Migration Responses to Regional Labor Market Conditions in Slovakia[1]

*Slavomír ONDOŠ – Marcela KÁČEROVÁ**

Abstract

Migration is expected to play an important role in establishing labor market equilibrium as implied by the neoclassical regional growth model. The economy in Slovakia has experienced a series of major interventions, potentially accompanied by regional adjustment processes: the post-socialist transition from a planned to an emerging market economy, partial separation from the Czech economy, and integration into the global economy on the basis of European Union membership and resultant investments. The core-periphery structure of the national labor market is expected to affect relocation decisions of households, and vice versa, migrants are expected to modify regional labor markets based on the origin and destination of their moves. This paper examines the migration response based on varying regional economic conditions. The spatial panel modeling framework is used to verify the existence of effects from unemployment rates and the level of employees' wages. These levels and lagged first differences between one and ten years suggest a complex chronological response in the size and significance of the effects, differentiating between early and late responses within and between regions.

Keywords: *migration, spatial panel model, unemployment, wages*

JEL Classification: J61, O15, R23

1. Introduction

The economic landscape of Slovakia has been gradually polarized between more and less prosperous regions, the source of which is partly in the nature of the previous settlement system. According to Huber (2004), the small size of

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regional centers has led to relatively high unemployment and lower wages within their periphery. Regions that are not along a foreign border, single industry regions and agricultural regions have all been experiencing labor market difficulties. The regional patterns established alongside the reintroduction of market mechanisms clearly have not changed in reaction to policies that have been implemented at several levels of public intervention (Heyns, 2005). Puga (2002) stated that insufficiently low exchange of labor, plus institutional constraints on wage adjustments, may be responsible for a large part of the inequality. Lack of interest in migration is also recognized by Clemens (2011) as an important economic factor.

The goal of this paper is to explore the connections that potentially lead to innate differences among regional labor markets. These connections are explained by either the neoclassical or the alternative growth models. In theory, eliminating unemployment above a critical level should be resolved through an efficient labor market. The mobility of capital and labor, and varying relative prices should eliminate long-term spatial differences at the regional level (Elhorst, 2003; Elsner, 2013a). Cushing and Poot (2004) considered such utility--maximizing behavior to be well-supported empirically. At the same time, the level of labor market adjustment seems to be taking place through skill-selective migration (Fratesi and Riggi, 2007) potentially causing "brain drain" from these individuals' places of origin. Borjas, Bronars and Trejo (1992) stated that primarily it has been skills mismatched with the locally-set value of labor that has modified the likelihood to relocate to places where a higher reward is offered for a particular skill. Migration, therefore, may as well increase variation in regional labor market conditions.

A specific local context affects the intention to migrate and selection of the destination. The aggregated effects transform regional markets in a feedback loop. Rational decision-making and a mobile labor force is thus an important equilibrating collective factor, responsible for a set of effects across the whole labor market. De Haas (2010) offered a different context in an overview of discursive development between optimism and the neo-classical view as well as neo-Marxist pessimism critical to the former, along with approaches avoiding both and finding a different way such as new economic theories of labor migration and migration as a livelihood strategy.

Meta-analytic findings focusing on migration in leading to potential regional convergence have indicated a limited positive role (Longhi, Nijkamp and Poot, 2010a). Migration is only one of several possible channels of adjustment (Fidrmuc, 2004). Investment flows, market price levels and their change, varying demand, more or less intensive innovation and productivity levels have been

discussed by Longhi, Nijkamp and Poot (2010a). Since interaction mechanisms are mutually dependent, Okkerse (2008) found the effect of migration on labor markets to be highly unpredictable. More recently, mobile capital and a mobile labor force are considered to be only fragments of endogenous development, with resources tending to concentrate in prosperous regions because of higher rates of return (Caroleo and Pastore, 2010).

There are two questions that arise in this context. Are regional economic differences shaping the process of internal population redistribution? Is mobile labor changing regional economic conditions? Bonifazi and Heins (2000) documented that migration does not respond significantly to short-term changes though a linkage has been found with long-term dynamics. Maza and Villaverde (2004), on contrary, showed that both variance in wage levels and unemployment levels can explain a significant part of migration. Similarly, Feser and Sweeney (2003) examined whether emigration alleviates or induces economic distress.

Migrants consider numerous factors in deciding to exit from problematic economic conditions that are manifested in the unbearable situation of many households falling into poverty. Wallace and Haerpfer (2001) found that pull factors were more important than push factors in their study of potential Slovak migrants. Regions that create jobs in an insufficient quantity or skill-level tend to lose their labor force. Migration to better performing regions transforms the lagging regions into recipients of the economically-active population. Ingene (2001) pointed to a trade-off that emerges between employment security and wage level. In the same sense, Arntz, Gregory and Lehmer (2014) have questioned whether migration's role in the “wage-maximizing process” is insufficient due to “persistent employment disparities”.

The objective of this paper is to explore precisely this kind of decision-making pattern in the context of a post-socialist economy. The available data sources aggregate information taken from statistical reporting of a change in a Slovak’s permanent address. These changes are expected to correspond with regional disparities in economic opportunities. At the same time, migration flows are expected to improve labor market efficiency (Borjas, 2001). Manson and Groop (2000) indicated in regard to internal migration in the United States in the 1990s that the population was being dispersed down the urban hierarchy. There are several additional questions regarding decision-making about the probability of employment and the wage to be received by economically-active household members. These might prove to be crucial in interpreting the results whether support for the effects under focus are found or not found. To answer these questions specific migration decisions recorded across various population segments must be analyzed.

In reality, we have to deal with a group of various preferences. For illustration purposes it seems useful to think about two opposing scenarios. In the first scenario, emigrants from a lagging region are mostly those experiencing a scarcity of opportunities. The regional economy in these conditions creates a suboptimal number of new jobs. In the second scenario, workers decide to migrate in hope of improving their household situation. Competition then drastically differentiates regions not only in terms of the probability of employment but also in the market value of skill-specific labor.

The neoclassical growth model is not very detailed in describing one of these two scenarios. The observed reality of innate regional disparities suggests that something closer to the latter, skill-specific qualification, is being experienced. Long-term unemployment seems to be skill related. Hansen and Niedomysl (2009) focused on the linkage between migration and the concept of a "creative class". Martin-Brelot et al. (2010), and most recently a special volume of papers Fratesi (2014), have shown that this issue is receiving much recent attention. The lack of competitive qualifications naturally leads to a preference for economic security. Dependence on owner-occupied housing and social transfers is part of economic reality for households in the periphery. Strategies on how to deal with this situation can be different, including economically-motivated temporary emigration abroad, which can be much more attractive than moving the household to a better performing but still less attractive labor market in one's own country.

