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SUBURBANIZATION, BUT CENTRALIZATION? MIGRATION PATTERNS IN THE POST-SOVIET FUNCTIONAL URBAN REGION – EVIDENCE FROM KYIV

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Abstract
Despite being one of the most influential paradigms of urban studies, the stages of urban development model have been criticised for inability to describe and explain the urban evolution in specific economic, social and political conditions. In particular this refers to the post-socialist world. This paper presents the study of migration patterns in Kyiv functional urban region (KFUR) using the stages urban development model and the alternative approach by Sýkora and Posová (2011) derived from the original model. In this way, the paper intends to evaluate the existing methodology and to make the comparative assessment of the results. The results show that both approaches may be used for classifying urban regions in terms of growth/decline and centralization/decentralization. At the same time, they have limited potential to predict the future development of the post-Soviet urban regions. Despite the presence of common trends, revealed migration patterns in the KFUR substantially differ from the patterns of urban evolution in the post-socialist countries of the Central Europe due to specific social, economic and political conditions in the post-Soviet space.

Key words
Migration pattern, post-Soviet functional urban region, stages of urban development, Kyiv, Ukraine.

INTRODUCTION

Starting from the 1990s, theories and models explaining the urban development (in particular, urban life cycle theory and, respectively, stages of urban development) have been tested through the lens of the post-socialist contexts and cases. Once stages of urban development are perceived as a model, the theory should re-

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flect the regions and conditions under which the models were developed (e.g. democracy, market economy). The situation in post-socialist countries differed a lot from these circumstances, mainly at the early phase of post-socialist transformation. Thus, it was expected that the considered models may be not so effective in explaining and predicting the urban development in (post)transition societies comparing with the western world.

The existing body of literature gives evidence that urban development in the post-socialist world not always can be clearly described and explained by the original urban life cycle theory (e.g. Sýkora and Posová, 2011; Novotný, 2012). The main reason for this is the specifics of the migration patterns in the conditions of the socialist political regime collapse and the transition from the state-led economy to the market. The analysis of successes and failures of the urban life cycle theory has brought valuable insights about both the theory itself and the specificity of urban development in different contexts. However, there are few researches focused on the post-Soviet countries, which differ to the post-socialist countries outside the former Soviet Union in certain aspects (Borén and Gentile, 2007; Brade et al., 2010; Stanilov and Sýkora, 2014). Testing theories of urban evolution in post-Soviet countries is valuable in order to check their adequacy in different social, economic and political conditions. This task is even more important since the adoption of the city life cycle idea has had consequences not only for the science but also for the cities and their inhabitants which became the targets of policies influenced by the idea (Roberts, 1991).

Contemporary development of urban regions in Ukraine have already been in the focus of research (e.g., Denysenko, 2010; Mezentsev and Mezentseva, 2012; Denysenko and Pidhrushnyi, 2013; Mezentsev and Kliuiko, 2015; Manshylina, 2015). However, at the moment, few contributions consider the urban development in Ukraine directly from the standpoint of the urban life cycle theories. In particular, Mezentsev and Havryliuk (2015) tested the differential urbanization model in Ukraine for the period 1840-2014; Gnatiuk (2017) apparently identified stages of urban evolution for largest Ukrainian cities, but focused predominantly on suburbanization process; Malchykova and Pylypenko (2017) tested the stages of urban development model for Kherson, but with extremely narrow time frame and ambiguous results.

Therefore, the purpose of this article is to test the stages of urban development model in post-Soviet conditions for Kyiv functional urban region (as the largest and most dynamic in Ukraine), to evaluate, in this manner, the explanatory and predictive power of the model and underlying theory, and to expand knowledge on the urban evolution in the post-Soviet countries in the broader context of post-socialist urban development.

THEORETICAL FRAMEWORK

There are several models explaining the growth and shrinkage of urban regions generally known as stages of urban development (SUD). These models (hereinafter referenced simply as a SUD model, unless otherwise specified) constituted one of the most influential paradigms of urban studies in the 1980s and 1990s (Ouředníček, 2005). Despite re-evaluation and criticism, they retain their importance and explanatory power with certain reservations until today. The common feature of the SUD models is definition of the consecutive stages of urban development determined by the relationship between the pattern of population change in the entire functional urban region and its structural parts: urban core (main city) and ring (suburbia or hinterland).

The earliest approach elaborated by Hall and Hay (1980) and Klaassen and Scimeni (1981), later modified by Cheshire and Hay (1989) and Cheshire (1995) under the influence of urban life cycle model, distinguished between 6 (or 8) types of urban development in terms of centralization/decentralization based on absolute or relative demographic growth/decline in the urban core and ring. The second approach, proposed by van den Berg et al. (1982), classified 4 subsequent stages of urban development (urbanization, suburbanization, desurbanization, reurbanization) and 8 phases based on absolute or relative centralization/decentralization. The model predicts the cyclical course of the stages, and therefore become known also as a model of urban life cycle. The underlining theory argues that the processes that occur in urban environment are the outcomes of the behaviour of three groups of urban actors: enterprises, households and public authorities (Leetmaa, 2008).

Osada (2003), inspired by Hall and Hay (1980), van den Berg et al. (1982), Cheshire and Hay (1989) and Cheshire (1995) proposed an integrated model that combines the types of urban development in terms of absolute or relative centralization/decentralization and the consequent stages of urban development: urbanization, suburbanization, desurbanization, reurbanization (Table 1).

