
Behind the Differentiation of Suburban Development in the Hinterland of Bratislava, Slovakia*

MARTIN ŠVEDA, MICHALA MADAJOVÁ and PETER PODOLÁK**

Institute of Geography, Slovak Academy of Sciences, Bratislava

Abstract: Several tendencies seem to indicate that in the hinterland of Bratislava specific new residential zones are forming with a different socio-economic structure. This article analyses the hinterland of Bratislava from various perspectives of suburban development. The selection of variables covers the origin of in-migrants and their economic activity, education, and family status. Indicators of land use, housing construction, and property prices supplement these data. The data are processed based on a factorial ecology approach, which tries to discover the basic dimensions of the socio-spatial structure, and cluster analysis. Using these methods the authors identify similar clusters and categorise individual municipalities into relatively homogeneous units—suburban development types. The results lead to a number of very interesting findings. The same types of suburban municipalities are not arranged in concentric zones, which means that the factor of distance from the city does not play a prominent role. The prevailing factor is the sectorial structure, which reflects the different levels of attractiveness municipalities hold for different socio-economic groups of in-migrants. This article seeks to identify key factors that affect the formation of individual suburban zones and thus contributes to a better understanding of the processes that decisively shape the socio-spatial organisation of hinterlands in post-socialist cities today.

Keywords: suburban development, socio-spatial differentiation, regional typology, Bratislava, Slovakia

Sociologický časopis/Czech Sociological Review, 2016, Vol. 52, No. 6: 893–925

DOI: <http://dx.doi.org/10.13060/00380288.2016.52.6.290>

Introduction

Suburbanisation has become the predominant mode of urban growth in post-socialist metropolitan areas [Sýkora and Stanilov 2014]. Slovakia is no exception to this phenomenon, which fully developed in the hinterland of Bratislava—a region usually overlooked in work on the urban development of major Central

* This article was prepared as part of work on Project No. 1/0082/15 and Project No. 2/0101/15 funded by the VEGA Grant Agency (Scientific Grant Agency of the Ministry of Education and the Slovak Academy of Sciences).

** Direct all correspondence to: Martin Šveda, Institute of Geography, Slovak Academy of Sciences, Štefánikova 49, 814 73, Bratislava, Slovakia, e-mail: mato.sveda@gmail.com.

East European cities [cf. Hamilton et al. 2005; Gentile et al. 2012; Sýkora and Bouzarovski 2012; Stanilov and Sýkora 2014]. Numerous studies on the hinterland of the capital have discussed the 'urban-rural continuum', in which the effects of suburbanisation decrease with the increasing distance from the city. This was further supported by the development of several basic indicators such as net migration [Podolák 2007; Slavík et al. 2011; Novotný 2016], the number of constructed dwellings [Šveda 2014], and the share of built-up areas [Šveda 2011], the value of which was highest in the immediate hinterland of the city and gradually decreased towards the periphery. In the context of an unregulated market and limited legal constraints for developing, suburbanisation could fully develop not only in the sense of land consumption [Šveda 2011; Pazúr et al. 2015] but also in the frame of social (demographic, ethnic) differentiation [cf. Kok and Kovács 1999; Ouředníček 2007; Tammaru et al. 2013]. Suburban processes are indeed the results of market-based location choices and of the individualisation and pluralisation of lifestyles in the post-socialist period [Wiessner 1999: 46].

Several studies considered migration patterns on a city-suburban scale, where migration flows of different directions and composition were observed [Tammaru 2001; Leetmaa and Tammaru 2007; Krišjāne and Bērziņš 2012]. The hinterlands of post-socialist cities are thus formed by various processes, of which suburbanisation is only one, albeit a dominant, component. Suburbanisation as intraregional deconcentration of the population from the urban core towards the hinterland is only one stream, supplemented by the processes of centripetal migration and tangential movements within the hinterland, respectively. In this regard it is indispensable to distinguish between suburban development—as a wider notion for all the transformation processes ongoing in the city hinterland—and suburbanisation, which is only one of these transformation processes [see Ouředníček 2007]. In this view suburban development represents a useful umbrella term for a variety of migration movements and settlement transformations. The etymology of the word 'suburban' emphasises the location's links to the city, but the character of development (transformation processes) varies depending on the particular conditions in every part of the hinterland (the distance from the urban core, population structure, infrastructure, natural conditions, cultural background, etc.). Suburban areas may still be configured in terms of dependency on a large city centre, but it is not just suburbanisation that matters.

Different patterns of suburban development (expansion) can be associated with specific environmental conditions, transportation, and social and demographic selectivity of suburbanites [Ouředníček 2007; Kährlik and Tammaru 2008; Krišjāne and Bērziņš 2012; Tammaru et al. 2013]. In addition, the hinterland of Bratislava is becoming a destination not only for migrants from the capital itself, but with its prominent position attracts migrants from all regions of Slovakia. This gives rise to a very colourful mosaic of varying settlement forms of residential construction; from compact residential areas as integrative extensions of already established settlements to solitary units scattered in suburban space.

Several tendencies seem to indicate that in the hinterland of Bratislava specific new residential zones are formed that have different socio-economic structures. Some of them are easily identifiable (e.g. on the basis of visual attributes—luxurious residential zones in an attractive environment and in the close vicinity of Bratislava). The character of other zones seems to be defined by indirect indications only.

A fundamental question arises: what is behind the differentiation of suburban development? To support the claim that the socio-economic pattern in the hinterland of Bratislava has shaped itself in a certain way and to reveal the hidden relations between residential construction, the structure of in-migration, and physical conditions, the article seeks to answer the following research questions: What is the pattern of suburban migration and residential intermixing in the hinterland of Bratislava? What are the key factors that condition the formation of individual types of suburban development? Does the differentiation follow an assumed relationship with the distance from the city? Is the origin of newcomers an important factor in shaping the pattern of residential structures?

Methodologically, the paper analyses the hinterland of Bratislava from the perspective of in-migration, housing construction, property prices, and land use within the analytical frame of factorial analysis and cluster analysis. The contribution is based on the factorial ecology approach [see Davies 1984], which represents a relatively sophisticated method for identifying and describing the main elements of socio-spatial structure, whose outputs depend substantially on the nature of the data input (e.g. from censuses). First, we briefly describe our methodological background and the rationale behind it. Second, we focus on a brief description of the data and methodology leading towards the identification of the individual suburban development types. Relying on several differential aspects of residential suburbanisation, we try to identify key factors that condition the formation of individual types and thereby identify and characterise similar configurations. The paper concludes with a discussion of key findings and with an overall assessment of limitations and suggestions for future investigation.

Studying socio-economic differentiation in the suburban zone of the post-socialist city

Since the collapse of socialism in Central and East Europe (CEE), researchers have explored the underlying processes that contribute to metropolitan transformation, such as suburbanisation. The character of suburban trends has in some respects become comparable to the driving forces in Western countries [see Széleányi 1996], but as Leetmaa et al. [2009] noted, the concept of ‘Western suburbanisation’ is not sufficient to understand post-communist intra-metropolitan migration [see also Timár and Váradi 2001; Nuissl and Rink 2005; Hirt 2007; Borén and Gentile 2007]. The traditional view on residential suburbanisation, as urban

families' flight into the suburbs for better living conditions, does not sufficiently explain the divergent trends in the metropolitan transformation of the post-socialist city. There has been a great effort in literature to better comprehend the variety of forms of suburban development in the inherited socio-spatial context of post-socialist metropolitan areas. Some scholars point to the different directions and composition of development [Kok and Kovács 1999; Ouředníček 2007; Hirt 2007; Kährlik and Tammaru 2008], others present evidence of various motivations contributing to suburban in-migration. As Kährlik and Leetmaa [2009] observed, less is known of the demand-side mechanism shaping suburbanisation—that is, residential preferences and satisfaction with living in new suburban areas. Post-communist migrants have diverse socio-economic backgrounds; some people move to suburban areas in search of a better quality of life (the dream of owning a detached house in the countryside), while others leave the cities to find cheaper housing [Kok and Kovács 1999; Hirt 2007; Leetmaa and Tammaru 2007]. The decentralisation of the population to some extent has taken place in a context of economic decline and was often motivated by the 'survival strategy' of poor households [Smith 2000]. There are still people who migrate into the hinterland from rural areas in order to find jobs in the cities, which became a positive pole of growing social and economic polarisation in the course of transition. Furthermore, the motivations for migration into suburban areas are not exclusively related to current changes, they are rooted in the legacy of housing construction and urbanisation during the socialist period [Krišjāne and Bērziņš 2012]. As Sýkora and Stanilov [2014] noted, a starting point for the exploration of post-socialist suburbanisation is the juxtaposition of the trajectories, patterns, and underlying forces of urbanisation and suburbanisation under socialism and capitalism.

Along with environmental and economic aspects, a clear ethnic dimension to suburbanisation has been revealed by studies conducted in Western European countries and the United States [e.g. Bolt et al. 2008; Clark 2006]. Whereas in the US suburbanisation was typically a 'white flight' into racially and socially homogeneous suburbs, less is known about the ethnic dimensions of post-socialist suburbanisation, despite the existence of numerous minorities in many CEE countries (the Russian minority in the Baltic states or the Hungarian minorities in Slovakia and Romania). This topic is underrepresented in research on CEE suburbanisation, and the exception is the analysis of the Russian minority in Estonia, where Tammaru et al. [2013] show that ethnic minorities are much less likely to move to the suburbs than the majority population, and minorities are less likely to move to rural municipalities in the suburban ring of a city.

