; Hering and Paillacar 2008; Paluzie et al 2009), the main advantage of the NEG approach is that it incorporates important general equilibrium feedback mechanisms, which interacting with labour migration determine the equilibrium distribution of labour force.

This structural NEG approach, however, is considerably more involved than the reduced-form approach, as it consists of two steps. In a first step we derive an empirically estimable migration equation from the theoretical economic geography model, where inter-regional migration is driven by real wage differentials (section 3). Next, we estimate the migration model using data for historical migration patterns in the CEE accession countries, which provides estimates of key parameters of the theoretical economic geography model (section 4). In a final step, we empirically implement the theoretical economic geography model with statistical data and the estimated parameters, and perform simulations of integration-induced impact on labour migration in the enlarged EU (section 5).

2. Migration in Europe

2.1. Migration policy in the EU

The last two enlargements of the EU to the East in 2004 and 2007 have significantly expanded the geography of the free-movement area. Nationals from these countries, on becoming citizens of the EU, have been accorded rights of movement through the European Union and partner states (e.g. EFTA countries) that are broader than those available to other groups of migrants in Eastern Europe.

In light of concerns that a massive influx of workers from NMS would negatively affect the local wages and employment in OMS, the Accession Treaties allow for transitional arrangements restricting the free movement of workers from most of the NMS. The transitional arrangements can be applied for up to seven years, with the policy reviewed after two and five years (European Commission 2007).

Only three OMS -- Ireland, Sweden and the United Kingdom -- opened their labour markets to NMS workers from the date of accession. At the end of the first two-year period, four more OMS -- Spain, Finland, Greece and Portugal -- opened their labour markets, later followed by Italy, the Netherlands, Luxembourg, and France. Belgium and Denmark still apply some restrictions, while in Austria and Germany the inflows of workers from NMS countries are regulated by national law (mainly through seasonal work-permit schemes operating under bilateral agreements). However, a number of exemptions have opened labour markets for high skilled workers and specific categories in these countries (Kancs and Kielyte 2010).

Transitional arrangements for the NMS from the Balkans (Bulgaria and Romania) are at the start of their second phase (from 1 January 2009 to 31 December 2011). In the first phase, all OMS except for Finland and Sweden opted to restrict access to their labour markets for Bulgarian and Romanian workers. At the beginning of the second phase, Greece, Spain, Hungary and Portugal lifted the restrictions. Denmark stopped applying restrictions for workers from Balkan NMS from 1 May 2009, when it also ended all restrictions for workers from NMS. In the context of a broadening economic downturn and rising unemployment in the EU, some OMS which had earlier hinted at eliminating restrictions chose to maintain them (European Commission 2010).

2.2. Migration in the Baltics

The three Baltic countries experienced large immigrant inflows before the break-up of the Soviet Union, with most of the immigrants coming from other parts of the Soviet Union. After all three Baltic countries became independent in 1991, migration patterns have reversed and migration flows turned in the opposite direction. In the first half of the 1990s, the Baltics experienced significant migration outflows, mostly of the so-called "Russian speaking" population returning to their countries of origin. In Estonia, about 100,000 have returned to

their 'homelands', with the majority leaving for Russia. As a consequence, these countries became net emigration countries. By the end of the 1990s the emigration flows weakened considerably and migration balance became slightly positive in Estonia and Lithuania for several years.

In around the same time, the migration to the Western countries started to increase, e.g. the net emigration from Latvia to the West increased from nearly zero to 1500 in 1996. The major destinations for migrants from the Baltics were Finland and Germany for Estonia, and Israel, the US and Germany for Latvia and Lithuania. Nevertheless, with 15,000 Estonians, 8,000 Lithuanians and 7,500 Latvians, the number of the legal Baltic countries' residents living in the OMS countries was relatively low at the end of the 1990s (Kancs and Kielyte 2002).

After the accession to the EU in 2004, the emigration from the Baltic States to the OMS increased substantially (Traser and Venables 2005). In all three Baltic countries the largest outflow of emigrants occurred in the years after the accession (2004-2005), when the share of emigrants increased substantially. Due to improving income possibilities in the Baltics relative to the OMS, it started to diminish in 2006 and 2007. The weakening of worker outflow after 2005 was also related to the domestic labour market tightening in the Baltics in 2006-2007. During this time Latvia, Lithuania and Estonia experienced the highest increases in wage rate among all EU member states and relatively low unemployment levels. On average, during 2002-2007 the largest gross flows of emigration were from Lithuania, followed by Latvia and Estonia. The average annual level of gross emigration was around 40 thousand people from Lithuania, 20 thousand from Latvia and 7 thousand from Estonia (European Commission 2007). As before, there were significant differences between the three countries in terms of destination countries. While the largest number of emigrants from Estonia went to Finland, followed by the UK and Ireland, the main destination country for emigrants from Latvia and Lithuania was the UK, followed by Ireland and Germany. Furthermore, while the annual emigration to most of the countries fluctuated in different years, it was relatively stable to Germany. In addition, the cross-country differences are notable. Whereas the emigration flows increased fourfold from Lithuania and Latvia after the EU enlargement (compared to 2002-2003), they only doubled from Estonia.

The European Commission (2010) suggests that in 2009, twenty years since the fall of the Wall, the highest worker mobility rate among all EU member states was in Lithuania, with around 3% of total population having moved to other EU member states since the EU enlargement.