2. The International Context

The relevance of international migration has increased over the studied period for multiple reasons. The cost of labor is comparatively low in the newer member states of the European Union (EU). Economic opportunities in Western Europe naturally attract many other EU residents, including those from Slovakia. At the same time, Boenisch and Schneider (2013) have argued that the exposure to communism still leads to a lesser response to economic opportunity, based on degraded participation in formal institutions that had been replaced by strong, informal structures. Despite the recent recession, Sporton (2013) presented evidence about "a continuing declining rate" of international economic migration. A recent overview of the Slovak contribution to international migration networks was provided by Bahna (2011; 2013). Besides integration into the European common market, migration to the Czech Republic (CR) can be considered as international after the previous federal state of Czechoslovakia was divided. Drbohlav (2003) noted that Slovaks' migration to the CR "has a long tradition and even now, after the split into two independent states, Slovak migration to the Czech Republic has been regulated by a special, freer regime".

According to Arntz, Gregory and Lehmer (2014) international flows are very likely skill-biased, relocating human capital between the periphery and the core as in a national context, just on a different scale. Baláž and Williams (2004) and also Williams and Baláž (2005) discussed temporary migration as training, as a form of learning experience. Similar to those studies, Martin and Radu (2012) asserted that certain kinds of working abroad are often followed by return migration and that the migrant more likely becomes self-employed rather than remaining dependent. The dimension of the issue was illustrated by White (2014), who noted that "about half the Poles who migrated since 2004 are living back in Poland", experiencing job insecurity and additionally low social trust. International labor migration is not a homogeneous process according to Engebersen et al. (2013). Elsner (2013a) also finds that "prospects for migrants to most of Western Europe have become less positive, and many migrants are returning to their home countries". Barrell, Fitzgerald and Riley (2010) assessed the macroeconomic impacts of labor migration between the newer member states on one side and Ireland, Sweden, UK, Austria, Germany, and Italy on the other side. Recent exploration of adjustment specifically within the Slovak economy can be found in Kahanec and Mytna Kurekova (2014) and in Vojtovich (2013), whose studies link a "significant drop in unemployment with labor migration abroad".

A unique role in the international network of Slovak migrants has been played by the CR. Detailed review of the situation has been covered by Horáková (2006) and Popovová (2009). Predominantly, the role has been based on language proximity and historical continuity. It was addressed in detail by Belot and Ederveen (2011). The asymmetrical nature of the migration linkage and gradual skill upgrading was described by Halás and Kladivo (2008). Potential migration was also connected with higher education, with similar limited reciprocity. Uherek (2007) offered an insight into the migration experiences of Roma between the two countries, as a part of a wider process employing transnational family-based networks of contacts. Early experience with Roma migration between Slovakia and another country, the United Kingdom, has been described in Clark and Campbell (2000). Cook, Dwyer and Waite (2011) accented the additional motivation to "escape the prejudice and discrimination of their homelands". Homoláč (2006) presented an additional perspective in his study of majority discourse on Roma migration, particularly that of the planned migration of Slovak Roma to the Czech Republic.

Many studies have pointed at indications of a mismatch between education and skills of migrants and the available occupations in their new place of work, an issue that is addressed in Blanchflower and Shadforth (2009). International migration has also been discussed as a potential institutionally-supported vehicle replacing labor force shrinkage due to declining population and demographic

ageing. Burcin, Drbohlav and Kučera (2008) provided an analysis of this phenomenon in the Czech context, comparing it with the Slovak situation. In this context, Wallace (2002) wrote that immigration into newer member states can rise when these countries take the role of "gateways to the European Union for a wider circle of countries".

The first part of our paper reviews various strands in literature with directly-linked or separate pieces of information potentially relevant in understanding population redistribution between economic cores and peripheries. Specifically, migration in emerging markets is the focus of this paper. The second part of our paper specifies the research question in econometric terms. Our selection of the methodological approach is also explained. The third part presents our findings, followed by the conclusions drawn. We also seek to formulate recommendations on how to look further to construct a more accurate picture of how the regional situation has been shaped by labor redistribution.

3. Regional Labor Markets and Migration

The overlap between the economy, demography and social structure is critical in understanding why people behave in a specific way regarding relocation decisions. Economic motivations can both reflect and be reflected in differently articulated reasons to change one's residence. Migration is an established part of demographic research on population dynamics.

Two papers focused on how the business cycle links with migration appear especially relevant. Fallick and Fleischman (2004) documented that pro-cyclicality in employer to employer flows is present only around recessions, rather than in all phases of the business cycle. They suggested that migration flows seemed to be linked with dynamics rather than with the level of unemployment. Saks and Wozniak (2011) found a positive correlation between the business cycle and migration. Using data covering ten recessions in the United States, migration was found to be pro-cyclical, especially for migrants 35 years of age and younger. The authors also suggested that there is heterogeneity in the effect of the business cycle on different regional markets, varying in timing and the nature of adjustment.

Migration is still considered as changing both the distribution of the population and the labor force. According to Cushing and Poot (2004) the recent experiences with temporary exchange of skilled professionals has biased the traditional notions of permanent migration. Temporary economic migration between Eastern and Western Europe can be similar. The level of its permanency remains unclear, since emigrants from the newer member states take place "without giving up residency in their home country" according to Barrell, Fitzgerald and

Riley (2010). Blanchflower and Shadforth (2009) also concluded that what is observed is not truly migration and that more appropriately "it should be considered temporary work".

The economic perspective is well-integrated in the gravity framework traditionally used to simulate migration flows. The scaling effect is present at source and at destination of a flow. A more populated region connected in a network generates migration more often than a less populated region. At the same time, a more populated region connected in a network creates more job vacancies. These are, in turn, considered in decision-making by the potential migrant employees. The separation between two regions, usually distance-based, translates into less links maintained with the community in one's previous locale. Migrants prefer less distant moves to longer ones. Hypothetically, their preference may be connected with information costs of establishing relationships in the new community. Questionable in rational economic terms or not, labor market conditions appear to be strongly spatially-dependent due to commuting and other interregional factors.

Moving between similar low-performing neighboring regions in economic-peripheral areas does not appear to be an option. But migrants do move within the periphery. They also move to distant destinations. Even more, migrants have made relocations not only towards wealthier areas but also in the opposite direction in a similar magnitude. Motivations beyond the scope of purely economic considerations must also be considered as well.