Given the above-mentioned background, the result is a colourful composition of in-migrants moving into the hinterland of the post-socialist city, not only in terms of their source destinations, but also with respect to their different social and cultural backgrounds and differentiated motivations. As Brade et al. [2009: 234] noted, the wide range of old and new residential areas—from suburban areas with exclusive residences to housing parks, old and newly erected second-

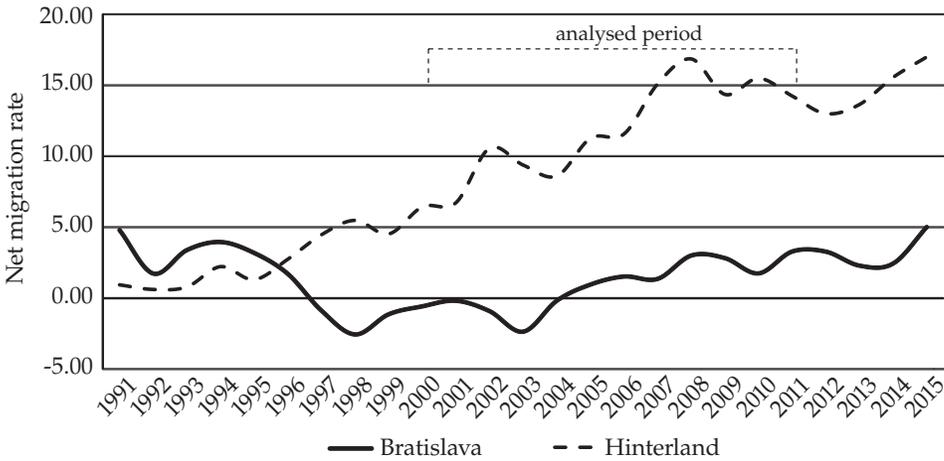
residence communities, and private homes built with modest financial means in the surrounding regions—indicates the need for a more differentiated view on the suburban space of transformation cities.

But where to look for more differentiated views—synthetic methods—for studying suburban differentiation? Methodologically, much inspiring work has already been done in revealing differentiated patterns of suburban development in CEE countries. Empirical analysis based on bivariate or multivariate methods were employed to analyse the patterns of suburban migration [Leetmaa and Tammaru 2007; Kährik and Tammaru 2008], motivations for migration [Kährik and Leetmaa 2009; Kriřjāne and Bērziņš 2012], commuting [Tammaru 2005], and the ethnic dimension of suburbanisation [Tammaru et al. 2013]. Evidently, the question of suburban development is increasingly attracting attention in spatial policy; however, this topic is mostly viewed from a quantitative demographic perspective; synthetic approaches involving a more complex framework (in terms of geographical synthesis) are still rather rare [e.g. Kährik and Tammaru 2008].

A vast source of inspiration is the commonly used method of factorial ecology, by which geographers and others analyse the residential patterning of cities. The factorial ecology methodology originated in studies of intra-urban spatial variations [Davies 1984], but it has been applied much more widely. Although the theoretical framework of this approach has received considerable criticism, from a methodological perspective we see it as an extremely fruitful direction of research whose basic objectives (to identify dimensions of socio-spatial differentiation) and analytical tools (factorial analysis, cluster analysis, etc.) could be inspiring in our effort to understand the nature of suburban development and differentiation.

Setting the scene: migration and housing construction in the hinterland of Bratislava

The first signs of suburban development started during the inter-war period as significant flows of urban dwellers moved into the agricultural hinterland of Bratislava. This process was soon stalled by the socialist regime. The ensuing forty-year period was very similar to that in other socialist countries in CEE. The surrounding areas were underdeveloped due to the strong role of the state in urban planning and the housing system and the concentration of all important socio-economic activities in urban cores [Stanilov and Šýkora 2014]. After the sudden change of political system, the scale, pace, and depth of post-socialist transformation were not uniform [Nuissl and Rink 2005; Pichler-Milanovič et al. 2007; Marcińczak et al. 2015]. Whereas the transition in the Czech Republic, Poland, and Hungary proceeded more or less smoothly (not to mention the intense impact of West Germany on the former East Germany after unification—Wiessner [1999]), the political instability in Slovakia during the 1990s caused a slowdown

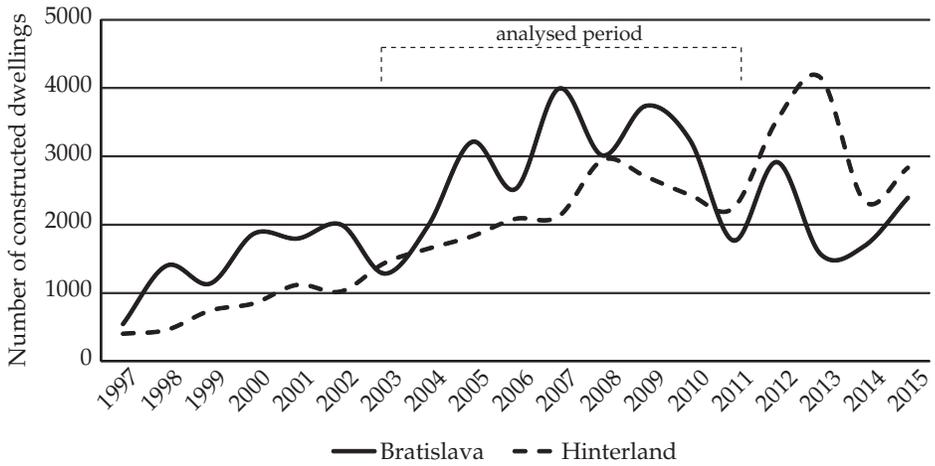
Figure 1. Net migration rate in the Bratislava Functional Urban Region

Source: Based on data from SOSR (2011).

in the transformation to neoliberal policies, which inevitably led to the later arrival of economic, social, and cultural changes [see Dražokoupil 2009; Šuška 2012].

In the first phase of the existence of an independent Slovakia (1993–1998) internal migration was characterised by a complicated and unclear situation [Michálek and Podolák 2011]. As in other CEE countries, urban development in Slovakia was concerned with the issues of urban regeneration, economic crisis, and deindustrialisation, increasing socio-spatial polarisation [cf. Szelenyi 1996; Niussl and Rink 2005]. Migration played only a minor role in the regional adjustment to the new economic situation in Slovakia during these years [Fidrmuc 2004]. The development of centrally planned large estate projects ended and individual housing construction was very modest, as the prices of new houses were very high in relation to population income. There was no help in the form of mortgage financing because it was not available until the end of decade [cf. Roy 2008]. The first more significant migration flows from the city to the hinterland had already begun occurring by the middle of the 1990s (Figure 1). The shift in the migration balance of the municipalities in the hinterland of the cities is one of the most typical traits of the changes that were manifested in the population's spatial movement in Slovakia in the new socio-economic conditions. This is the period (1996–1999) particularly connected with the first phase of the suburbanisation processes. Residential suburbanisation was characterised by the construction of single-family homes (some of them in the form of castle-like villas) located in the immediate vicinity of Bratislava. However, the volume of housing construction in the hinterland of Bratislava was low—around 400–800 dwellings per year during

Figure 2. Dwelling construction in the Bratislava Functional Urban Region



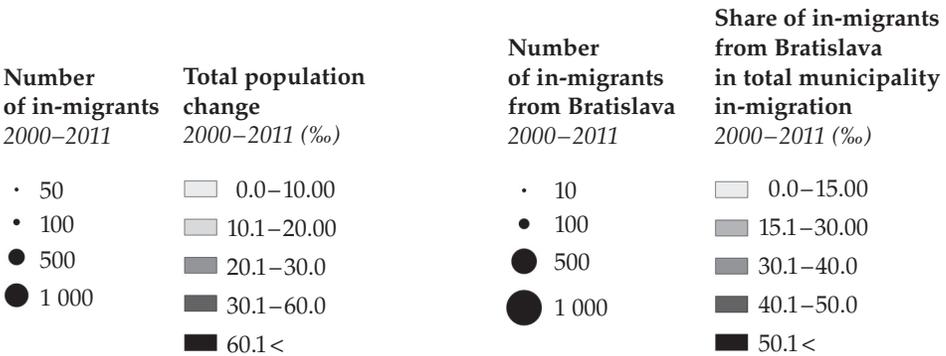
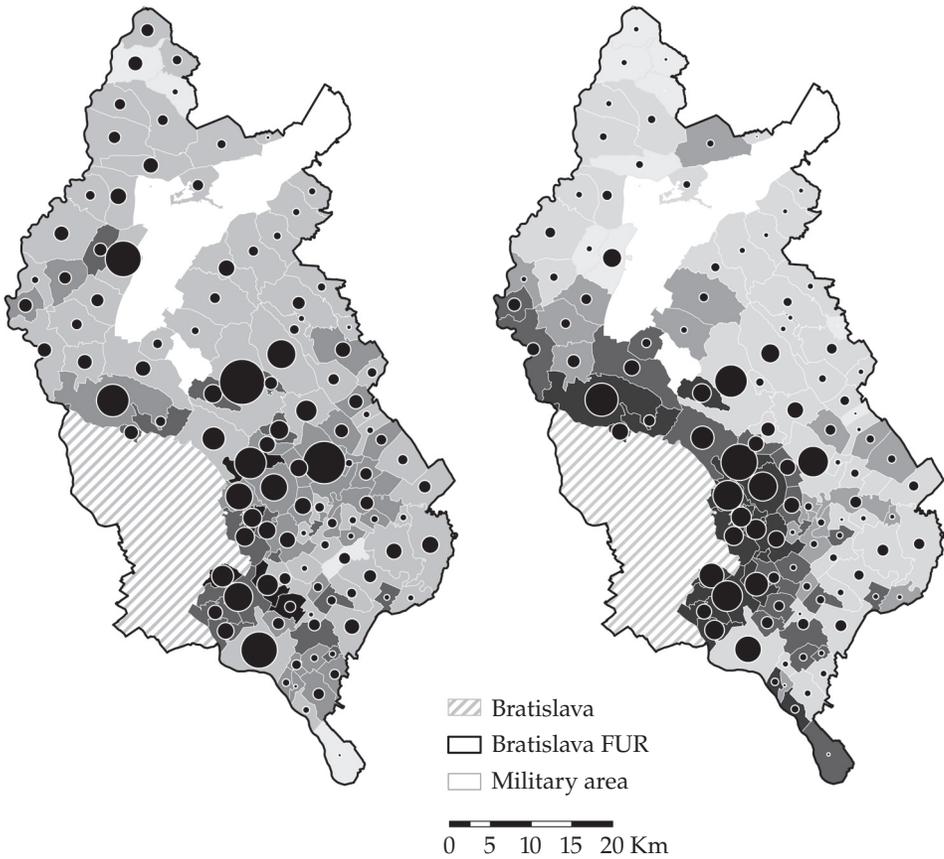
Source: Based on data from SOSR (2015).

the second half of the 1990s compared to 2000–3000 in the decade that followed (Figure 2).