2.3. Migration in the Visegrád Four

Before the EU enlargement, nearly 300 thousand persons from the Visegrád Four were legally employed in the EU, accounting for 0.2% of the EU workforce (or around 6% of total non-EU foreign workers (European Commission 2007)). Germany and Austria hosted 70% of Visegrád Four workers in the EU. Broken down by sending country, 55,000 were from

Bulgaria, 35,000 from the Czech Republic, 20,000 from Slovakia, 77,000 from Hungary, 435,000 from Poland, 155,000 from Romania, and 20,000 from Slovenia. As a result of closed labour markets but unrestricted travel, it was estimated that, in addition to legal workers, there were around 600,000 undocumented workers from the Visegrád Four countries. The total number of legal immigrants, both working and non-active persons, from the Visegrád Four was approximately 830,000 in the beginning of the 2000s (European Commission 2007).

Simultaneously with the outflows to the West, the Visegrád Four itself developed into a migrant-receiving area. The Czech Republic, a regional leader, hosted as many as 150,000 migrant workers or foreign entrepreneurs in 2002, the majority of whom came from Slovakia and Ukraine. Also Hungary and Slovenia (and to a lesser extent Poland) received substantial numbers of immigrants. Most of the countries also recorded large inflows of asylum seekers; e.g. between 1996 and 2003 the Czech Republic 63,000, Hungary 45,000, Poland 35,000 and Slovakia 33,000 (European Commission 2008).

Emigration to the West increased substantially after the enlargement in 2004. In 2004 the number of the residents from these countries stood at around 900,000. Although, the exact scale of post-enlargement migration flows are difficult to determine, population statistics and Eurostat's LFS survey data suggest that the total number of people from the Visegrád Four, living in the OMS has increased by around 1.1 million since the enlargement in 2004 (European Commission 2010). Ireland has been by far the largest receiving country from the Visegrád Four relative to its population size, with around 5% of its current working age population from the Visegrád Four, followed by the UK (1.2%). Also Austria and Luxembourg host significant proportions of the recent arrivals from the Visegrád Four, albeit much fewer than in the UK and Ireland. In all other OMS, the population share of the recent Visegrád Four arrivals is very small, even in Sweden, which never applied restrictions to the free movement of workers, and in those MS, which have opened their labour markets since 2006.

As already noted, the mobility of labour force is different across the Visegrád Four countries. Polish citizens accounted for 25% of all recent intra-EU movers, who changed their residence to another EU member state. Around 60% of Poles went to the UK, while the second destination was Ireland. In total, around 2% of the total Polish and Slovak populations have moved to other EU member states since the EU enlargement in 2004. On the other hand, the Czech Republic and Hungary showed rather low mobility rates, which are similar to those of OMS.

3. Theoretical framework

3.1. The model

Usually, international labour migration is studied in a reduced form approach (Borjas 1994). In our study the standard reduced-form approach would be the superior choice, if we would be interested in bilateral migration flows and if we would know a priori how migration would affect the determinants of migration. Given that the reduced form approach of fixing the explanatory variables has been often rejected for small and open economies (Massey et al 1993, Gallup 1997, Fertig and Schmidt 2001), our study on NMS requires a framework, where both migration flows and explanatory variables could be determined endogenously. In the context of net migration, the general equilibrium framework seems to be superior for studying labour migration. An emerging strand of structural migration models find that migrants tend to follow market potential (Crozet 2004; Kancs 2005; Pons et al 2007; Hering and Paillacar (2008; Paluzie et al 2009). Using these insights, we base the theoretical framework[3] of our analysis on the theory of economic geography à la Krugman (1991) and Fujita, Krugman and Venables (1999).[4]

Similar to the models of Krugman (1991) and Fujita, Krugman and Venables (1999), the underlying conceptual framework of the present study is subject to several assumptions. Two assumptions of the underlying economic geography model are particularly important for the present study, as they might limit the generalisation of our results. First, we discuss driving forces of migration in the economic geography framework. These are common to all models of economic geography. Second, we discuss the particular assumptions of our model, which distinguishes our model within economic geography models.

One of the most critical assumptions of the economic geography framework is the limited number of forces driving workers migration decisions. In the economic geography framework, labour migration is solely driven by inter-regional differences in the maximal attainable utility. The indirect utility is in turn determined by manufacturing wages and the cost of living (price index). Inter-regional differences in the manufacturing wage and price index are in turn driven by differences in regions' (countries') economic geography, such as economic size of countries, remoteness from other countries, size of the manufacturing sector and inter-regional substitutability of manufacturing varieties. Thus, according to our model, any other factors leading to differences in per capita earnings (such as differences in the macroeconomic environment or available technologies), are not accounted for. In other words, our model explains only a part of all factors, which lead to income differences among regions and countries, and inter-regional differences in workers' income is only one among many push and pull factors leading to migration decision in reality. Hence, driving forces leading to migration decision in the model are only a part of the economic factors, which in reality determine economically driven migration, and economic factors consist of only a part of all socio-economic pull and push factors, which drive the migration decision in reality.

This limitation has implications for model predictions. The consistency which we achieve by endogenising the right-hand side variables might cost some explanatory power. Reduced form models have the ability to include an unlimited number of explanatory variables both economic and non-economic (such as cultural, ethnic, linguistic and historical preferences), if these increase the explanatory power and if sufficient data is available. This is not possible in the economic geography framework, which rests on the general equilibrium theory. These limitations in determining migration decision suggest that numerical values of model simulations should not be overemphasised, but have to be seen in a context of these assumptions.

Although, we cannot account for all cultural, ethnic and historical migration preferences explicitly in the economic geography model, we can partially account for these factors by regrouping all CEE countries along their cultural, ethnic and historical migration preferences in the simulation exercises. According to the recent migration trends discussed in section 2, workers from the Baltics usually choose to stay within the Baltics and workers from the Visegrád Four usually choose to stay within the Visegrád Four. In order to account for these regional preferences in the empirical analyses, we model migration in these two regions separately. For comparison, we also perform simulation exercises, where workers from the Baltics are allowed to migrate to the Visegrád Four and vice versa.