Commuting, migration and search costs imply how labor supply elasticity manipulates wage levels, the so-called wage curve (Longhi, Nijkamp and Poot, 2006). Econometric migration modeling is traditionally based on quantified migration direction frequencies. Even without structural information about the subjects of migration, origin and destination characteristics are used in a search for answers on how their motives become aggregated into significant effects. Unfortunately, the gravity modeling tradition in a social context has until recently been seriously biased by a spatial auto-correlated, data-generating process. An alternative solution is suggested to partially replace the gravity model, which should be sufficient for our study purposes.

4. Panel Alternative to Spatial Gravity Models

Spatial interaction models are frequently used by scientists studying regions to explore various forms of linkages in space. The gravity model was developed as a direct analogy with Newton's physical law, later supported on the entropy maximization basis. The gravity equation is capable of finding systematic effects of various regional conditions. Regions enter the data-generating process as flow origins or destinations. Despite competing concepts and widely-used techniques

(Simini et al., 2012), the gravity model parameters are considered to remain cognitively useful. Indirect interpretation of mobility across space and the role of distance are articulated namely in the concept of intervening opportunities (Noulas et al., 2012).

The gravity model together with the theory of movements by Alonso (1978) remains the baseline for scientific regional migration research according to Newbold (2012). Regional characteristics can be tested in this framework. Certain characteristics can be pushing migrants out of their origin regions and certain characteristics can be pulling migrants into destination regions. For a long time the modeling techniques neglected the central role of space in shaping migration phenomena. Besides distance between source and destination, research has been focused on the explanatory power of regional characteristics (Pellegrini and Fotheringham, 2002). Ignoring the econometric complications of mutually dependent observations of spatially-neighboring flows necessarily led to biased parameter estimates.

The spatial generalization of LeSage and Pace (2008) solved the problems of violated independence assumption among observations. It can be present among the observations of regional characteristics and among flows connecting regions. Regional economies consist of various individual interacting actors. They organically establish and cancel links of various kinds, including commuting, trade, knowledge exchange and others. The nature of connectedness among regions can have various forms. Taking into account these linkages, to some extent, brings solutions to inconsistencies between the evolving regional economic structure and statistical units (Bezák 2001). Spatial modeling aims at minimizing the risk of ecological bias.

LeSage and Pace (2008) proposed a general spatial econometric model for migrant flows. They technically extended the linear equation by spatially-lagged dependent variables of three kinds: origin-based, destination-based, and origin-to--destination based. All three of these express different ways of how individual flows relate to flows in their surroundings. Parameters associated with these terms that differ significantly from zero indicate that spatial flows are not spatially independent. Such a model that takes into account the spatial auto-correlated nature of a spatial interaction network is typically expressed as

$$y = \rho_d W_d y + \rho_o W_o y + \rho_w W_w y + \alpha \iota_N + X_d \beta_d + X_o \beta_o + \gamma g + \varepsilon$$

where

- y – the log of migration intensity summed over the sample period;
- ρ_d, ρ_o and ρ_w – parameters corresponding with network spatial lags using corresponding spatial weight matrices W_d, W_o and W_w;
- α – a constant term parameter;
- X_d and X_o – the explanatory variables characterizing destination and origin regions with corresponding β_d and β_o parameters;
- γ – a scalar reflecting the distance, g, effect.

Still, having the parameter estimates from the spatial gravity model and their variance is not sufficient. The remaining problem of interpretation was left for further research. Incorrect attempts to interpret corresponding β_d and β_o parameters in terms of common regression parameters, quantifying change in the dependent variable with unit change in the explanatory variables appeared, before LeSage and Thomas-Agnan (2014) finally presented a correction. The reason for additional corrections for purposes of interpretation lies in the complexity of a spatial network. Considering existing spatial linkages between neighboring flows indirect and network effects from each change in regional characteristics modify the whole network to a certain extent, not only flows from and to the single specific region.

Interpretation of effects relies on averaging of individual effects across a network, summarized in the interaction matrix. Until this technique is commonly available, we suggest a simple strategy inspired by this approach, relying on the spatial panel Durbin model (Elhorst, 2014, pp. 37 – 93) for column (emigration) sums and row (immigration) sums within the migration matrix

$$y_{it} = \delta W y_{it} + \alpha + X_{it}\beta + WX_{it}\theta + \mu_i + \lambda_t + \varepsilon_{it}$$

with μ_i and λ_t representing spatial and time-fixed effects. The advantage of this alternative is separation of the spatial and temporal dimensions in variance with the characteristics included in the analysis. This is not possible in a solely cross-sectional specification. The panel generalization for the general spatial gravity model is not yet available to our knowledge. The disadvantage of this approach is that emigration and immigration must be explored in separate equations. Despite the availability of a list of factors determining wage and employment impacts in Longhi, Nijkamp and Poot (2010a), our intention is to overcome this level of complexity. This would leave us incapable of distinguishing between the direct effects of migration modifying wages at given employment levels and the indirect effect of migration via changing employment levels as described in D'Amuri, Ottaviano and Peri (2010) or Borjas (2003).

There are two kinds of remaining econometric complications. The risk of endogenous migration decisions depends on local wage and employment levels with causality running in both directions (Ozgen, Nijkamp and Poot 2010). The diffusion effect also spreads across the national economy even if no significant effect is measured among particular regions (Okkerse, 2008). This means that an empirical exercise may suffer from endogenous predictors, theoretically corrected in an instrumental variable approach, or by focus given to natural experiment. Kırdar and Saracoğlu (2008) approach wage convergence in a similar way, also trying to determine whether internal migration has any influence or not. Coulombe (2006) pointed to the non-responsiveness of migrants to short-run problems over the business cycle horizon because migration carries relatively high

costs. Since individual households evaluate the benefits of migration, the economic gains are expected to be greater for those who are young and better skilled (Gurak and Kritz, 2000). Elsner (2013b) added that "Eastern Europe experienced a large outflow of young workers" from all skill categories.

A dataset from the Statistical Office of the Slovak Republic available for empirical testing captures internal migration in a set of 72 units over the period between 1996 and 2013 (18 periods) and foreign migration to and from these units. The regional units are statistical districts, after applying two updates needed in order to merge nine urban districts into city-wide units. Two dependent variables are constructed as the log value of immigrant and emigrant frequencies per mid-year population of a region. The data include all migration between municipalities belonging to different regions but we have included no special expression for internal migration within the borders of a single region. In matrix notation, the models attempt to predict the column and row sums relative to regional populations. Diagonal elements are set to zero. Then row and column sums are extended by the exchange with foreign countries. In demographic terms, we can predict crude rates of immigration and emigration for each of these 72 units.