Economic reforms introduced in the late 1990s bore fruit some years later and the country then experienced a period of distinct economic progress, including relatively high GDP growth. By the 2000s there appeared factors that stimulated suburban growth: the creation of a mortgage market, the clarification of the ownership structure of suburban land, and the overall increase in income in-equalities in the region [Gerbery 2010]. In these conditions the motivations behind moves into suburban areas (along with environmental and aesthetic preferences) were amplified by the practical considerations of residential property prices. Living beyond the city border became a pragmatic solution for many of those dwellers who could not afford to live in Bratislava [Šveda 2016; cf. Kährík et al. 2012]. The connection between migration and economic development strengthened during the later phases of the post-socialist transformation [Novotný 2016].

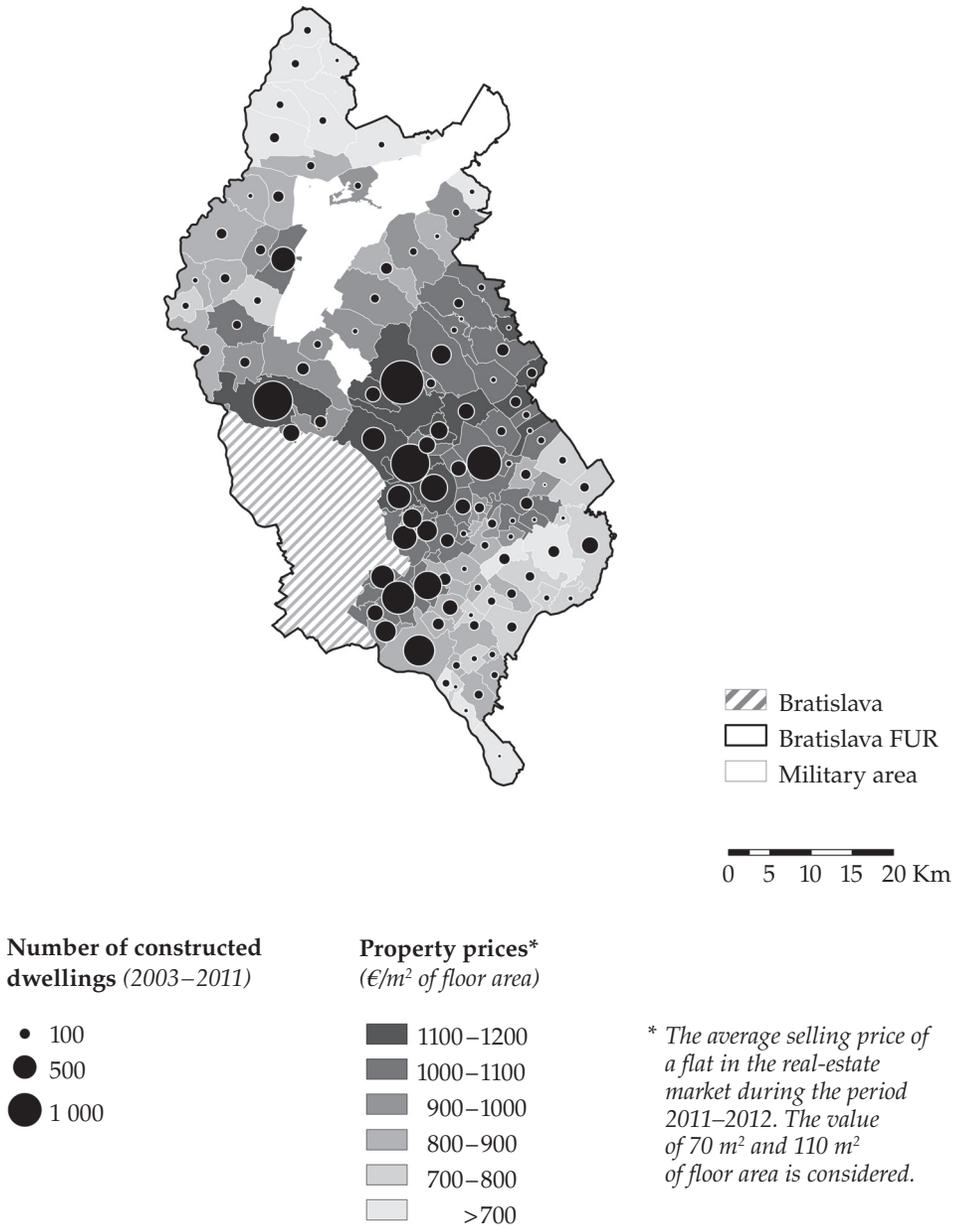
Statistics from the 2011 National Census reveal that more than 45 000 inhabitants moved into the municipalities in the hinterland of Bratislava between 2000 and 2011. The annual net migration rate peaked in 2005–2008 at 19.3 % (Figure 1). People migrating from Bratislava made up 36% of all in-migrants into the hinterland, while 28% migrated from other hinterland municipalities and 29% from other regions of Slovakia. The share of people who moved to the suburbs from Bratislava out of the total number of people who moved into the individual municipalities during the monitored period was 26.7–92.3%. This figure was above 50% in just 18 out of 111 analysed municipalities (Figure 3). However, it is

Figure 3. Migration to the hinterland of the Bratislava Functional Urban Region



Source: Based on data from SOSR.

Figure 4. Dwelling construction and property prices in the hinterland of the Bratislava Functional Urban Region



Source: Based on data from SOSR and the Institute for Financial Policy (2015).

important to bear in mind that this finding may be biased to a certain extent by the more complex migration trajectory of many inhabitants. Numerous migrants who (according to the statistical evidence) moved into the hinterland of Bratislava from other regions of Slovakia had lived for several years in the city, but had never registered their permanent residence there (living in rented housing); they therefore reflect behavioural patterns that are more like those of the inhabitants of the capital rather than those of their original place of residence. Consequently, the reliability of migration statistics is limited as evidently the record of migration to the hinterland of Bratislava is incomplete [Šveda and Podolák 2014]. Given the above-mentioned limitations of the data, the real movement of the population cannot be precisely monitored. For the same reason it is suitable to complete the migration statistic with the data on housing construction.

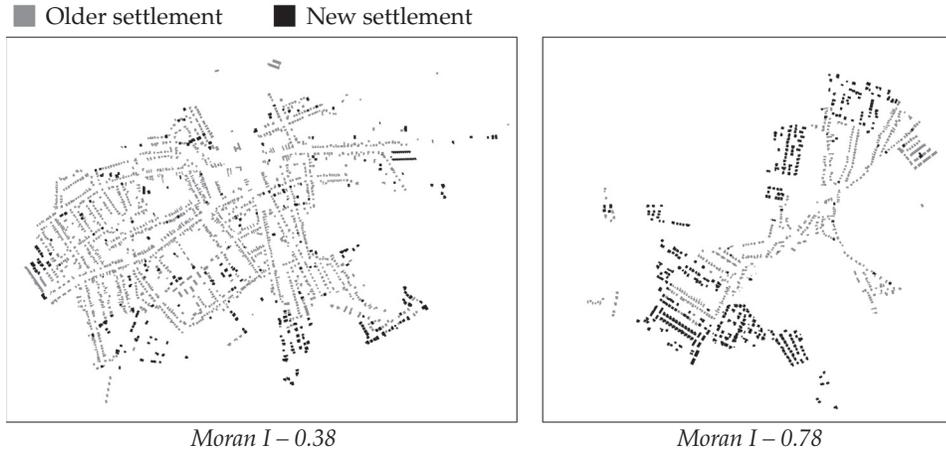
The monitored period of 2003–2011 may be considered significantly dynamic from the perspective of the volume of housing construction as the scope and form of this construction is unprecedented in Slovakia as a whole. In the nine-year period 44 000 dwellings were constructed throughout the Bratislava Functional Urban Region, 20 000 of them in the hinterland. Housing construction had a rising tendency and peaked in 2007–2009, when 6000 dwellings were being built annually. After 2009, housing construction slowed because of the economic crisis and the consequent economic uncertainty of the population and the stakeholders in the real estate market (investors and banks). This decline did not last long and it has been replaced in recent years by an even more intense pace of dwelling construction, as growth in the hinterland has come to outperform that in the urban core (Figure 2).

As far as spatial distribution is concerned (Figure 4), the biggest volume of housing construction in the hinterland of Bratislava was located in the cities of the studied region (Pezinok, Stupava, Senec), which attract suburban migrants by combining 'rural living' in an urban area with a sufficient infrastructure of amenities. The most intensive housing construction took place in municipalities within the immediate vicinity of Bratislava. We can observe a continuous decline in housing construction with increasing distance from Bratislava. The same applies to property prices differentiation. The only exception is the territory in the north-eastern direction from the city, where the prices have remained at the same high level (despite the increasing distance from Bratislava), reflecting the attractiveness of these areas (Figure 4).

Data and methods

Before we introduce the methodology used in this study, we shall briefly describe the spatial frame and data. The spatial frame is defined by the Bratislava Functional Urban Region (FUR), identified by Bezák [2014] on the basis of daily urban systems. The construction of FUR reflects the complex spatial and functional re-

Figure 5. The value of Moran's Index for new suburban settlement: the example of two municipalities (left: Ivanka pri Dunaji; right: Malinovo)



relationships between the city and its hinterland and it is therefore an appropriate spatial framework for monitoring suburban processes. The hinterland consists of 111 municipalities, the largest is the city of Pezinok, with 21 000 inhabitants, and the smallest is Kyselica, with just 140 inhabitants. There are six more small cities with a population ranging from 6000 to 17 000 inhabitants, and 104 municipalities with an average population size of 1400. The population (in 2011) of the whole region is 650 000 (430 000 in the city core; 220 000 in the hinterland).

The analysis is based on four data sets: migration records, housing construction, property prices, and the land use database.