The second critical assumption of the underlying theoretical framework is specific to the particular economic geography model which we adopt for this study. The canonical Krugman's (1991) core-periphery model has Cobb-Douglas preferences. In order to achieve the analytical solvability of the model, Ottaviano, Tabuchi and Thisse (2002); Forslid and Ottaviano (2003); and Kancs (2005) replaced the Cobb-Douglas preferences with quasi-linear preferences (quadratic quasi-linear function and logarithmic quasi-linear). The main effect of introducing quasi-linear preferences is that consumer demand for manufacturing goods solely depends on regional price index and on model parameters but not, as with the Cobb-Douglas utility function, on worker income. Given that manufacturing good demand determines the equilibrium location of firms and workers, altering the functional form of the upper-tier utility will affect the spatial outcome of the Krugman's (1991) core-periphery model.

The spatial outcome of the two economic geography models can best be compared by looking at the sets of spatially stable equilibriums. The canonical Krugman's (1991) core-periphery model with Cobb-Douglas preferences exhibits a 'subcritical pitchfork bifurcation', implying that when transport costs decline to a certain level (the sustain point), two stable fully agglomerative equilibriums appear in addition to the initial symmetric equilibrium. At a still lower level of transport costs (the break point), the symmetric equilibrium becomes unstable. Our model with quasi-linear preferences exhibits a 'supercritical pitchfork bifurcation', where at a certain level of transport costs, the initial symmetric equilibrium becomes unstable and two stable asymmetric equilibriums emerge. The two equilibriums become increasingly asymmetric, when transport costs are lowered. Thus, the model predicts a smooth transition from symmetry to agglomeration in the course of trade integration and a stable interior

equilibrium with some, but not all mobile workers concentrated in one region can emerge. Kancs (2005) argues that this type of spatial agglomeration may even be a better description of industry and workers' relocation processes that will potentially be initiated by the European integration compared to the 'catastrophic' emergence of a complete agglomeration predicted by the canonical Krugman's (1991) core-periphery model.

What are implications of this particular theoretical framework for our study? Removing income effects from manufacturing goods demand generates an additional dispersion force in the Krugman's (1991) core-periphery model. This additional dispersion force is, in our view, a useful component in a model with perfectly mobile labour, when studying labour migration questions in Europe, where international labour mobility is extremely low. The goal of future research should nevertheless be to account for both income effects and imperfections in labour mobility. Beyond imperfections in worker mobility, the location taste heterogeneity generates additional dispersion force. This has not been accounted for in the present study and is a promising avenue for future research.

4. Parameter estimation

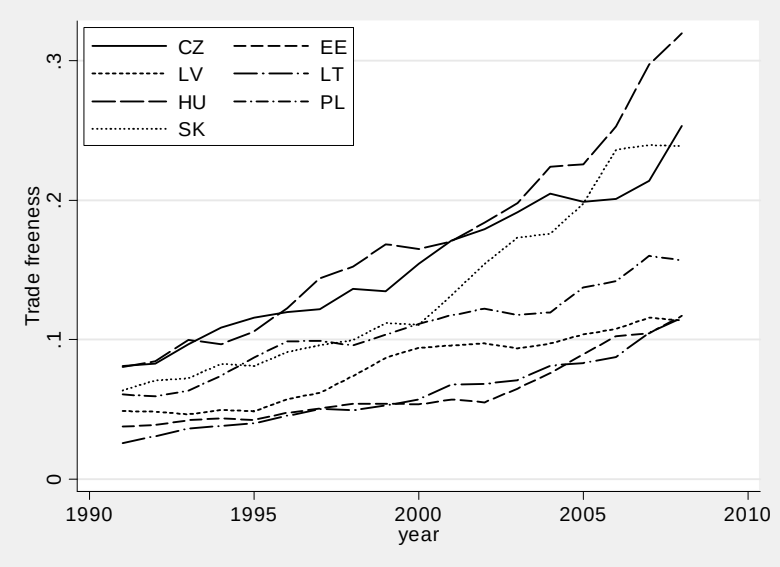
4.1. Trade cost estimates

The empirical implementation of the underlying economic geography model requires numerical parameter values, which we estimate in the following sections. The estimation of the trade freeness equation (1), which is formally derived in Kancs (2010), requires bilateral trade data for importers and exporters, M_{od} and M_{do}, and domestic sales in each country, M_{oo} and M_{dd}.

$$\varphi_{od} = (M_{od}M_{do} / M_{oo}M_{dd})^{1/2} \qquad (1)$$

The time period covered in the available trade data spans from 1991 to 2008. Eurostat's External Trade Statistics (COMEXT) provides bilateral trade flows in SITC and NACE classification. The COMEXT trade data has a detailed time, country and sectoral coverage and is already available for all CEE accession countries. Therefore, we use the COMEXT trade data, which allows us to build eight equally sized panels each containing 144 observations (8 countries x 18 years). The obtained trade freeness estimates are reported in Figure 1, where trade freeness, φ_{od}, is on the vertical axis and time measured in years on the horizontal axis.

Figure 1. Trade freeness of intra-CEE trade, 1991-2008



According to Figure 1, the intra-CEE trade freeness is rather different across the eight CEE economies. We can identify two groups of CEE countries: three Visegrád (CZ, HU and SK) and three Baltic (EE, LT and LV). Poland is between the two groups. Generally, the estimated trade freeness for the Visegrád countries is higher than for the Baltic countries throughout the whole interval. Among others, these sizeable differences in trade freeness between the Visegrád and Baltic countries might be attributed to different time lines when the Visegrád and Baltic countries entered into regional free trade agreements (BAFTA - the Baltic Free Trade Agreement was established several years later than CEFTA - the Central European Free Trade Agreement). Figure 1 also indicates a clear upward trend - trade freeness increases steadily in all our sample countries, although at different rates. On average, trade freeness has increased by 230% (from 0.057 to 0.188) between 1991 and 2008.