There are two independent variables characterizing the labor markets of individual regions, which can add significant information in predicting flow aggregations, alternatively origin or destination-centered. The first independent variable is the log value of the average annual unemployment rates. These rates correspond to a specific methodology used by Slovakia's Central Office of Labor, Social Affairs and Family. This agency is obligated to register inhabitants in active search for a job and relates them with the economically-active population residing in a region. This variable is of major interest since if it proves significant and intuitively oriented, it will support the expected push and pull impacts on migration flows based on probability of employment. The difficulty of finding a job varies greatly across the economic landscape of Slovakia. The variation is also linked with the business cycle on a national basis. The expected signs of related parameters are positive on the origin side and negative on the destination side. Corresponding parameter estimates are positive in the emigration equation and negative in the immigration equation.

The second explanatory variable captures regional differences in the cost of labor. The log value of the average monthly wage of an employee comes from aggregation of size-filtered regional samples of firms having a minimum of 20 employees collected by the Statistical Office of the Slovak Republic. The wage data have also been adjusted for inflation using the Harmonized Index of Consumer Prices from Eurostat. We set all wage data to the 2013 price level. The expected signs of related parameters are negative on the origin side and positive

on the destination side. Reflecting the motivation of workers to improve a household's income situation, the corresponding parameter estimates are negative in the emigration equation and positive in the immigration equation. The same shorter dataset (1996 – 2008) has also been recently described and linked with unemployment and wage variation by Michálek and Podolák (2011).

The spatial panel model is estimated along the recommended approach of Elhorst (2014, pp. 37 – 93). In the baseline model we pooled observations and estimated the parameters by ordinary least squares without fixed effects and spatial interactions included. Subsequently, spatial and temporal fixed effects were included separately and likelihood ratio tests were used to decide upon their joint significance in the model. Each alternative was at the same time tested against the alternative of expanding the model by spatial interactions. Lagrange multiplier tests for no spatial lag and no spatial error, as well as their robust versions indicate a possibility of misspecification for the non-spatial panel equation. Finally, the spatial panel model, including jointly significant fixed effects, was estimated. Results of the estimation from this step are reported graphically below. Numerical results can be obtained from the authors upon request.

This procedure was employed in ten different versions of our model with a varying time delay across which potential migrants reviewed the specific regional situation and compared alternatives to their current situation. We allowed for a lag between only the single previous year and up to ten years. Each model was then estimated on the immigration side and the emigration side, altogether giving twenty different models, the results of which can be effectively reported in a graphical form as described in the following chapter. In technical terms, we estimated a model of levels y_{it} explained by average lagged levels of independent variables X_{it-T} and average lagged first differences $X_{it-T} - X_{it-T-1}$ with a modified lag T. Both dependent variables and explanatory variables were log transformed before entering regressions, which allowed interpretation of the parameter estimates as to elasticity. Different specifications provided a more complete picture on how the processes considered and the changes in processes were mutually related, if such systematic relationships could be identified across a possible overview of the situation by potential migrants.

5. Results

Migration flows filtered for this analysis include 785,100 people over 18 years old, details of which can be found in Table 1. Migrating persons accounted annually for between 6.2% and 7.6% of the national population. There was a growth trend of about 684 persons per year. The maximum number of people

(51,000) migrated in 2008, the year of the positive culmination of the last business cycle. The share of foreign migrants in the process is relatively small and asymmetric. Immigration from foreign countries grew from 6.4% to 17.7% in 2008, and later fell and stabilized at the level of 2005 – 2006. Emigration steadily rose over the analyzed period from 0.6% to 6.6%. The velocity of the increase was 116 people per year.

Emigrations remained only a small fraction of immigration, which may be a result from limited data. Foreign migratory exchange was to a large extent with a single country, the Czech Republic. Starting at 40.1% of foreign migration in both directions in 1996, the immigration weight decreased faster (–1.7% per year) than emigration (–0.2% per year). In 2013, 33.8% of emigrants had moved only to the Czech Republic and 21.1% of immigrants had arrived from the same country. A certain degree of concentration into a relative low number of spatial channels accessing a metropolitan region is obvious, both attracting and sending major flows (Podolák, 1995 and Bezák, 2006).

Regional economic conditions can be illustrated by a rising unemployment rate until 1999 (at 21.3%), then decreasing until 2007 (at 9.5%) and then rising again until the last year available (15.0%). Real wages grew by an average of 1.8% per year but there were periods of much faster growth as well as decreases in real wages.

T a b l e 1

Migration Summary, Share of Foreign Exchange, and Regional Economic Conditions for the Set of 72 Regional Units

Year	Migrants		Foreign (%)		Unemployment rate (%)			Wage (2013 EUR)		
	Th.	% Pop.	Im.	Em.	Min.	Avg.	Max.	Min.	Avg.	Max.
1996	38.7	6.7	6.4	0.6	4.2	13.8	24.2	460	573	837
1997	39.1	6.7	6.0	1.6	3.3	13.9	26.0	494	601	905
1998	40.7	7.0	5.1	1.9	4.0	17.5	33.3	507	607	945
1999	37.5	6.4	5.6	1.7	5.8	21.3	37.4	484	590	924
2000	36.4	6.2	6.4	2.4	5.0	19.4	32.0	450	563	908
2001	37.7	6.5	5.5	2.8	4.3	20.5	35.5	448	565	943
2002	42.1	7.1	5.7	3.5	4.0	19.3	37.2	470	604	1,016
2003	41.6	7.0	6.4	3.1	3.2	17.1	30.6	461	597	1,025
2004	43.8	7.0	10.6	4.0	2.8	14.7	28.7	464	609	1,046
2005	45.3	7.1	12.1	4.7	2.1	13.0	29.2	490	638	1,131
2006	48.0	7.6	12.1	4.1	1.9	10.9	28.3	514	667	1,201
2007	50.8	7.5	17.6	4.3	1.6	9.5	27.0	537	710	1,264
2008	51.2	7.5	17.7	4.0	1.9	10.0	26.8	560	743	1,328
2009	45.9	6.9	14.4	5.0	3.6	14.9	33.3	514	730	1,380
2010	47.3	7.4	11.6	4.5	3.9	14.3	33.6	539	763	1,342
2011	45.6	7.2	11.0	4.6	4.8	15.3	34.6	611	785	1,231
2012	45.8	7.1	12.4	5.0	5.0	16.5	35.6	613	776	1,222
2013	47.3	7.2	12.1	6.6	5.8	15.0	31.2	597	767	1,225