Migration records: The first data set is based on anonymous microdata from the Population Census 2011 [SOSR 2011]. Data on 45 000 in-migrants who moved to the hinterland of Bratislava during the period of 2000–2011 were analysed. In terms of suburban development, this twelve-year period can be considered outstandingly dynamic and extraordinary in the context of the wider demographic and housing development in Slovakia [Šveda 2014; Novotný 2016].

It should be noted that we do not investigate the hinterland of Bratislava as a complex spatial system. The aim of this study is to reveal the hidden territorial structure of the Bratislava hinterland in terms of ongoing processes, which are represented by 'suburban flight', along with migration flows of various directions and intensity. This is reflected in our approach, which does not include the work with commonly used data for municipalities, but rather uses the data based on individual migrant records, where the age structure, education, family status, nationality, economic activity, and source destination are recorded. Although the dataset contains unique migrant records, it lacks the relevant characteristic of

social and economic status, which we consider indispensable. Direct data on the incomes and savings of residents—though they might be very useful in this context—are not available in Slovakia.¹

Housing construction: The second set of data consists of the number and size of constructed dwellings during the period of 2003–2011. These data are direct records from the construction permission procedure at the municipality level. Because the new houses are built in various forms, we used an indicator of the spatial arrangement of new built-up areas, which is represented by the Morans' Index.² We can thus distinguish highly concentrated large-scale development sites from the more dispersed development of individual constructors (Figure 5).

Property prices: The empirical data are based on the average sales of dwellings (houses) in the real estate market during the period of 2011–2012 [Institute for Financial Policy 2015]. This dataset is based on a regression model, which works with the specific characteristics of the dwellings (floor level, construction material, does the dwelling has an elevator, a balcony, or a terrace, etc.), and locality. It should be noted that prices are the response of market supply and demand forces, and they do not necessarily reflect the real selling price. Furthermore, residential property is reported as the most valuable asset people own and therefore has the potential to be used as a measure of socio-economic status. The pattern of price distribution is remarkably useful in identifying the socio-economic 'upper end' and 'lower end', and it helps to create a more complete picture of suburban development.

Environment—land use: Out of the numerous pull factors of (suburban) migration, the crucial role is played by the attractiveness of the environment. Obviously, the municipalities at the foothills of the Little Carpathian (Malé Karpaty) Mountains or localities on the waterfront offer a more attractive environment than the flat, monofunctional agricultural landscape with predominantly arable land. Differences in the attractiveness of a location for development are reflected in the real-estate market, where the building plots at the foothill sites near forest areas or vineyards sell for prices several times higher than sites in the agricultural lowland areas. The considerable heterogeneity of the natural environment in the hinterland of Bratislava thus provides a variety of conditions for suburban development. In addition to the migration data and data from housing construction,

¹ The Statistical Office of the Slovak Republic collects data on the incomes, expenditures, and consumption of private households in a sample survey, but these Household Budget Surveys are ultimately available only for individual regions of Slovakia. In addition, there are data on the average monthly wage in Slovakia, but this is available only at the district level.

² Moran's Index is a measure of spatial autocorrelation [Cliff and Ord 1973]. A perfectly concentrated arrangement of units would give a value that is close to 1. A random dispersed arrangement of units would give a Moran's Index value that is close to 0.

we have therefore included the land use data from the Aggregated Areas of Land Types Database [2011].

Selected variables do not capture all significant attributes; we can, however, consider them sufficiently relevant for our attempt to capture decisive processes influencing the socio-spatial differentiation of Bratislava's hinterland. A list and definitions of the initial set of variables are presented in Table 1.

Methods: To investigate the differentiation of suburban development and to reveal hidden forces and dependencies we tried to develop a regional typology of suburban development. The main objective was to characterise similar configurations and thereby to identify the key factors that condition the formation of individual types. The aim is to disaggregate the municipalities into several subsets in such a way that the objects in one cluster will be as alike as possible and simultaneously the degree of association between municipalities in different categories will be minimal. One of the hierarchical agglomerative methods of cluster analysis—Ward's method—was chosen to class municipalities into a system of categories characterised by their typical features.

Regarding the conditions of this method (independent variables), our primary objective was to monitor the character of the relations between indicators. A statistically significant relationship was proven between several variables. These pairs of indicators had to be either eliminated from the analysis or the entry variables had to be transformed into new independent hypothetical variables. A multidimensional statistical technique that can be used for this is Factor Analysis (FA), which makes it possible to describe the same volume of information in the set of several correlated variables with a smaller number of new variables while losing the least amount of information [Field 2005]. It makes it possible to identify certain dimensions (factors) that explain the relationship between variables with sufficient accuracy.

From the data set it was possible to define 22 separate variables, but initial analyses aimed at removing redundancies and multicollinearity led to a final selection of 12 variables. Partial adequacy measures of the variables and the computed communalities showed that indicators related to age structure, single in-migrants, less-educated in-migrants, in-migrants on maternity leave, the size of new dwellings, in-migrants from the hinterland of Bratislava, and land use—vineyards had inadequate values and therefore they were excluded from the FA. This does not mean that these indicators are not important. They are just not suitable for FA and can be considered individually in other analyses. The remaining 12 indicators capture the maximum of information about the original set, and based on Bartlett's test of sphericity, the overall KMO measure of 0.7, partial measures of variable adequacy, and the explained variability can be deemed suitable for a factor analysis. The parameters of the FA model were estimated using the principal component method, based on applying principal component analysis. The principal axis method was tested and both methods offered almost identical solutions. The number of statistically significant factors was determined

Table 1. Initial set of variables—part one

Variable name	Variable definition
<i>Migration</i>	
Migration rate	The share of in-migrants in the total population of municipality in the period 2000–2011
Highly educated in-migrants	Percentage of university graduates among in-migrants to the municipality in the period 2000–2011
Less educated in-migrants	Percentage of high school graduates among in-migrants to the municipality in the period 2000–2011
Married in-migrants	Percentage of married among in-migrants to the municipality in the period 2000–2011
Single in-migrants	Percentage of unmarried (singles) among in-migrants to the municipality in the period 2000–2011
Employed in-migrants	Percentage of employed in-migrants
In-migrants on maternity leave	Percentage of in-migrants on maternity leave
Young in-migrants	Percentage of age category 0–14 among in-migrants to the municipality in the period 2000–2011
In-migrants of working age A	Percentage of age category 15–49 among in-migrants to the municipality in the period 2000–2011
In-migrants of working age B	Percentage of age category 50–64 among in-migrants to the municipality in the period 2000–2011
Elderly in-migrants	Percentage of age category 65+ among in-migrants to the municipality in the period 2000–2011
In-migrants of Hungarian nationality	The share of in-migrants of Hungarian nationality out of the the total number of in-migrants to the municipality in the period 2002–2011
In-migrants from Bratislava	Percentage of in-migrants from Bratislava in the period 2002–2011
In-migrants from the hinterland of Bratislava	Percentage of in-migrants from Bratislava region (except Bratislava itself) in the period 2002–2011
In-migrants from other regions of Slovakia	Percentage of in-migrants from Slovakia (except Bratislava region) in the period 2002–2011
<i>Construction</i>	
Dwelling construction	The number of constructed dwellings per 1000 inhabitants in the period 2003–2011
The size of new dwellings	The average floor area of constructed dwellings per 1000 inhabitants in the period 2003–2011
Moran's Index	Measure of spatial autocorrelation of new houses constructed in the period 2002–2012

Table 1. Initial set of variables—part two

Variable name	Variable definition
<i>Property prices</i>	
Property prices	The average selling price (€/m ² of floor area) of flats in the real-estate market during the period 2011–2012. The value for 70m ² and 110 m ² of floor area is considered.
<i>Environment</i>	
Land use – arable land	Percentage of arable land in the total cadastral area of the municipality (2011)
Land use – forests and water bodies	Percentage of forests and water bodies in the total cadastral area of the municipality (2011)
Land use – vineyards	Percentage of vineyards in the total cadastral area of the municipality (2011)

using the criterion of an eigenvalue (the amount of information captured by a factor) higher than 1. This led us to identify four components, which explain almost 80% of the variability of the variables. The original matrix of factor saturation was rotated using orthogonal Varimax rotation (it preserves the independence of original factor dimensions; the variance of the loadings is maximised) in order to reduce the number of significant saturations to the minimum in each line of the factor matrix and for better interpretability of results. A pure factor solution, where each variable has a significant saturation in just one component, was obtained (Table 2).

The first component differentiates municipalities on the intensity of in-migration and the volume of housing construction. Furthermore, the nature of the spatial distribution of new houses, highly-educated in-migrants, and in-migrants from Bratislava constitute this dimension. This hypothetical variable can be referred to as the ‘factor of construction and migration’. The second dimension brings together three variables that capture flat prices, the source destination of the in-migrants, and their nationality. This is commonly referred to as the ‘factor of property prices and in-migrant’s origin’. The third dimension is saturated by variables of land use (the component positively correlates with the share of arable land; the share of forests and bodies of water appears as the opposite pole). This dimension is interpretable as the ‘factor of the natural environment’. The fourth and last dimension explains only 10.4% of the total variability of the data set and brings together two variables representing employed and married in-migrants. This hypothetical variable can be referred to as the ‘factor of the in-migrant structure’.

Based on the component score computed for each municipality in the above-mentioned factorial solutions we tried to find similar groupings using

Table 2. Rotated Component Matrix*

Variable	Component			
	Factor of construction and migration	Factor of property prices and in-migrant's origin	Factor of natural environment	Factor of in-migrant's structure
Dwelling construction	.932			
Migration rate	.924			
In-migrants from Bratislava	.741			
Moran's Index	.707			
University-educated in-migrants	.692			
In-migrants from other regions of Slovakia		.877		
In-migrants of Hungarian nationality		.798		
Property prices		-.739		
Land use – forests and water bodies			-.953	
Land use – arable land			.951	
Employed in-migrants				.882
Married in-migrants				.840

Note: Rotation Method: Varimax with Kaiser Normalisation (rotation converged in 5 iterations).