Hungary has the highest trade freeness among the four Visegrád countries (0.320). The Czech Republic started well but its trade freeness did not increase significantly during the nineties. In fact, it declined compared to the rest of the CEE. Until 2004 the freeness of intra-CEE trade was equally in the Czech Republic and Hungary. Comparing our estimates with those reported in Kancs (2007), we note that trade freeness estimates for the Visegrád countries is in the same order of magnitude, which indicates a solid robustness of our estimates.

Intra-CEE trade freeness for the three Baltic countries, with respect to the rest of the NMS, has not been estimated in the literature before and hence cannot be compared directly. In our view, the estimated trade freeness for the Baltic countries appears to be rather low (0.117, 0.114 and 0.116, respectively in 2008), despite the fact that these countries are known for their high levels of the formal trade integration (e.g. BAFTA). The estimated trade freeness is particularly low in Estonia and Lithuania, where until 2003 φ_{od} varies around 0.05. Kancs (2005) estimates the intra-Baltic trade freeness until 2004. His estimates are in the same range of magnitude, but with more pronounced differences between the three Baltic countries. He

explains those differences among the three Baltic countries by two factors. First, the geographical location - the three countries are located along the Baltic Sea and Estonia does not have a land border with Lithuania. Second, intra-BAFTA trade between Estonia and Lithuania is not only associated with the largest average transportation distance, shipping between Estonia and Lithuania have to cross more borders.[5] Both factors are captured by intra-Baltic trade freeness, φ_{od}, which sum up to sizeable differences.

4.2. Migration estimates

The empirical estimation of migration equation (2), which is derived in Kancs (2010), requires time series cross section data of bilateral migration flows, M_{od}, sectoral output data, X_r, and multilateral resistance, θ_r.

$$\ln M_{odt} = \beta_1 + \beta_2 \ln \theta_{ot-1} + \beta_3 \ln \theta_{dt-1} + \beta_4 X_{dt-1} + \beta_5 X_{ot-1} \nu_{od} + \varepsilon_{odt} \quad (2)$$

Migration data is drawn from the national statistics, which provide immigration data by education and country of previous residence. Sectoral output, X_r, data is drawn from the Eurostat's New Cronos Theme 2 - Economy and Finance, Domain - Accession countries non-financial accounts (NAMNAG). Calculation of the multilateral resistance index requires data for trade freeness, φ_{od}, the supply of labour force in each country, H_r, and the total labour force, H. Trade freeness, φ_{od}, has already been estimated in the previous section. Country endowments with labour force are drawn from the New Cronos Theme 3 - Population and social conditions, Domain - Employment (EMPLOY).

Table 1. Fixed effects estimates of intra-CEE migration

	CZ	EE	HU	LV	LT	PL	SK	SI
β_2	-0.482*	-0.531*	-0.625**	-0.607*	-0.579**	-0.537*	-0.499**	-0.533*
	(0.123)	(0.108)	(0.083)	(0.106)	(0.085)	(0.129)	(0.066)	(0.097)
β_3	0.254	0.323*	0.342	0.250	0.276*	0.313*	0.318*	0.333
	(0.147)	(0.077)	(0.154)	(0.138)	(0.071)	(0.090)	(0.092)	(0.148)
β_4	0.925**	0.899**	0.842**	0.945*	0.862**	0.899*	0.757*	0.901**
	(0.108)	(0.068)	(0.072)	(0.126)	(0.076)	(0.124)	(0.133)	(0.106)
β_5	-0.975*	-1.005**	-0.963**	-1.009*	-1.038*	-1.019*	-1.019*	-1.032**
	(0.139)	(0.067)	(0.079)	(0.124)	(0.100)	(0.115)	(0.151)	(0.081)
N	126	126	126	126	126	126	126	126
R^2	0.523	0.550	0.534	0.480	0.499	0.462	0.458	0.532

*Notes: Dependent variable: log of migration rate, ln E_{od}, (equation 2). Standard errors in parenthesis. *significant at 95% level, **significant at 99% level.*

The regression results for the fixed effects model are presented in Table 1. All coefficients have the expected signs, which is due to the imposed coefficient restrictions. Generally, coefficients of manufacturing output (β_4 and β_5) are more significant that coefficients of

multilateral trade resistance (β_2 and β_3). According to the estimates reported in Table 1, origin country o's multilateral resistance affects labour migration negatively, destination country d's positively. According to our estimates, origin country o's manufacturing output affects labour migration negatively, destination country d's positively. These results are in line with Crozet (2004), Pons et al (2007), Hering and Paillacar (2008) and Paluzie et al (2009), suggesting that migrants do follow the market potential.

As usual, we test the robustness with respect to the choice of the estimator and the maintained assumptions. In particular, we estimate equation (2) using contemporaneous values of θ and X. Robustness test results suggest that, when the OLS estimator or when contemporaneous values of explanatory variables are used instead, coefficient signs do not change. Not controlling for the county-pair fixed characteristics increases variation of β_2 and β_3 coefficients across countries (Kielyte 2008). Moreover, the magnitude of these coefficients do not change significantly. Changes in coefficients β_4 and β_5 are even smaller, suggesting that the fixed effects estimates are robust. Testing the idiosyncratic errors for serial correlation is tricky, as we cannot estimate ε_{odt}. Because of the time demeaning used in fixed effects, we can only estimate the time-demeaned errors of ε_{odt}. However, given the small time dimension of our panel, we abstract from this issue in the present analysis.