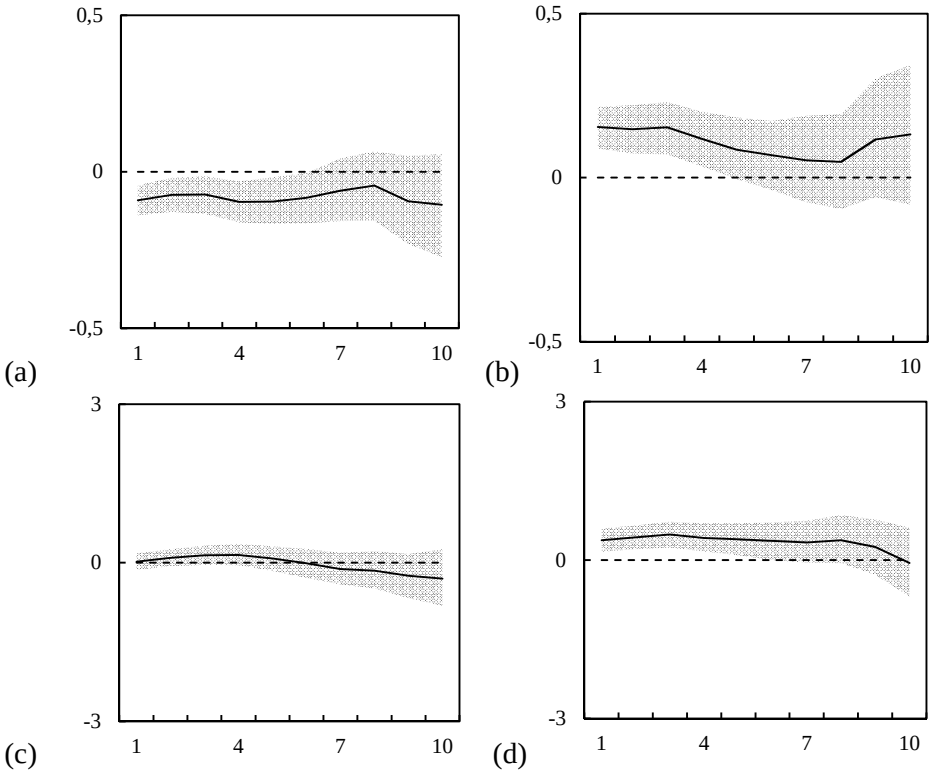
Note: Internal Flows within Districts are Excluded.

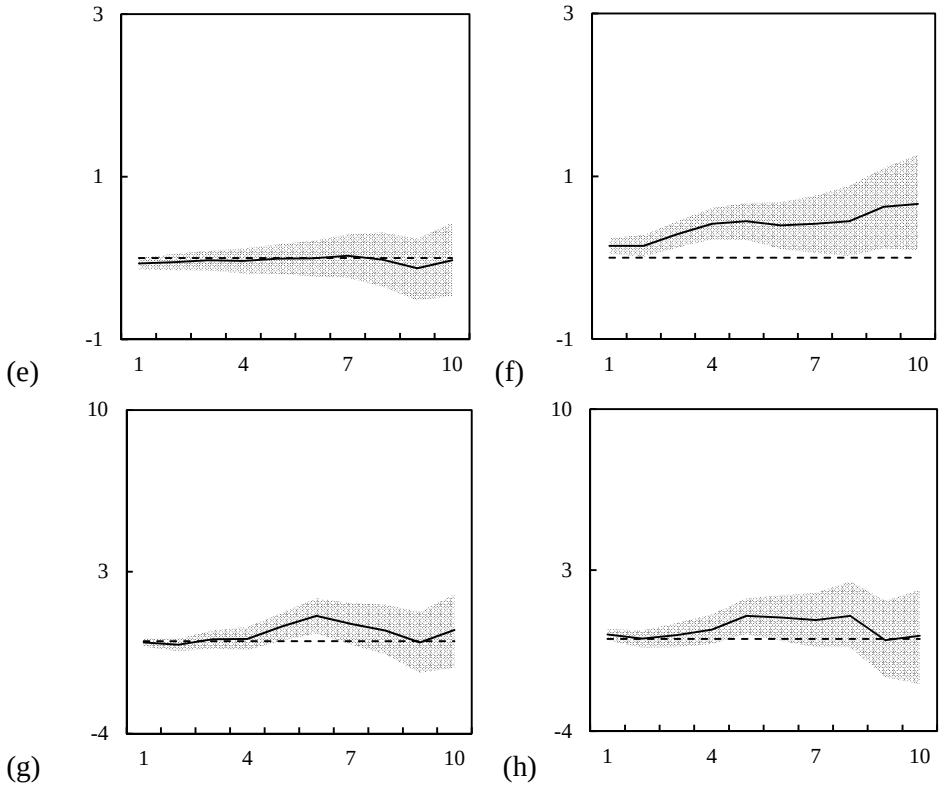
Source: Statistical Office of the Slovak Republic (2014).

The connection between intensity of migration and dynamic economic conditions is approached in the perspective of spatial Durbin model, parameters of which are effectively summarized in total effects, consisting of two partial effects. Direct and indirect effects separate the response of migration to regional economic conditions within and across borders. Figure 3 offers a graphical interpretation for the set of total effects. Figure 1 and Figure 2 offer the same interpretation for two partial subsets of direct and indirect effects. The left column in all three figure sets summarizes immigration-side models and the right column summarizes emigration-side models. The rows represent the effects of levels of unemployment and real wages, followed by the effects of the first difference in unemployment and real wages. Each plot then gives a line of parameter mean points dependent on the length of the time lag *T* employed in the model. One plot therefore compares ten different spatial Durbin models, using between one and ten-year time lags for averaging levels and the dynamics driving migrants' decisions.