Ward's method of cluster analysis. After verifying the statistical significance between each pair of correlation coefficients and after standardising the variables, only five indicators (out of the 14 variables considered—the 10 indicators and 4 components omitted from the FA) could finally be entered into the cluster analysis: four components and 'land use—vineyards'. Several alternatives were tested before we chose the appropriate number of clusters. To meet the objectives of the research, the procedure finally chosen was the one whose results best suit a certain intuitive vision of a suitable classification of municipalities into separate clusters. Although there are some methodological limitations to the suburban development typology in the hinterland of Bratislava presented here, we believe that the resulting set of municipalities fairly reflects the intensity, arrangement, and nature of ongoing suburban processes.

Table 3. Cluster centroids of individual indicators for the regional typology of suburban development in the hinterland of Bratislava Functional Urban Region

Type no.	Suburban type	Factor of construction and migration	Factor of property prices and in-migrant's origin	Factor of natural environment	Factor of in-migrant's structure	Land use – vineyards
1	Large-scale development in the suburban ring	2.17	-0.34	-0.16	-0.11	-0.36
2	Intensive development in an agricultural landscape	-0.25	-0.36	0.90	0.45	-0.13
3	Intensive development in vineyards	0.10	-0.66	-0.51	0.36	3.05
4	Development with Hungarian in-migration	0.04	1.35	0.70	-0.26	-0.17
5	Development in a natural environment	-0.61	-0.64	-0.65	0.17	-0.25
6	Second-home development on the Danube riverside	0.15	1.62	-1.88	0.75	-0.43
7	Development in the rural periphery	-0.63	0.67	-0.59	-1.85	-0.43

Regional typology of suburban development

The statistical procedure mentioned above produced a series of hybrid variables (factors), each successively accounting for a proportion of the total variance in the input data and each statistically independent of one another. By applying the cluster analysis (Ward's method) on the set of 111 municipalities constituting the hinterland of Bratislava, we identified seven suburban development types that may be considered for sufficiently numerous and spatially compact categories.

An interesting pattern in the spatial expression of these suburban development types appears (Figure 6). The identified types represent a remarkably high degree of spatial compactness despite the clustering procedure did not contain any additional conditions regarding the spatial association of the clustered

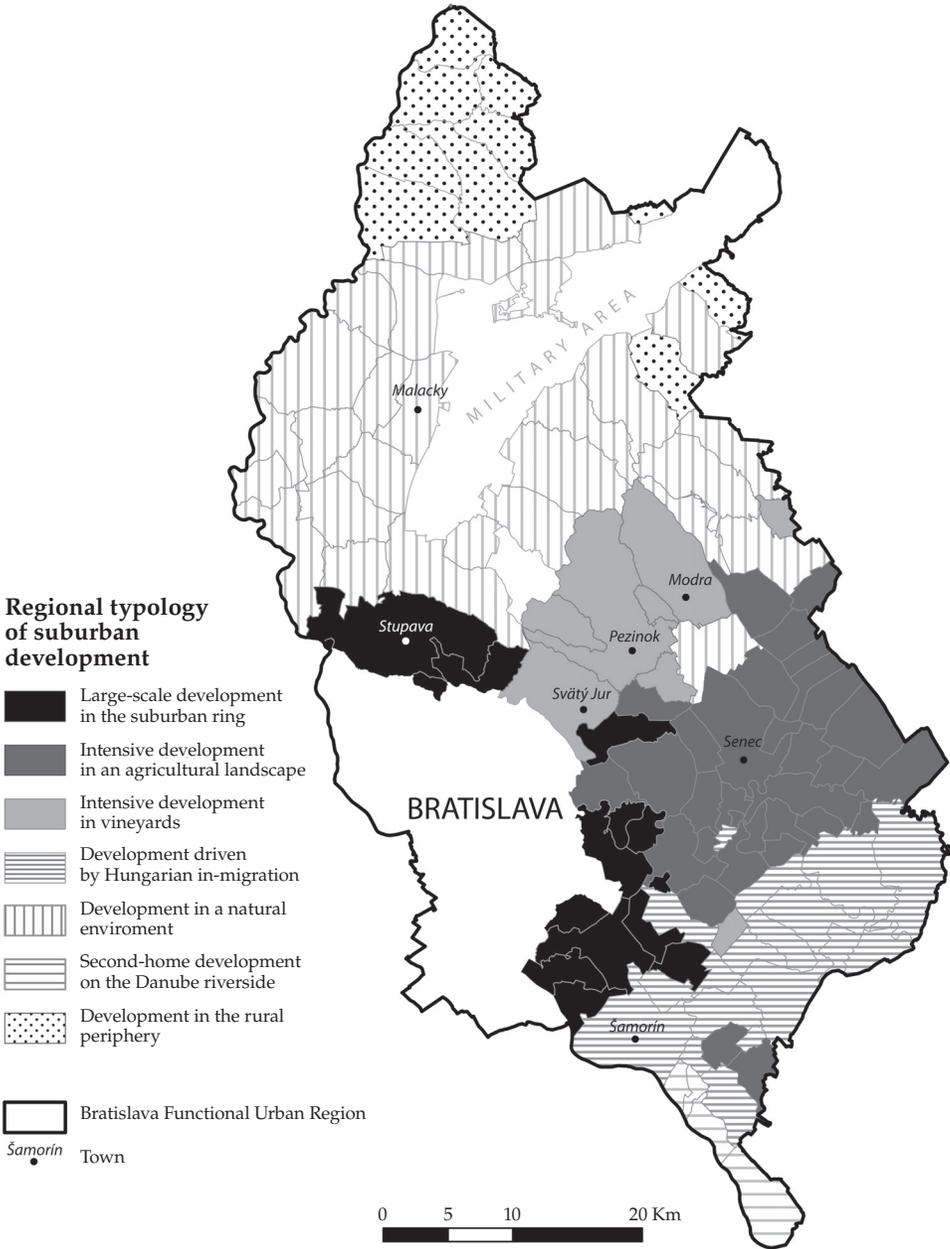
Table 4. Selected features of regional typology of suburban development in the hinterland of the Bratislava Functional Urban Region—part one

	Type no.	Suburban development type	Number of municipalities	Population (2011)	Total in-migration (2000–2011)	
					abs.	%
<div style="display: flex; flex-direction: column; align-items: center;"> <div style="writing-mode: vertical-rl; transform: rotate(180deg);">General characteristic of suburban development</div> <div style="display: flex; gap: 10px;"> <div style="writing-mode: vertical-rl; transform: rotate(180deg);">concentrated</div> <div style="writing-mode: vertical-rl; transform: rotate(180deg);">suburbanised</div> </div> <div style="display: flex; gap: 10px; margin-top: 20px;"> <div style="writing-mode: vertical-rl; transform: rotate(180deg);">dispersed</div> <div style="writing-mode: vertical-rl; transform: rotate(180deg);">rural</div> </div> </div>	1	Large-scale development in the suburban ring	13	33 186	9 670	21.4
	2	Intensive development in an agricultural landscape	31	58 733	11 043	24.4
	3	Intensive development in vineyards	8	41 202	7 223	16.0
	4	Development driven by Hungarian in-migration	17	37 593	5 772	12.8
	5	Development in a natural environment	27	66 759	9 332	20.6
	6	Second-home development on the Danube riverside	5	2 375	363	0.8
	7	Development in the rural periphery	10	15 544	1 811	4.0
		Hinterland of Bratislava FUR	111	255 392	45 214	100

Table 4. Selected features of regional typology of suburban development in the hinterland of Bratislava Functional Urban Region—part two

Type no.	In-migrants from Bratislava	In-migrants from hinterland	In-migrants from other regions of Slovakia	University-educated in-migrants	Number of constructed dwellings (2003–2011)		Average property price (2011–2012)
	%	%	%	%	abs.	%	€/m ² floor space of dwellings
1	57.7	14.9	22.0	40.1	7 030	36.1	1 039
2	37.1	29.9	26.3	29.3	4 187	21.5	1 006
3	29.7	39.3	23.6	35.1	2 959	15.2	1 078
4	28.4	5.5	59.1	19.1	2 200	11.3	772
5	25.0	47.7	19.3	19.9	2 515	12.9	942
6	45.5	12.1	37.2	18.5	150	0.8	638
7	15.4	21.1	55.2	9.9	419	2.2	568
	35.90	28.24	28.93	28.44	19 460	100	863

Figure 6. Regional typology of suburban development in the hinterland of the Bratislava Functional Urban Region



units (municipalities). The basic characteristics for the individual suburban types are listed in Table 4, which states the number of municipalities per type and the summary values of selected variables.

Before we proceed to the description of individual suburban development types, we would like to briefly comment on their nomenclature. The typology used in this study adopts a context-sensitive strategy. We investigate the local geographies of residential development and we introduced a typology of suburban neighbourhoods based on the most significant features. The basis for the interpretation of individual types is the value of the cluster centroids listed in Table 3. The ordering of suburban types is also relevant as it reflects the position of a particular type on an axis that runs from the most suburbanised to the most rural, and from the most concentrated to the most dispersed character of new residential construction, respectively (Table 4). Findings resulting from the logical examination of the problem, previous univariate analysis of the variables, as well as the authors' long-term experience with research in this area played a significant role.

Type 1—Large-scale development in the suburban ring. The location of municipalities within this type in the immediate vicinity of Bratislava predetermines them to become the area of the most intensive in-migration and housing construction. More than 9000 inhabitants moved in and 7000 dwellings were completed in the municipalities of this type during the reviewed period. The source of the migration is the decisive factor for identifying the processes ongoing in the city hinterland. The migrants from Bratislava constitute a majority (58%) in this type. If residential suburbanisation is understood as the relocation of the population from the core city to new construction in the city hinterland then this type is its spatial demonstration. Besides originating from Bratislava, the migrants into this zone have the highest share of university-educated people. Although we lack more detailed characteristics of social structure, we may assume that the high prices of real estate in the municipalities of this type have a significant selective effect on migration. This factor as well as other research [Šveda 2016] indicate that a typical migrant into this zone is a university-educated inhabitant of Bratislava with a higher societal status seeking to increase his/her quality of housing (to live in a proprietary house, move from a flat to a house) and at the same time maintain ties to the city³.

The city population brings a whole spectrum of specific features into the rural hinterland, which manifest themselves mostly in forms of housing (the dense construction with a high degree of visual separation is more reminiscent of an ur-

³ These findings are based on original data from a questionnaire survey in the selected suburban localities in the hinterland of Bratislava [Šveda 2016]. The results of the vast questionnaire survey, carried out on a sample of 500 respondents, imply that living in this suburban type is rather a pragmatic solution to housing issues rather than a dream-come-true of living in the countryside in the city hinterland.