Migration estimates provide us with the underlying structural parameters of the NEG model: from β_2 and β_5 ($\sigma_o = 1/\beta_5 + 1$ and $\alpha_o = \beta_2 (1 - \sigma_o)$) we back out parameter α_o, which describes consumer preferences for manufactured goods in origin region, and parameter σ_o, which represents the constant elasticity of substitution between manufacturing varieties in the origin region.[6] Table 2 reports the obtained parameter values.

Table 2. Estimates of structural parameters α_o and σ_o

	CZ	EE	HU	LV	LT	PL	SK	SI
α_o	0.495	0.528	0.649	0.601	0.558	0.528	0.490	0.516
	(0.886)	(1.613)	(1.049)	(0.856)	(0.853)	(1.121)	(0.435)	(1.201)
σ_o	2.026	1.995	2.039	1.991	1.963	1.982	1.981	1.969
	(0.139)	(0.067)	(0.079)	(0.124)	(0.100)	(0.115)	(0.151)	(0.081)

Notes: Parameter values calculated from estimates in Table 1 using the structural equations $\sigma_o = 1/\beta_5 + 1$ and $\alpha_o = \beta_2 (1 - \sigma_o)$.

Parameter values reported in Table 2 suggest that both parameters - consumer preferences for tradable goods and the elasticity of substitution between manufacturing varieties - are heterogenous across the CEE accession countries, but in the same order of magnitude. The average value of σ_o is 1.993 with a standard deviation of 0.026. Compared to literature, our estimates of σ_o are rather low. This deviation might be partially explained by lower income and hence higher importance of product prices, and a generally low willingness to substitute for imported products in the post-Soviet CEE transition economies (Kielyte 2002). The average value of α_o is 0.546 with a standard deviation of 0.055. Also these values are lower than literature estimates for the OMS and OECD economies. These deviations can eventually

be explained by the fact that in the CEE transition economies consumers spend a higher share on food and agricultural products (Kielyte 2002).

5. Predicting integration-induced migration

5.1. Baseline equilibrium

Empirical implementation of the economic geography model requires two types of data: a cross-section of exogenous variables and numerical values of the model's parameters. Endowments with the immobile factor (land) are drawn from the New Cronos Theme 1 - General Statistics, Domain - Central European Countries. Sectoral expenditure shares are drawn from the New Cronos Theme 2 - Economy and Finance, Domain - Accession countries non-financial accounts (NAMNAG). Base year endowments with the mobile factor (labour) are drawn from the New Cronos Theme 3 - Population and social conditions, Domain - Employment (EMPLOY).

Solving the economic geography model, we obtain short-run equilibrium values for all endogenous variables, such as prices, manufacturing output, wages, sectoral employment for each region ('base run'). The obtained base run equilibrium values (P_r, W_r and X_r) are different across the CEE regions. Inter-regional differences in the manufacturing price index and wage rate give rise to inter-regional differences in the indirect utility, V_r, and firm profits, which implies that this is not a long run equilibrium.

According to the underlying economic geography model, the transition from the short-run equilibrium to the long-run equilibrium occurs through workers' migration and firm relocation. We assume that workers migrate to regions with the highest attainable utility and firms relocate to regions with the highest profits. Practically, we calculate the number of workers required to enter/leave each region in order to achieve the long run equilibrium of the regional share of mobile workers and the explanatory variables, using the short run equilibrium values of P_r, W_r and X_r and fixing the inter-regional utility differences at zero. Subtracting the short-run equilibrium values from the long run equilibrium values and expressing these in terms of the initial labour endowment, we obtain a net migration rate for each region, $\mathbb{M}^{BR}$. This migration rate tells us how many mobile workers had to move into or out of each region in order to establish an inter-regional equilibrium.

In order to assess the robustness of the base run results, we compare the predicted net migration rate, $\mathbb{M}^{BR}$, in the base run with observed migration flows in 2007, M^{07}. This comparison is not straightforward, however. First, because of misspecification of the model (missing variables, specific functional forms), there are differences between the driving forces of worker migration in the model and in the reality. For example, according to the underlying economic geography model, the only way that workers can deliberately increase their utility, is to move from a low-wage region to a high-wage region. In reality, however, because of

language, cultural, political and many other non-pecuniary aspects, workers might prefer to stay put or even move to low-wage regions.

Second, the time-scales are different. In statistical data migration is usually expressed either as a number of migrants per year or in percent of the total population per year. Our simulation results, on the other hand, do not give any time reference, i.e. the underlying economic geography model does not provide any information about how long the transition from the short-run equilibrium to the long-run equilibrium will last.

In order to account for these limitations in result comparability, instead of comparing the absolute migration rates, we compare the relative migration rates, i.e. we express the predicted migration in region 1 in terms of migration in region 2 ($\mathbb{M}_1 / \mathbb{M}_2$, where $\mathbb{M}_1$ and $\mathbb{M}_2$ are the predicted net migration rates in regions 1 and 2) and compare it with the corresponding values observed in the data (M_1 / M_2). The comparison indicates that the relative migration rates, which our model predicts, are indeed of the same order of magnitude as those recorded in statistical data, which allows us to conclude that our results are robust, at least in relative terms. Differences in the absolute values of migration underline that numerical results should not be overemphasised, but have to be seen in a context of the model's assumptions, which we outlined in section 3.

5.2. Integration-induced migration in the Baltics

The factor and product market integration in the CEE accession countries is modelled as declining inter-regional trade costs. For setting up integration scenarios of declining border-crossing costs, we require two types of transport cost data: (i) the magnitude of transport costs in the base year, and (ii) integration-induced changes in the inter-regional transportation costs. Trade freeness has already been estimated in the previous section. Reliable estimates of transportation cost changes related to future labour and product market integration in the CEE accession countries are not available in the literature yet. Therefore, in order to overcome this data limitation, we construct several hypothetical scenarios, which will help us to understand what type of labour market effects could be expected from the EU integration.