F i g u r e 1

Parameter Estimates from Spatial Durbin Models with Spatial and Time-fixed Effects



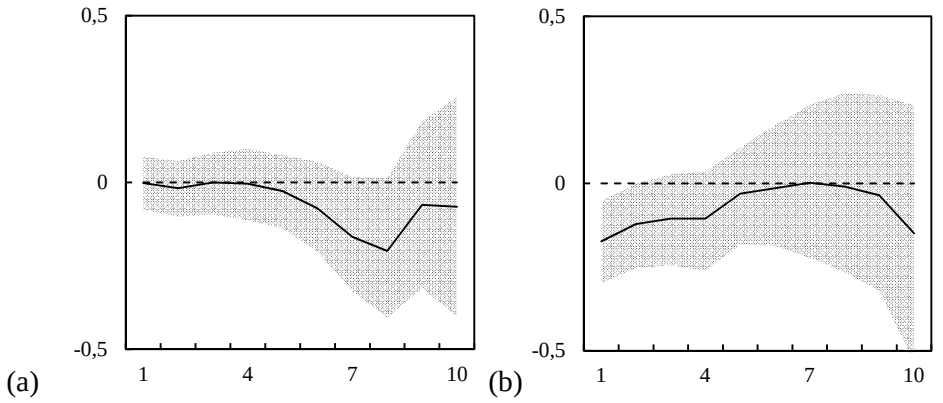


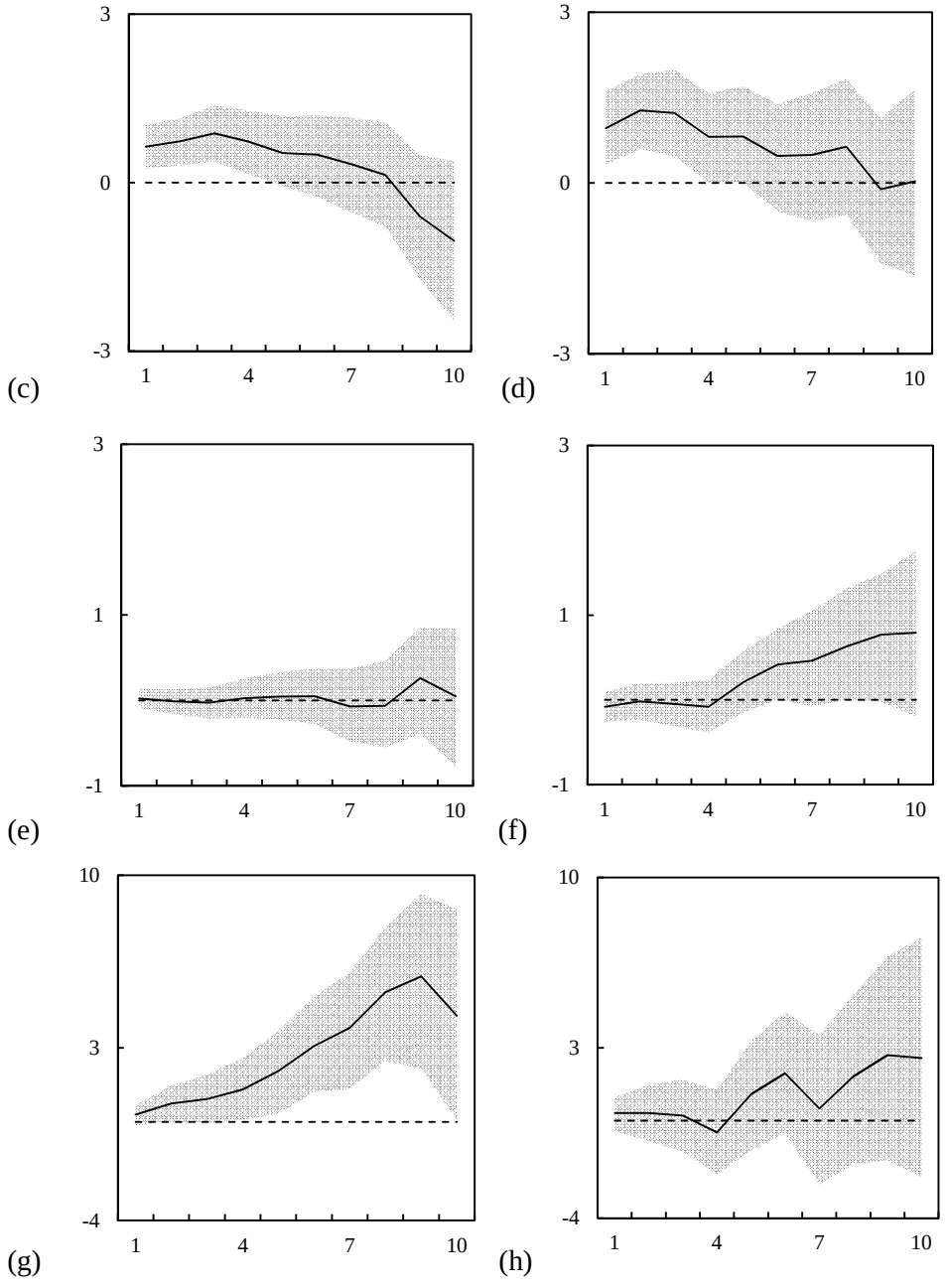
Note: Direct effects of (a) unemployment level on immigration, (b) unemployment level on emigration, (c) wage level on immigration, (d) wage level on emigration, (e) unemployment change on immigration, (f) unemployment change on emigration, (g) wage change on immigration, (h) wage change on emigration. Factors averaged between 1-year and 10-year delay. Shaded area represents 0.95 confidence interval.

Source: Research results.

F i g u r e 2

Parameter Estimates from Spatial Durbin Models with Spatial and Time-fixed Effects