Figure 7. An example of large-scale development in the hinterland of Bratislava, the case of Chorvátsky Grob municipality—Čierna Voda locality (top: 2003, bottom: 2015)



Source: Google Earth.

ban environment than a rural one). A high concentration of housing construction is a characteristic feature of this type, often translated in the form of large-scale residential development with specific urbanism (an amorphous street network, blind and irregular alleys). In most cases, these new housing units are the result of big development projects, which prepare the infrastructure for individual construction works and/or build standardised houses. Although these areas usually tie in with the existing settlement network, they are usually connected with the rest of the municipality through the bottleneck of a single road.⁴ New residential development with significant signs of separation is emerging primarily in localities with an aesthetic environment (the slopes of the Little Carpathian Mountains) and with high property prices (Marianka, Záhorská Bystrica, Limbach). New residential localities in the middle of agricultural fields and with little connection to the infrastructure and service networks are found only to a limited extent. The largest suburbium with greenfield development is localised in the municipality of Chorvátsky Grob (Figure 7). The incompetent and inefficient approach of the local government (also supported by the unclear legal situation) has allowed investors to build a suburb with inadequate infrastructure and lacking any spatial links. The spontaneous and unrestrained construction work has generated a number of problems, which have degraded the quality of life in this locality. In the 2001–2011 period the population of the municipality more than doubled (from 1571 to 3932 inhabitants) and more than 1400 new dwellings were constructed. Due to this extensive construction, the municipality of Chorvátsky Grob has become a symbol of suburban development (urban sprawl) that has both positive and negative impacts.

Type 2—Intensive development in an agricultural landscape. The second suburban type is formed by municipalities with an agricultural character, where arable land dominates the land-use structure (the factor of the natural environment). This suburban type consists of a diffusion of several migration flows. The volume of migration flows from the core city, the hinterland, and outer parts (of the city) are about equal in size (see Table 4). Although the share of migrants from Bratislava (37%) may be underestimated (as a result of incomplete evidence), the volume of tangential migration is significant (30%). The processes and motivations underpinning the tangential migratory flows, however, are not clearly identifiable and would require separate research to identify them. We can assume that important factors causing this movement include, alongside family-related motivations, the wish to live closer to one's workplace or to enhance the quality of one's housing.

⁴ During sales the closed nature of the streets is presented as an advantage providing silence and security. The need for isolation from the surroundings along with stability in social and material areas contribute to creating the ontological safety of suburbia [cf. Giddens 1990].

This type makes up the largest number of municipalities and inhabitants in the overall volume of migration. Despite the large volume of construction in this zone (4000 new units), compact suburbia are not being created and the prevailing form of construction is houses built by individual owners with the aid of small contractors. Larger settlements (Senec, Bernolákovo, Ivanka pri Dunaji) are, however, an exception, as they tend to feature larger projects for new residential zones. Despite this, a characteristic feature of this zone is its fragmented and dispersed spatial pattern. The visual appearance of some new residential areas in this suburban type closely resembles the suburbia listed under Type 1. It should be noted that suburban housing with architectural and aesthetic features are not just associated with migrants from big cities, but are a reflection of broader cultural trends. Residential suburbanisation can be viewed as a certain consumption pattern that is being reproduced regardless of the source or motivation of suburban migrants.

Type 3—Intensive development in vineyards. The municipalities on the south-eastern slopes of the Little Carpathian Mountains offer ideal conditions not only for vine growing, but also for residential construction (3 000 new units). This sloped landscape has become an extremely attractive area of high aesthetic value. The fragmented ownership structure of the vineyards has resulted in construction that has a very selective spatial character reminiscent of a mosaic, where the former vineyards areas alternate with smaller residential projects, solitary villas, or the abandoned vineyards. The total number of in-migrants reached 7000 in the reviewed period. The fact that this area has the second-largest share of university-educated migrants suggests that it has become a destination for residents from a higher social class. The selective effect is amplified by the high prices of the plots. Prices are driven up not just by the ever decreasing number of free plots, but also by speculative purchases of abandoned vineyards in the hope that they will be reclassified as construction plots. One of the distinctive features of this zone is that it contains as many as three cities (Svätý Jur, Pezinok, Modra), which increase the attractiveness of the area by offering better access to amenities and a specific wine culture.

Type 4—Development driven by Hungarian in-migration. The fourth suburban type is a rather compact zone in the south-eastern part of the FUR. This zone, exclusively rural in character, is a space with smaller scale of suburban development and is mainly shaped by the second component (the factors of the in-migrant's origin and property prices). The source destination of migration is located outside the city region (59%) and a characteristic feature is the increased share of migrants of Hungarian nationality. This fact is not surprising as historically the municipalities in this region have had a larger share of inhabitants from the Hungarian ethnic minority, thus creating a familiar environment for migrants from the southern regions of Slovakia.

The small share of in-migrants with university education and employed in-migrants may imply that this zone is becoming an area for 'blue-collars' who

want to live near the capital, where the largest number of job opportunities are concentrated for this social group in the construction industry and similar economic activities. However, this is just a hypothesis not supported by more detailed research. Nevertheless, the concentration of migrants with lower social status in this particular area is driven by the fact that this is the area with the most affordable real-estate prices in the hinterland of Bratislava. The flight of residents from the provincial periphery to the metropolitan areas—typical for the socialist period—apparently continues [cf. Stanilov and Sýkora 2014]. Job motives may be an important factor for migrants moving into the metropolitan region from elsewhere and a significant feature of the rural urbanisation process [cf. Kok and Kovács 1999].

Type 5—Development in a natural environment. This type of development relates to the municipalities located on the north-west slopes of the Little Carpathian Mountains or in the vicinity of the alluvial forests of the Morava River, which features a large share of forest area and bodies of water. The 26 municipalities identified as belonging to this type have become the new home for more than 9000 in-migrants in the reviewed period. Despite the relatively large volume of in-migration, the intensity of residential construction has remained below average. This suburban type is free from large development projects and more than 2500 housing units were built, mainly in the form of detached houses that do not create significant spatial concentrations. Given the favourable morphology, the natural environment, and the relatively good transport connection (a highway to the Czech Republic), this part of Bratislava's hinterland is not the site of such intensive development as in Types 2 and 3. This may have to do with the origin of the in-migrants, whose source destination is the hinterland themselves (48%), and who are willing to live in older (reconstructed) houses—the total number of in-migrants in this type exceeds the capacity of constructed dwellings there, which may indicate that the migrants are moving not just into new residential localities, but also into older housing stock.

Type 6—Second-home development on the Danube riverside. As far as the number of inhabitants is concerned, these municipalities are the smallest, accounting for just 1% of migration and 1% of housing construction located in 5 municipalities with (a total of) 2400 inhabitants. The reason for designating this less populous case of development as a specific type lies in its specific conditions, which manifested itself in multivariate analysis. This type comprises several municipalities on the banks of the Danube River. The river acts as an important feature that affects the nature of the land use (a large share of bodies of water and riparian forests—the 3rd component), but at the same time it acts as a serious traffic barrier (the river can only be crossed by ferry). The low property prices, isolated character of the area, and attractive natural environment create favourable conditions for recreational houses and second-home living. This is indicated not only by the character of the new construction but also by the migrant structure, which prevalently consists of migrants from Bratislava (45%) and of an older age (50+).

The phenomenon of owning a second home has a long tradition in CEE countries (e.g. Estonia, the Czech Republic). While during the state-socialist period second homes were the result of a need for individual recreation, currently they represent more a form of (long-term) investment.

Type 7—Development in the rural periphery. As the name of this suburban type suggests, it refers to a periphery of FUR, where the influence of the core city is so low that it is difficult to estimate whether the minimal volumes of in-migration and housing construction are the result of suburban development or rather the outcome of natural population transfers due to job or marital status changes. This peripheral type has the lowest intensity of in-migration, the smallest share of university-educated in-migrants, and the in-migrant structure factor with the lowest value. The minimal amount of housing construction in this area suggests that the migrants are moving into already existing houses. The character of some reconstructions points to the fact they are used as second homes.

Discussion

The typology presented above provides us with a better understanding of the dependencies and hidden forces behind the differentiation of suburban development and forms a basis on which we can discuss our research questions. Using the analytical frame of factorial analysis we sorted the key factors that condition the formation of individual types of suburban development. The intensity and spatial arrangement of housing construction, the intensity of in-migration, in-migrant origin, the share of well-educated in-migrants, and property prices can be identified as the most significant factors. Other factors played a less important role in the scale of consideration (see Table 2).

Our analysis confirms the results of other studies in the CEE region showing that people who are well educated and belong to well-off social groups are the typical actors in suburbanisation [cf. Kok and Kovács 1999; Hirt 2007; Kährlik and Tammaru 2008; Krišjāne and Bērziņš 2012; Špačková and Ouředníček 2012]. These people prefer localities in the vicinity of the city, while people with primary and secondary education are more likely to move to more remote residential areas. The formation of a better-educated and well-off 'suburban ring' (Type 1) contributes to socio-economic clustering in the suburban space. This selective character of migration is reinforced by the different sources (origins) of the newcomers, where only less than half of new suburban residents originate from the core city. The rest of the new residents come from outer parts or move within the hinterland.

Surprisingly, the age structure does not play a role in the spatial differentiation of migration. One would expect that housing in more remote suburban areas would be more available to younger and medium-income households, but all that we can identify is a partial migration flow of older urban dwellers moving to second-home-like localities in Type 5 and 6. As Kährlik and Tammaru (2008) observed in Tallin, young people are most likely to take risks and move directly to

the most desirable housing stock, despite the fact that the rise of real estate prices has made entering the housing market increasingly difficult. An analogous situation could occur in the case of Bratislava as well.