In order to simulate labour and product market integration and to assess integration-induced labour migration in the CEE accession countries, we proceed as follows. First, we exogenously change the level of trade costs to the peripheral regions in 10% steps up to 60%. Solving the model for the short-run equilibrium with spatially immobile labour, we obtain a solution with sizeable inter-regional differences in price indices, wages and worker utility. As explained above, this is not a stable long-run equilibrium solution, because inter-regional differences in explanatory variables give workers an incentive for relocating. Therefore, in a second step we solve the model for a new inter-regional distribution of human capital, such that the indirect utility is equalised between regions. In other words, we exogenously set inter-regional differences in indirect utility equal to zero for all pairs of regions and solve the model for new equilibrium values of mobile labour. The net migration is then calculated as

difference between the two,[7] where negative values stand for emigration of region r, and positive values stand for migration to region r. Migration rate is obtained by normalising by the total labour force.

Table 3 reports simulation results for six different levels of trade cost reductions. Columns 2-6 report the predicted migration rate as a percentage of the regions' initial endowment with mobile workers. Considering the estimates reported in Table 3, we note that an asymmetric integration shock results in substantial differences in the net migration rate among the three Baltic countries. Aggregate migration flows (immigration minus emigration) do, however, sum up to zero in each period fulfilling the general equilibrium condition of the total labour supply.[8]

Table 3. Integration-induced net migration in the Baltics, share of labour force

	$\mathbb{M}^{10}$	$\mathbb{M}^{20}$	$\mathbb{M}^{30}$	$\mathbb{M}^{40}$	$\mathbb{M}^{50}$	$\mathbb{M}^{60}$
Estonia	-9.27	-9.33	-8.73	-7.35	-4.87	1.53
Latvia	-3.06	-3.17	-3.52	-4.32	-5.82	-9.65
Lithuania	5.78	5.71	5.83	5.85	5.77	5.90

Notes: $\mathbb{M}$: "–" emigration, "+" immigration. Source: NEG model calculations based on New Cronos data for 2007.

The simulation results reported in Table 3 also suggest that, if factor and product market integration in the Baltics would follow the particular pattern we assumed in our simulations, then the two peripheral regions would be the largest gainers in terms of the region's share of mobile workers (column $\mathbb{M}^{60}$ in Table 3) and manufacturing firms. As expected from the underlying economic geography framework, transport cost reduction between the two asymmetric peripheral regions, allows the largest peripheral region (Lithuania) to attract relatively more mobile workers than the smallest peripheral region (Estonia). Lithuania steadily attracts more and more mobile workers from other regions throughout the whole interval of integration: migration increases from 5.78% when transport costs are reduced by 10% to 5.90% when transport costs are reduced by 60% (Table 3).

Latvia, the 'core region' in the Baltics, turns out to be the largest looser from the labour market integration, if transport costs to the peripheral regions decline more rapidly than to the core region. The emigration rate from Latvia is continuously increasing from 3.06%, when transport costs are reduced by 10%, to 9.65%, when transport costs are reduced by 60% (Table 3). Given that transport costs are reduced asymmetrically favouring the two peripheral regions (Estonia and Lithuania), these results are in line with our expectations and with the underlying theoretical framework.

Estonia is eventually the most interesting country from the new economic geography perspective. According to our simulations, the relationship between market integration and Estonia's share with mobile labour is non-linear and non-monotonic. Initially, the trade cost reduction to the peripheral regions, of which Lithuania is relatively large and Estonia is

relatively small, gives rise to agglomeration of workers and firms in the peripheral region with the largest internal market (Lithuania). At the beginning of the simulated integration process the peripheral region with the smallest internal market (Estonia) looses more than 9% of its mobile work force (columns $\mathbb{M}^{20}$ and $\mathbb{M}^{30}$ in Table 3). When the inter-regional transport costs fall below some critical level, Estonia starts to attract mobile workers and its share of mobile workers begins to increase.

5.3. Integration-induced migration in the Visegrád Four

We study the integration-induced migration in the Visegrád countries by performing the same simulation exercises as for the Baltic countries. According to Table 4, the largest winner of integration in the Visegrád Four is Hungary, where the immigration of labour steadily increases from 0.71% ($\mathbb{M}^{10}$) to 6.77% ($\mathbb{M}^{60}$) compared to the base run. However, Hungary reaches agglomeration peak (break point) at circa $\mathbb{M}^{50}$, from when the immigration starts to decline. These results are consistent with the estimated trade freeness for Hungary, which is the highest among all Visegrád countries (Figure 1). The two other Visegrád countries benefiting from economic integration are the Czech Republic and Slovakia. However, Table 4 indicates that the pattern of integration-induced migration is different among these two Visegrád countries. The Czech Republic first attracts mobile labour, then starts to lose, whereas Slovakia loses economic activity and labour at the beginning of integration, but starts to attract workers at around $\mathbb{M}^{30}$. Poland is the ultimate looser of integration in terms of mobile labour, although Poland has the largest internal market. These losses may be associated with the highest transport costs (lowest trade freeness) relative to other Visegrád countries (Figure 1).

Table 4. Integration-induced net migration in the Visegrád Four, share of labour force

	$\mathbb{M}^{10}$	$\mathbb{M}^{20}$	$\mathbb{M}^{30}$	$\mathbb{M}^{40}$	$\mathbb{M}^{50}$	$\mathbb{M}^{60}$
Czech Republic	6.70	8.02	9.43	2.14	1.48	0.70
Hungary	0.71	1.03	2.65	6.56	7.04	6.77
Poland	-2.03	-2.50	-3.52	-2.60	-2.59	-2.33
Slovakia	-1.53	-1.06	-1.95	-0.07	0.45	1.07

Notes: $\mathbb{M}$: "–" emigration, "+" immigration. Source: NEG model calculations based on New Cronos data for 2007.