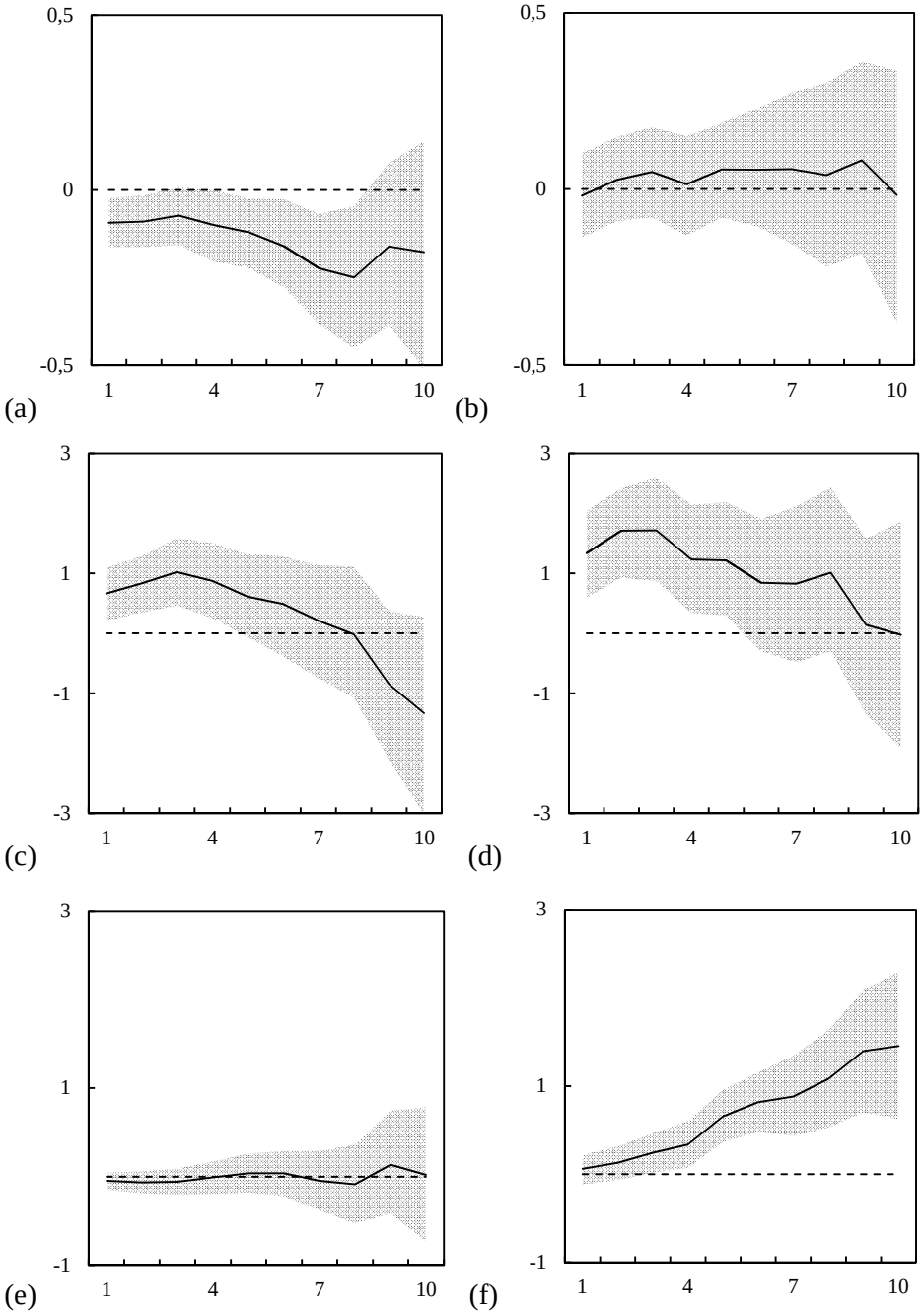


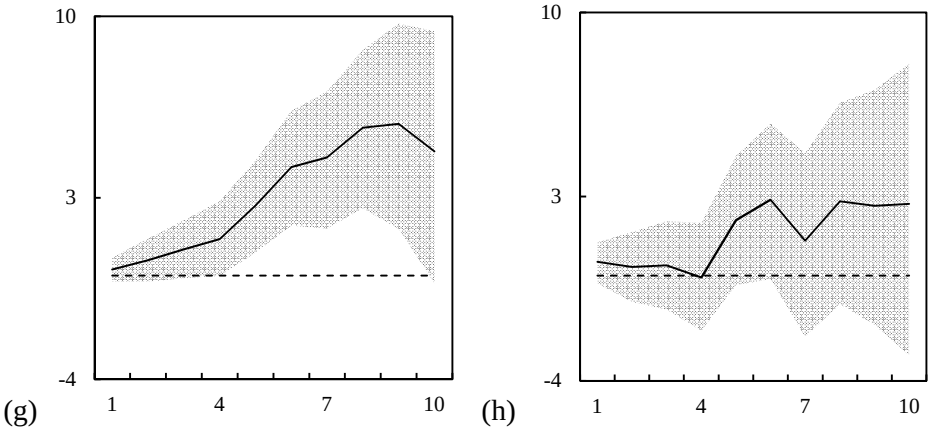
Note: Indirect effects of (a) unemployment level on immigration, (b) unemployment level on emigration, (c) wage level on immigration, (d) wage level on emigration, (e) unemployment change on immigration, (f) unemployment change on emigration, (g) wage change on immigration, (h) wage change on emigration. Factors averaged between 1-year and 10-year delay. Shaded area represents 0.95 confidence interval.

Source: Research results.

F i g u r e 3

Parameter Estimates from Spatial Durbin Models with Spatial and Time-fixed Effects





Note: Total effects of (a) unemployment level on immigration, (b) unemployment level on emigration, (c) wage level on immigration, (d) wage level on emigration, (e) unemployment change on immigration, (f) unemployment change on emigration, (g) wage change on immigration, (h) wage change on emigration. Factors averaged between 1-year and 10-year delay. Shaded area represents 0.95 confidence interval.

Source: Research results.

Assuming the realistic inseparability of a region from the regional structure to which it belongs, the empirical evidence is most completely mirrored in the variation of total effects shown in Figure 3. The unemployment level of a region appears to significantly downsize immigration and its effect stretches back up to eight years into the past. In contrast with immigration, emigration was unaffected by the unemployment level. Since unemployment levels were in constant flux, we also paid attention to the effect of change by the averaged first difference and we found a contrasting situation. Declining probabilities of finding employment did not alter immigration intensities but significantly increased emigration after two years, and the effect systematically strengthened over a decade. Our results support intuition that relies upon the neoclassical model but also bring a contrast. The levels are linked with the choice between alternative destinations, and the dynamics are linked with the probabilities of leaving regions. If the former shows that the memory of choice-making households was limited to less than a decade, moving away appeared to be delayed, most probably by the hope of conditions improving; however, this only lasted during the first few years.

Keeping employment probabilities equal, wage levels and change also differentiated the behavior of potential and actual migrants. Higher wage levels encouraged, according to expectation, immigration for up to five years. At the same time, emigration was also encouraged in the same time frame. Kwiatkowski, Kucharski and Tokarski (2004) and Huber (2007) also found that the network segments connected with the lowest exchange rates were those in the economic

periphery. Symmetry in effects of levels was once again lost when we looked at the effect from wage changes. An increasing wage attracted migrants after three years and moreover kept attracting them over all subsequent years. In contrast, wage changes did not modify emigration. As before, the result also corresponded with expectation. More resources available to households encouraged them to change their housing situation more frequently. However, this lasted only for a short period of a few years. Movement in wages is linked with destination choice. Not surprisingly, migrants prefer regions with an increasing cost of labor. But rising or falling wages were not a sufficient reason alone for relocating.