One of the crucial tasks was to determine whether the differentiation follows the assumed relationship with the distance from the city. As the regional typology described above reveals, the hinterland of Bratislava cannot be considered homogeneous from the perspective of how suburban development (especially suburbanisation) is manifested. The concentric configuration, which is generally characteristic for manifestation of centripetal and centrifugal forces in the city's hinterland, is in the case of Bratislava modified not only by the region's geography (relief, settlement structure, transport network), but also by the preferences and opportunities of newcomers. We believe that it is more appropriate to think in terms of the sectorial arrangement, which reflects the different level of attractiveness of municipalities for different socio-economic groups of in-migrants. This kind of interpretation reflects the fact that suburban migration is sensitive not only to spatial distance, property prices, and the quality of natural conditions, but is also (significantly) responsive to factors connected with (1) the newcomers' origin, (2) the spatial arrangement of new suburban localities, (3) and ethnicity.

(1) The case of Bratislava's urban region showed that the origin of the newcomers is an important factor in shaping the pattern of residential structure. As indicated by the analysis it was the share of in-migrants from Bratislava that was deemed to be the crucial differentiation factor. Close contact with the city is obviously important for former urban dwellers, while non-Bratislava in-migrants seek more remote localities. The breakdown of the in-migrants by origin raises the question of whether non-Bratislava in-migrants live in more remote areas because of property price differentiation or because of their desire to live in a more rural-like environment. The second reason seems to apply especially to Type 3, where property prices do not fall with increasing distance from the city. The experience of living in an urban environment seems to be important for the decision about where to go and how to live in suburban localities.

(2) As for the spatial arrangement of new localities, the new suburban development in the hinterland of Bratislava has taken various forms (patterns): from compact residential areas as integrative extensions of already established settlements to solitary units scattered in the suburban space. Looking at the spatial relationships of migration sources and the spatial arrangement of new built-up areas, one notices that in-migrants from Bratislava prefer more compact and densely built residential localities, while non-Bratislava in-migrants prefer more dispersed residential development. We can only speculate on the reasons behind this differentiation. Explanations may be found in the preferences of urban dwellers to live in a more city-like environment (higher density, row houses, condominiums), but this thesis would require more detailed investigation [cf. Kährík et al. 2012]. Nevertheless, there is still the fundamental question of whether the given spatial arrangement is a precondition for social differentiation, or whether it is rather the result of residential preferences.

(3) Another interesting issue is connected with the role of ethnic structure in forming suburban differentiation. The study reveals that ethnic Hungarian immigrants are not evenly spread across all parts of the hinterland. The fact that ethnic Hungarian migrants move almost exclusively into the south-eastern parts of the metropolitan region (Type 4) might indicate an overlap between socio-economic and ethnic divisions [cf. Ruoppila and Kährik 2003; Tammaru et al. 2013]. The absence of ethnic Hungarian migrants in the remaining area implies that language (cultural) similarity is an important determiner of spatial processes in the hinterland of Bratislava. This determiner is, however, not one-sided, but works in the opposite direction as well. Moving into the 'Hungarian' parts of the metropolitan area (areas with a small percentage of Slovak population) may for many 'Slovak' migrants be equally unappealing. It could be argued that fears about the language barrier or cultural stereotypes may act as a significant determining factor. Such behavioural tendencies are (still) found in a segment of the population despite the obvious process of mutual assimilation that is going on between the Slovak and Hungarian communities in Slovakia [see Majo 2014].

The presented regional typology of suburban development does not include the territories beyond the state border, which naturally belong to the hinterland of Bratislava. Several municipalities in Austria (Berg, Kittsee, Wolfsthal) and Hungary (Rajka) have been affected by the arrival of migrants from Bratislava, who are probably attracted by the lower property prices and/or transport accessibility [Zubriczký 2010]. We believe that given the nature of the residential construction (individual constructors) and the apparently lower intensity of immigration⁵ (due to the language barrier, spatial regulation, administrative difficulties, developer fees, etc.) these municipalities would probably constitute a separate suburban type of 'cross-border development'. However, due to the lack of data this cross-border migration was not included in the analysis.

Conclusion

This study sought to highlight the usefulness of the method of multivariate classification (cluster analysis) in attempting to depict the differentiated course of suburban development processes and the formation of heterogeneity in a city's hinterland. The analysis brings to light hidden—unavailable to direct observation—characteristics that provide us with a better understanding of the processes that form the spatial organisation of suburban areas. Each one of the delimited suburban development types exhibits unique features related to the specificities of individual socio-economic, environmental, and cultural contexts.

⁵ There are no exact data on this issue. The spatial extent and intensity of cross-border suburbanisation is estimated by indirect data from local authorities and the press.

Two important issues should be kept in mind when drawing conclusions from this study. First, our attempt at a more synthetic approach must necessarily operate with some degree of generalisation and overlook local specifics; however, it allows us to extract the most significant processes and patterns behind the differentiation of suburban development. Bearing in mind the complexity of the phenomenon analysed here, further investigation may be carried out in selected municipalities—representatives of particular suburban development types—to verify the differentiation presented here. However, the regional typology presents sufficient evidence for us to be able to outline the dynamics of suburban development and could serve as a basis for identifying key differences and broad trends.

Second, the formation of compact and meaningful regional types was achieved by using a rather limited set of data, which lacks detailed socio-economic characteristics and works with general land use categories. Moreover, given the small number of municipalities that make up each of the individual types of suburban development there are noticeable variations within each type. As Bezák has pointed out [1988], some specific features of spatial areas may remain hidden as a result of the loss of the original variable variance that cannot be explained by the dimensions. However, the available data used (in this study) represent the most comprehensive source of information on suburban migration in Slovakia so far. On the other hand, the simple data set structure may be viewed as an advantage. The data that were used (here) can most likely be found in other metropolitan regions as well and with an effort to capture suburban development trends they may also enable international comparison (when considering the individual specifics of the compared regions). Although the selected variables do not capture the full diversity of the hinterland of Bratislava, this study provides a baseline for more complex socio-economic analysis, thus contributing to a better understanding of the processes that decisively form the socio-spatial organisation of hinterlands in post-socialist cities today.

MARTIN ŠVEDA is a researcher at the Institute of Geography of the Slovak Academy of Sciences. His research interests are centred on suburbanisation and the transformation of landscape in the suburban zone.

MICHALA MADAJOVÁ studied regional geography at Comenius University and works as a researcher at the Institute of Geography of the Slovak Academy of Sciences. She specialises in data harmonisation and data-processing methods in human geography. Her research interests include land-cover analysis and time geography.

PETER PODOLÁK is a senior researcher at the Institute of Geography of the Slovak Academy of Sciences. His research interests include population dynamics, internal migration, and suburbanisation.

References

- Bezák, A. 1988. 'Regionálne typy sociálno-priestorovej štruktúry Bratislavy.' (Regional types of socio-spatial structures in Bratislava) *Geografický časopis* 40: 311–325.
- Bezák, A. 2014. 'Funkčné mestské regióny na Slovensku v roku 2001.' (Functional urban regions in Slovakia in 2001) Pp. 169–198 in *Regionálne dimenzie Slovenska*, edited by Viliam Lauko et al. Bratislava: Univerzita Komenského.
- Bolt, G., R. van Kempen and P. White. 2008. 'Minority Ethnic Groups in the Dutch Housing Market: Spatial Segregation, Relocation Dynamics and Housing Policy.' *Urban Studies* 45: 1359–1384, <https://doi.org/10.1177/0042098008090678>.
- Borén, T. and M. Gentile. 2007. 'Metropolitan Processes in Post-communist States: An Introduction.' *Geografiska Annaler: Series B, Human Geography* 89: 95–110, <https://doi.org/10.1111/j.1468-0467.2007.00242.x>.
- Brade, I., G. Herfert and K. Wiest. 2009. 'Recent Trends and Future Prospects of Sociospatial Differentiation in Urban Regions of Central and Eastern Europe: A Lull before the Storm?' *Cities* 26: 233–244, <https://doi.org/10.1016/j.cities.2009.05.001>.
- Clark, W. A. V. 2006. 'Race, Class and Space: Outcomes of Suburban Access for Asians and Hispanics.' *Urban Geography* 27: 489–506, <https://doi.org/10.2747/0272-3638.27.6.489>.
- Cliff, D. A. and J. K. Ord. 1973. *Spatial Autocorrelation*. London: Pion.
- Davies, W. K. D. 1984. *Factorial Ecology*. Aldershot: Gower.
- Drahokoupil, J. 2009. *Globalization and the State in Central and Eastern Europe: The Politics of Foreign Direct Investment*. Abingdon: BASEES/Routledge.
- Fidrmuc, J. 2004. 'Migration and Regional Adjustment to Asymmetric Shocks in Transition Economies.' *Journal of Comparative Economics* 32: 230–247, <https://doi.org/10.1016/j.jce.2004.02.011>.
- Field, P. A. 2005. *Discovering Statistics Using SPSS*. 2nd ed. London: Sage.
- Gentile, M., T. Tammaru and R. van Kempen. 2012. 'Heteropolitanization: Social and Spatial Change in Central and East European Cities.' *Cities* 29: 291–299, <https://doi.org/10.1016/j.cities.2012.05.005>.
- Gerbery, D. 2010. *Príjmová nerovnosť v SR*. Bratislava: Inštitút pre výskum práce a rodiny.
- Giddens, A. 1990. *The Consequences of Modernity*. Cambridge: Polity.
- Hamilton, I. F. E., K. Dimitrovska Andrews and N. Pichler-Milanović (eds). 2005. *Transformation of Cities in Central and Eastern Europe: Towards Globalization*. Tokyo: United Nations University Press.
- Hirt, S. 2007. 'Suburbanizing Sofia: Characteristics of Post-socialist Peri-urban Change.' *Urban Geography* 28: 755–780, <https://doi.org/10.2747/0272-3638.28.8.755>.
- Jonston, R. J., D. Gregory, G. Pratt and M. Watts (eds). 2000. *The Dictionary of Human Geography*. 4th ed. Oxford: Blackwell.
- Kährlik, A. and T. Tammaru. 2008. 'Population Composition in New Suburban Settlements of the Tallinn Metropolitan Area.' *Urban Studies* 45: 1055–1078, <https://doi.org/10.1177/0042098008089853>.
- Kährlik, A. and K. Leetmaa. 2009. 'Residential Preferences towards Suburban Living in Post-socialist Metropolises.' Paper for the ENHR Conference in Prague 2009, 'Changing Housing Markets: Integration and Segmentation', 28 June–1 July 2009.
- Kährlik, A., K. Leetmaa and T. Tammaru. 2012. 'Residential Decision-making and Satisfaction among New Suburbanites in the Tallin Urban Region, Estonia.' *Cities* 29: 49–58, <https://doi.org/10.1016/j.cities.2011.07.005>.
- Kok, H. and Z. Kovács. 1999. 'The Process of Suburbanization in the Agglomeration of Budapest.' *Netherlands Journal of Housing and the Built Environment* 14: 119–141, <https://doi.org/10.1007/BF02496818>.