Similar to the Baltics, Table 4 indicates that the regional share of labour and hence migration rate is non-linear and non-monotonic in transport costs. Because these three agglomeration/dispersion forces - the price-index effect, the demand linkages and cost linkages - are region-specific, the factor and product market integration associated with declining border-crossing costs between regions has an ambiguous effect on utility of workers and, hence, on inter-regional migration. The presented numerical simulations offer a useful insight to the possible relationships between migration pull and push factors in light of the ongoing factor and product market integration in the EU. The ability to predict the levels at

which the net migration rate will start to decrease and reach zero are one of the key advantages of the economic geography approach, they are exogenous in reduced form models.

5.4. East-West migration

Given the extraordinary high relevance of the East-West migration in Europe, in this section we perform stylised simulation exercises of labour and product market integration between NMS and OMS. According to section 2.1, Ireland, the UK, and Sweden are the only old MS, which opened their labour markets as from the first day of the EU enlargement. Therefore, in addition to the eight NMS, we include these three EU-North OMS in the set of potential destination choices for migrants.[9]

As in the previous two sections, we draw the data for regional endowment with the immobile factor (land), initial endowment with labour and income share spent on manufacturing goods from the Eurostat's New Cronos database. Parameters for the Baltics and the Visegrád have already been estimated and are averaged by weighting according to the regions' share of labour force.[10] Parameters for the EU-North cannot be estimated econometrically, as our data does not contain time-series for OMS. These parameters are drawn from the literature (Kielyte and Kancs 2002; and Kancs 2005). For studying the East-West migration, we assume that factor and product market integration between NMS and OMS would symmetrically reduce inter-regional transaction costs.

Table 5. Integration-induced East-West net migration, share of labour force

	$\mathbb{M}^{10}$	$\mathbb{M}^{20}$	$\mathbb{M}^{30}$	$\mathbb{M}^{40}$	$\mathbb{M}^{50}$	$\mathbb{M}^{60}$
Baltics	-3.16	-4.60	-6.51	-5.08	-4.67	-4.38
Visegrád	-0.56	-0.91	-1.64	-3.10	-3.23	-3.03
EU-North	0.69	1.10	1.82	2.80	2.79	2.57

Notes: $\mathbb{M}$: "–" emigration, "+" immigration. Source: NEG model calculations based on New Cronos data for 2007.

Table 5 reports simulation results for the three EU regions: the Baltics, the Visegrád Four and the EU-North. According to Table 5, workers from the Baltics and the Visegrád Four would migrate to the EU North, if the three European regions would symmetrically reduce inter-regional transaction costs by the same percentage between all regions: the mobile labour share declines in the Baltics and in the Visegrád Four, while it increases in the EU-North. At some lower level of inter-regional transport costs (which are region-specific), the agglomeration (net migration) stabilises. The share of mobile labour force starts to increase in CEE and decline in EU North. These results are qualitatively similar to intra-Baltic and intra-Visegrád country migration results reported in the two previous sections, and are in line with Krugman (1991).

5.5. Comparison with previous studies and limitations

A growing number of migration studies rely on the economic geography framework (Crozet 2004, Kancs 2005, Pons et al 2007, Hering and Paillacar 2008; Paluzie et al 2009; Kancs 2011). Crozet, Pons et al, and Paluzie et al estimate quasi-structural economic geography models relating market access to workers' location choices in Europe. The results of all three studies show that the economic geography framework provides a good explanation of migrant behaviour in the EU. Hering and Paillacar analyse bilateral migration between Brazilian states using regional differences in access to international markets. They find that workers choose to migrate to states with higher market access. Kancs (2005) uses a new economic geography model to predict migration flows in the Baltics. Simulating European integration as a reduction in trade costs, he finds that, depending on the integration scenario, between 1.8% and 11.0% of workers would change their country of residence. Hence, the results presented in this study are in line with previous literature, where migrants follow the market potential.

Comparing our predictions with reduced form models, we note that our calculations are different from the estimates in the literature. For more than a decade, the general statement of reduced form migration literature was that the common EU labour market will initiate massive labour migration from the CEE accession countries, with peak levels arising during the first years after the EU enlargement. Accordingly, between 0.5 and 15.0% of the current CEE population was predicted to migrate to OMS in the medium and long run (10-30 years) (Boeri and Brücker 2001; Fertig 2001; Kielyte and Kancs 2002). Reduced form estimates in the literature are extremely diverse themselves. This is little surprising, because in reduced form models all assumptions about country developments and the response to integration, migration and development are made a priori based on econometricians beliefs. In contrast, our results suggesting that between 4.38% (from the Baltics) and 3.03% (from the Visegrád Four) of the total workforce would move, are considerably more robust and moderate.

Deviations among previous studies and our calculations might be caused, among others, by misspecification of the models (missing variables, specific functional forms), differences in the data used, differences in source and destination countries studied, and differences between the underlying theoretical frameworks. One particular feature that sets the framework employed in our study apart from the traditional reduced-form specifications is implied by differences in the treatment of explanatory variables. According to the underlying economic geography model, the relocation of workers not only absorbs market distortions caused by short-run transitory shocks, it also induces changes in explanatory variables, such as wage rate, utility and profits. For example, if the net wage (indirect utility) is a positive function of region's size of labour force, as in the underlying economic geography model, then migration will induce circular causality forces in the economy. These circular causality forces are captured in the underlying economic geography model, but missed out in reduced form models (Massey et al 1993, Gallup 1997, Fertig and Schmidt 2001). As a result, in our model labour migration converges to zero endogenously, whereas in reduced form models it is exogenous.