Determined chronologically-structured mechanisms can be deconstructed into two partial effects, separating the responsibility of the regional context within the borders, and the responsibility of surrounding regional conditions. Focusing on a particular region, the unemployment level significantly diminished immigration for up to six years but at the same time encouraged emigration for up to five years. This positive effect was lost if facing similar conditions in a region's neighborhood. A change in the unemployment rate only modified emigration over the full decade, similar to the total effect. A low probability of finding a job would alone obviously push out more migrants. But a cross-regional setting effectively puts brakes on this process, probably by offering employment and discouraging households from leaving. In contrast with unemployment, the wage level did not affect immigration and encouraged emigration up to five years. Rising wage levels encouraged immigration in a narrow five to six-year window and emigration in a similar five-year window. Using the situation in a high-wage region as an example, resources distributed through the value of labor itself did not attract permanent residents but rather encouraged its own residents to move out. For some reason, growth in the cost of labor effectively had a narrow optimum of five to six years delay in this process, reminiscent of environmentally-motivated suburbanization.

The speculation about suburbanization should mirror itself in the set of indirect effects, flowing across borders of neighboring regions. Unemployment levels did not affect immigration across the borders, but diminished emigration in a very short, single-year time lag. This means that choice-makers did not pay attention to the probability of finding a job in neighboring regions but that potential emigrants reacted positively to a high probability of finding a job there, although only looking at the recent past and seizing opportunities quickly. This can also be a sign of close-knit interactions and information sharing. Wage levels affected migration across borders in a symmetrical fashion. Both flow directions were encouraged for up to a four to five year time frame. Availability of resources spilled over boundaries in terms of migration. Wage changes had no

effect on emigrants across borders but encouraged immigration to neighbors after three years. This can be safely considered as a supporting result for the suburbanization hypothesis.

T a b l e 2

The Response Structure Summarized between Early and Late, Positive and Negative

			Response	
			immigration	emigration
Direct	Unemployment	Level Growth	Early – 	Early + Early & Late +
	Wage	Level Growth	 Medium +	Early + Medium +
Indirect	Unemployment	Level Growth	 	Early –
	Wage	Level Growth	Early + Late +	Early +
Total	Unemployment	Level Growth	Early & Late – 	 Late +
	Wage	Level Growth	Early + Late +	Early +

Source: Research results.

Conclusions

The multiple-lag modeling strategy used in this study allowed determining the significant response structure of migration to varying regional labor market conditions as summarized in Table 2. Potential migrants reacted to their regional economic context in a chronologically differentiated manner. In the reality of a regional system, emigrants were encouraged by a higher wage level to migrate at an early time. Growing unemployment also encouraged migrants to leave but with a certain delay in time. The effects within borders include an early push from higher unemployment and low wages. The effect from wage growth is delayed, and the effect from unemployment growth is long-lasting. Emigration is additionally encouraged from a neighboring context through a set of two early responses: from a low unemployment rate and higher wages.

According to our immigration models, migrants choose between alternative destinations and tended to prefer certain regional conditions to others. The models also showed a rather complicated chronological response. An early response was generated from a high wage, a later response from wage growth, and a long-lasting negative effect from a high unemployment level. The particular region was responsible for the early negative response from the high unemployment rate and the delayed positive response from wage growth. Cross-border effects were positive and were generated from higher wages, not unemployment levels. The early response came from higher wages and the later one from growth in wages.

Possible explanations include the already mentioned preference for a secure but lower level of living standards to the possibly better but less secure outcome via migration. A competing reason for the finding may be even simpler. Economic migrants prefer foreign destinations ahead of wealthier regions within their home country. As Bahna (2008) pointed out, a general theoretical concept for the relationship between regional and international migration is needed. Furthermore, multiple authors have noted that economic migrants have had no motivation to change their formal residence when they take only temporary jobs. The same outcome occurs from a temporary relocation for work within the boundaries of the national economy. These explanations slightly undermine the otherwise highly relevant support for the neoclassical view of migration determinants in the labor market.

Similar findings by Faini et al. (1997) were hypothetically explained by additional possibilities: converging regional wage levels, family and government support, transaction costs, renting, population aging, and inefficient job matching. On the other hand, Ingene (2001) considered such behavior patterns as anomalous and related to firms that seem irrational in not lowering their wage offer when the available labor would work for less.

More migration seems to bring better conditions for regions from which the migrants left. This supports the scenario of employed migrants, who are economically motivated to change their jobs, not unemployed migrants in search of jobs in their new place of residence. Longhi, Nijkamp and Poot (2010b) noted that relevant literature fails to observe a significant negative wage and employment impact of receiving migrants while our results show indices that at least the latter part may be true. Overall, a limited set of significant effects appearing on the origin side of migration flows may again reflect the same arguments used earlier. The hypothetical preference for foreign destinations in economic migration seems to offer a reasonable solution. It also seems well advised to remember that prospective migrants behave in accordance with expected utility maximization (Harris and Todaro, 1970).

Residents of peripheral regions may not expect a significant improvement by moving within the same country if more attractive options are available elsewhere. Our findings also correspond fully to the conclusions of Michálek and Podolák (2011) and Fidrmuc (2004). Fidrmuc found prosperous regions with relatively large inflows and outflows, while the economic periphery had a largely immobile population. As we speculated above, such an implication may be false due to the significant lack of information about the international context of de facto economic migrants with unclear status. Borjas (2003) wrote that much could be learned about labor market impacts of migration from specific adjustments made

by workers and firms. According to Mitze (2012), spatiotemporal dynamics are highly relevant for modeling migration flows and this potential was fulfilled in the approach used in this study. The current understanding of spatial disparities in economic development (Fingleton and Fischer, 2010) seems to be correctly putting the emphasis on the mobility of labor.

Our results firmly support the equalizing role of migration in terms of unemployment variation. At the same time, it seems that we are dealing with migration that is highly selective and reward-motivated, which by no means can lead to diminishing spatial disparities. The basic story shown by our models is that the economic core and periphery of Slovakia are moving in opposite directions. A similar conclusion can be found in Arntz, Gregory and Lehmer (2014), who argued that "allocation of human capital across space is driven by employment rather than wage disparities". Regional labor market conditions play a significant role in shaping migration. The migration network also obviously shapes regional economies in a feedback loop, although this matter is not addressed directly in this paper. The novel aspect of the results in this paper is that the implications of the neoclassical growth model appear true but not fully sufficient. We must deal with extensions appearing in new growth theories, allowing low mobility in the economic periphery and a strong exchange between the economic core and rest of the country.

The expected finding is a one-sided improvement of the employment situation linked with more migration. This conclusion does not entirely contradict implications from the neoclassical growth model. At the same time, serious limits to our analysis are buried in the nature of the available data. Nevertheless, fragments revealed by the data still yield the fundamental trend that has shaped economic differences in the recent past.

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