- Krišjāne, Z. and M. Bērziņš. 2012. 'Post-socialist Urban Trends: New Patterns and Motivations for Migration in the Suburban Areas of Riga, Latvia.' *Urban Studies* 49: 289–306, <https://doi.org/10.1177/0042098011402232>.
- Leetmaa, K. and T. Tammaru. 2007. 'Destinations of Suburbanisers in the Tallinn Metropolitan Area.' *Geografiska Annaler, Series B*, 89: 127–146.
- Leetmaa, K., T. Tammaru and K. Anniste. 2009. 'From Priority-led to Market-led Suburbanisation in a Post-communist Metropolis.' *Tijdschrift voor economische en sociale geografie* 100: 436–453, <https://doi.org/10.1111/j.1467-9663.2009.00551.x>.
- Majo, J. 2014. 'Niekoľko poznámok k fenoménu ethnicity v súčasnej slovenskej humánnej geografii.' (Several remarks on the phenomenon of ethnicity in contemporary Slovak human geography) *Acta Geographica Universitatis Comenianae* 58 (2): 149–172.
- Marcińczaka, S., T. Tammaru, J. Novák, M. Gentile, Z. Kovács, J. Temelová, V. Valatka, A. Kährlik and B. Szabó. 2015. 'Patterns of Socioeconomic Segregation in the Capital Cities of Fast-track Reforming Postsocialist Countries.' *Annals of the Association of American Geographers* 105: 183–202, <https://doi.org/10.1080/00045608.2014.968977>.
- Michálek, A. and P. Podolák. 2011. 'Impact of Key Socio-economic Disparities on Migration in Slovakia: Economic Diversification vs Traditional Pattern.' *European Spatial Research and Policy* 18: 71–87, <https://doi.org/10.2478/v10105-011-0005-0>.
- Novotný, L. 2016. 'Urban Development and Migration Processes in the Urban Region of Bratislava from the Post-socialist Transformation until the Global Economic Crisis.' *Urban Geography* 37 (7): 1009–1029, <https://doi.org/10.1080/02723638.2016.1139413>.
- Nuissl, H. and D. Rink. 2005. 'The "Production" of Urban Sprawl in Eastern Germany as a Phenomenon of Post-socialist Transformation.' *Cities* 22 (2): 123–134, <https://doi.org/10.1016/j.cities.2005.01.002>.
- Ouředníček, M. 2007. 'Differential Suburban Development in the Prague Urban Region.' *Geografiska Annaler: Human Geography* 89B 2: 111–125, <https://doi.org/10.1111/j.1468-0467.2007.00243.x>.
- Park, R. E., E. W. Burgess and R. D. McKenzie. 1925. *The City*. London: University of Chicago Press.
- Pazúr, R., J. Oľahel and M. Mareta. 2015. 'The Distribution of Selected CORINE Land Cover Classes in Different Natural Landscapes in Slovakia: Methodological Framework and Applications.' *Moravian Geographical Reports* 23 (1): 45–56, <https://doi.org/10.1515/mgr-2015-0005>.
- Pichler-Milanovič, N., M. Gutry-Korycka and D. Rink. 2007. 'Sprawl in the Post-socialist City: The Changing Economic and Institutional Context of Central and Eastern European Cities.' Pp. 102–135 in *Urban Sprawl in Europe: Landscapes, Land-use Change & Policy*, edited by C. Couch, L. Leontidou and G. Petschel-Held. Oxford: Blackwell Publishing, <https://doi.org/10.1002/9780470692066.ch4>.
- Podolák, P. 2007. 'Geografické aspekty suburbanizácie a priestorový pohyb obyvateľstva.' (Geographic aspects of suburbanisation and spatial mobility of the population) *Životné prostredie* 41: 298–302.
- Roy, F. 2008. 'Mortgage Markets in Central and Eastern Europe—A Review of Past Experiences and Future Perspectives.' *European Journal of Housing Policy* 8: 133–160, <https://doi.org/10.1080/14616710802061953>.
- Ruoppila, S. and A. Kährlik. 2003. 'Socio-economic Residential Differentiation in Post-socialist Tallinn.' *Journal of Housing and the Built Environment* 18: 49–73, <https://doi.org/10.1023/A:1022435000258>.
- Slavík, V., R. Grác, M. Klobučník and K. Kohútová. 2011. 'Development of Suburbanization of Slovakia on the Example of the Bratislava Region.' Pp. 35–58 in *Urban Regions as Engines of Development*, edited by T. Marszal. Warsaw: Polish Academy of Science, Committee for Spatial Economy and Regional Planning.

- Smith, A. 2000. 'Employment Restructuring and Household Survival in "Postcommunist Transition": Rethinking Economic Practices in Eastern Europe.' *Environment and Planning A* 32: 1759–1780, <https://doi.org/10.1068/a32101>.
- Špačková, P. and M. Ouředníček. 2012. 'Spinning the Web: New Social Contacts of Prague's Suburbanites.' *Cities* 29: 341–345, <https://doi.org/10.1016/j.cities.2011.09.002>.
- Stanilov, K. and L. Sýkora (eds). 2014. *Confronting Suburbanization—Urban Decentralization in Postsocialist Central and Eastern Europe*. Chichester: Wiley Blackwell.
- Šuška, P. 2012. 'Production of the Built Environment in the Postsocialist City of Bratislava: Conditions, Dynamics, and Spatial Manifestation.' *Geografický časopis* 64: 155–179.
- Šveda, M. and P. Podolák. 2014. 'Fenomén neúplnej evidencie migrácie v suburbánnej zóne (na príklade zázemia Bratislavy).' (The phenomenon of incomplete migration records in a suburban zone: the case of Bratislava hinterland) *Geografický časopis* 66: 115–132.
- Šveda, M. 2011. 'Suburbanizácia v zázemí Bratislavy z hľadiska analýzy zmien krajiny pokrývky.' (Suburbanisation in the hinterland of Bratislava from the perspective of analysis of land cover change) *Geografický časopis* 63: 155–173.
- Šveda, M. 2014. 'Bytová výstavba v zázemí veľkých slovenských miest v kontexte suburbanizácie a regionálnych disparít.' (Dwelling construction in the hinterland of big Slovak cities in the context of suburbanisation and regional disparities) Pp. 173–195 in *Regionálne a priestorové disparity na Slovensku, ich vývoj v ostatnom desaťročí, súčasný stav a konzekvenencie*. Bratislava: Geografický ústav SAV.
- Šveda, M. 2016. 'Život v Bratislavskom suburbiu: prípadová štúdia mesta Stupava.' (Living in suburbia: a case study of Stupava (the hinterland of Bratislava)) *Sociológia* 48: 139–171.
- Sýkora, L. and S. Bouzarovski. 2012. 'Multiple Transformations: Conceptualising Post-communist Urban Transition.' *Urban Studies* 49: 41–58, <https://doi.org/10.1177/0042098010397402>.
- Sýkora, L. and K. Stanilov. 2014. 'The Challenge of Postsocialist Suburbanization.' Pp. 1–32 in *Confronting Suburbanization. Urban Decentralization in Postsocialist Central and Eastern Europe*, edited by K. Stanilov and L. Sýkora. Chichester: Wiley-Blackwell.
- Szelényi, I. 1996. 'Cities under Socialism—and After' Pp. 286–317 in *Cities after Socialism*, edited by G. Andrusz, M. Harloe and I. Szelényi. Oxford: Blackwell, <https://doi.org/10.1002/9780470712733.ch10>.
- Tamaru, T. 2001. 'Suburban Growth and Suburbanisation under Central Planning: The Case of Soviet Estonia.' *Urban Studies* 38: 1341–1357, <https://doi.org/10.1080/00420980120061061>.
- Tamaru, T. 2005. 'Suburbanisation, Employment Change, and Commuting in the Tallinn Metropolitan Area' *Environment and Planning A* 37: 1669–1687, <https://doi.org/10.1068/a37118>.
- Tamaru, T., M. van Ham, K. Leetmaa, A. Kährrik and K. Kamenik. 2013. 'The Ethnic Dimensions of Suburbanisation in Estonia.' *Journal of Ethnic and Migration Studies* 39: 845–862, <https://doi.org/10.1080/1369183X.2013.756697>.
- Timár, J. and M. Váradi. 2001. 'The Uneven Development of Suburbanisation during Transition in Hungary.' *European Urban and Regional Studies* 8: 349–360, <https://doi.org/10.1177/096977640100800407>.
- Wiessner, R. 1999. 'Urban Development in East Germany—Specific Features of Urban Transformation Processes.' *GeoJournal* 49: 43–51, <https://doi.org/10.1023/A:1007016912703>.
- Zubriczký, G. 2010. 'Suburbanizácia Bratislavy.' Pp. 50–75 in *Slovensko-maďarská*

aglomerácia v okolí Bratislavy, edited by T. Hardi, M. Lados and K. Tóth. Győr-Šamorín: Stredisko regionálnych výskumov Maďarskej akadémie vied, Fórum inštitút pre výskum menšín.

Data sources

- Geodetic and Cartographic Institute. 2011. *Aggregated Areas of Land Types Database*.
- Institute for Financial Policy. 2015. *The Property Prices Calculator*. Ministry of Finance of the Slovak Republic.
- Statistical Office of the Slovak Republic (SOSR). 2011. *Anonymised Microdata of the Population of Slovakia*. Population and Housing Census 2011.
- Statistical Office of the Slovak Republic (SOSR). 2015. *Dwelling Construction 2003–2015*.