6. Conclusions

The present paper analyses how product market integration might affect labour migration in the CEE accession countries. First, from the theoretical economic geography model we derive estimable trade cost and migration equations. Estimating these equations based on historical data for CEE yields parameter estimates, which we use to empirically implement the theoretical NEG model. Finally, we perform simulation exercises of European integration and assess impacts on labour migration in the Baltics, the Visegrád Four and EU-North.

The theoretical framework adopted in this study is rather different from the conventional migration studies. Given that the traditional reduced-form approach, where explanatory variables are exogenous and fixed a priori, has serious drawbacks for studying migration in small and open economies, we propose an alternative approach, which is based on the economic geography theory à la Krugman (1991). The economic geography framework applied in this study allows us to cope with several problems of reduced-form models, such as wrong assumptions, endogeneity and reverse causality of the right-hand side explanatory variables, which is a particularly critical issue in the CEE transition economies. A potential downside of the economic geography approach is that a structural model per se does not guarantee a better fit - certain reduced-form specifications might still perform better in terms of explanatory power and forecasting performance. Therefore, we urge for more research, both methodological and empirical, be devoted to the estimating and testing of economic geography models in predicting the location of firms and workers. Future expectations may also play a significant part in migration decisions - expecting improvements in the home country's economy may delay migration decision or ultimately erase the idea of migration. This issue has not been considered in the current study and is a promising avenue for future research.

Our empirical findings predict a selective migration between the CEE accession economies, if market integration would advance. However, according to our empirical results, labour migration is sufficiently low to make a swift emergence of a core-periphery pattern very unlikely in both the Baltics and Visegrád Four. These results are in line with previous studies of labour migration in the CEE.

Simulation results for the Baltics suggest that the peripheral regions would be the largest winners in terms of the share of workers and manufacturing activity. According to our simulation results, Lithuania steadily attracts more and more mobile workers from Estonia and Latvia: the immigration rate to Lithuania increases from 5.78% if transport costs decline by 10% to 5.90% if transport costs are reduced by 60%. Latvia, the core region, turns out to be the largest looser from integration in the Baltics. The emigration rate from Latvia is continuously increasing from 3.06% to 9.65%. Given that transport costs are reduced asymmetrically favouring the two peripheral regions (Estonia and Lithuania), these results are in line with our expectations and with the underlying economic geography framework. The

results for Estonia are particularly interesting, as they suggest that the relationship between market integration and the share of mobile labour force is non-linear and non-monotonic.

The results for the Visegrád countries suggest that the largest winner of economic integration would be Hungary, where the share of mobile labour would increase by 6.77% compared to the pre-integration state. However, Hungary reaches the agglomeration peak soon, and its share of mobile labour starts to decline after that. The two other winners from integration in the Visegrád Four would be the Czech Republic and Slovakia. Whereas the Czech Republic first attracts mobile labour, then starts to loose, Slovakia looses mobile workers at the beginning of integration and starts to attract them at more advanced levels of integration. Poland, which has the largest internal market in the Visegrád countries, turns out to be the ultimate looser of integration in terms of labour force and economic activities. Similarly to the results for the Baltics, these results suggest that the local share of mobile labour, and hence migration, is both non-linear and non-monotonic in transport costs.

Simulation results for the East-West migration suggest that workers from the Baltics and Visegrád Four would migrate to EU-North, if market integration would symmetrically increase between the three European regions, implying that the share of mobile labour would decline in the Baltics and in the Visegrád Four, while it would increase in the EU-North. However, our results also suggest that at some lower level of inter-regional transport costs (which are region-specific), the share of mobile labour force starts to increase in the CEE and decline in the EU North. This prediction is in line with the empirical migration literature, which looking forward notes that, the economically motivated migration, which largely depends on differences in the level of prosperity between home and destination regions, will likely become less marked as Europe becomes more integrated.

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Endnotes

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[1]In this paper EU-15 are referred as old EU Member States (OMS) and CEE-8 accession countries as new EU Member States (NMS), which include the Czech Republic, Estonia, Hungary, Latvia, Lithuania, Poland, Slovakia and Slovenia.
[2]The integration of factor and product markets is one of the main goals of the Single European market, which was created in 1992. The free movement of workers within the Single European market is an integral part of the Treaty of the European Community and the freedom of movement is one of the fundamental principles upon which the Single European market was founded. It belongs to the *acquis communautaire* that has to be granted reciprocally to citizens from the old and new EU Member States (MS) (*European Commission* 2007).
[3]The formal model is derived fully in Kancs (2010).
[4]The present model also incorporates features of Ottaviano, Tabuchi and Thisse (2002) and Forslid and Ottaviano (2003).
[5]Whereas the bilateral trade between Estonia and Lithuania involves at least two border crossing (depending on the exact route up to four borders), the bilateral trade between any other pair of regions usually involves crossing of only one border.
[6]Each migrating worker has eight destination choices, which are pooled together in the panel data estimation. Given that the number of destination choices is larger than one, of parameters α_d and σ_d are not consistent with the theoretical model and, therefore, cannot be used for parameterisation of the model.
[7]Analytically, we are able to calculate the long-run equilibrium solution for the regions' share of mobile factor. Empirically, in the R -region case with region-specific parameters it turns out impossible to solve the model for the long-run equilibrium in one step.
[8]Zero net migration balance, when all regions weighted by their population are summed up.
[9]EU-North: Ireland, the UK, and Sweden.
[10]A consistent parameter estimation would require estimation based on aggregate data, which is beyond the scope of the present study.