In the 1980-1990s, the SUD model was tested in urban regions in different economic, social and political conditions. On the one hand, it was shown that urban regions may be classified according to the model-predicted stages, and move between them. However, even the founders of the model pointed at some its deficiencies. In particular, real functional urban regions rarely passed all four stages of the urban life cycle in the model-predicted sequence (van den Berg et al., 1982; Vartianen, 1989; Nyström, 1991; Sjöberg, 1992; van den Berg, 1999; Champion, 2001; Ouředníček, 2000; Klusáček et al., 2009; Sýkora and Posová, 2011; Wolff, 2017). The empirical evidence supports the acceptability of the model for industrial cities, but it appears to be less valuable for administrative and service centres (Cheshire and Hay, 1989; Cheshire, 1995). The economic, social, cultural, political,

Table 1 The urban development stages according to the SUD model

Hall / Hay / Cheshire		van den Berg		Population change			
				Core	Ring	Total	
Stage 1	LC-A	Stage 1	Reurbanization (I)	–	–	–	-ΔC<-ΔR
Stage 2	LC-B	Stage 2	Reurbanization (II)	+	–	–	
Stage 3	AC	Stage 3	Urbanization (I)	+	–	+	
Stage 4	RC	Stage 4	Urbanization (II)	+	+	+	ΔC>ΔR
Stage 5	RD	Stage 5	Suburbanization (I)	+	+	+	ΔR>ΔC
Stage 6	AD	Stage 6	Suburbanization (II)	–	+	+	
Stage 7	LD-A	Stage 7	Desurbanization (I)	–	+	–	
Stage 8	LD-B	Stage 8	Desurbanization (II)	–	–	–	-ΔR<-ΔC

LC-A, centralization during regional decline in population (A); LC-B, centralization during regional decline in population (B); AC, absolute centralization; RC, relative centralization; RD, relative decentralization; AD, absolute decentralization; LD-A, decentralization during regional decline in population (A); LD-B, decentralization during regional decline in population (B).

Source: *Osada (2003).*

etc. forces influencing urban development substantially vary from place to place, making difficult to either explain or predict urban development (Zakirova, 2010). Seemingly the same urban forms can be shaped by completely different principles, and conversely, the same principles can lead to different forms of settlement in different social contexts, including geographical areas and historical periods (Sýkora and Posová, 2011). The qualitative migration characteristics appear to be important in evaluating particular stages or processes of urban development (Halliday and Coombes, 1995; Ford, 1999; Fisher, 2003; Lindgren, 2003; Hirt, 2007). Therefore, in the recent decades, urbanization, suburbanization, desurbanization and reurbanization are often considered as the processes (which may occur simultaneously) or simply tools for classification of urban regions rather than consequent stages of urban development (Roberts, 1991; Ouředníček 2005; Sýkora and Posová, 2011).

Furthermore, the choice of an indicator (e.g. change of population, change of housing, or migration) is a primary factor that may influence the overall classification results (Lisowski, 2005; Sýkora and Posová, 2011; Novotný, 2012). In particular, the model based on the overall population growth/decline cannot be correctly applied for urban regions in the condition of overall population shrinkage, including the majority of urban regions in post-socialist countries (Nuissl and Rink, 2005; Leetmaa et al., 2014). This methodological deficiency can be solved by the use of net migration rate as a key indicator (Novotný, 2012). Moreover, migration reacts to economic, political and social changes much faster than the birth rate (Drewett and Rossi, 1981). Also, the delimitation of functional urban regions is no less impor-

tant to make the results adequate and comparable (Lisowski, 2005); the commonly used approaches make it impossible to see what is happening in middle-sized or small towns (Nyström, 1991).

The other debatable matter is the use of absolute and relative indicators in the SUD model. The use of absolute values would reflect the size imbalance between core and ring rather than the relative significance of the change in each zone (Drewett and Rossi, 1981). The original authors of the urban life cycle theory allow the use of both types of data (van den Berg et al., 1982). However, in certain specific situations the original model produced different outcomes in the classification of stages of urban development depending on whether absolute or relative data were used (Sýkora and Posová, 2011). Consequently, Matznetter (2004), facing certain problems while working with relative data, described the SUD model as suitable for pedagogical purposes because of its simplicity, but nevertheless problematic for use in empirical analysis. Moreover, based on empirical findings in the analysis of Prague and Vienna urban regions, Sýkora and Posová (2011) showed that the model may work incorrect with relative data, and concluded that the model itself is constructed in a problematic way, which leads to contradicting and misleading results. Instead, they suggested (cf. Posová and Sýkora, 2011) an alternative method of classifying forms of urbanization using the combination of growth or decline of an entire urban region and the centralization or decentralization within an urban region, distinguishing between urbanization, suburbanization, desurbanization and reurbanization (Table 2):

Table 2 Forms of urbanization according to Sýkora and Posová (2011)

Process	Centralization (growing share of the core)	Decentralization (growing share of the ring)
Growth of the FUR	urbanization	suburbanization
Decline of the FUR	reurbanization	desurbanization

The initial comparative study, testing the SUD model, included some cities in socialist world (Hungary, Yugoslavia, Poland, and Bulgaria), and despite the overall prevalence of centralization compared to the Western Europe, found some decentralization processes occurring there also (Van den Berg et al., 1982). Numerous studies brought evidence that in many cities in Central and Eastern Europe, strong centralization trends were substituted with suburbanisation starting from the 1990s in the post-socialist countries (e.g. Sýkora and Čermák 1998; Kok and Kovács 1999; Brown and Schafft, 2002; Ouředníček 2005, 2007; Hirt 2007; Sýkora and Novák, 2007; Raźniak and Winiarczyk-Raźniak, 2013; Stanilov and Hirt, 2014; Sýkora and Mulícek, 2014; Kovács and Tosics, 2014; Gałka and Warych-Juras, 2018) and

from the 1990s-2000s in post-Soviet countries like Estonia, Latvia, Russia, Belarus and Ukraine (Kostinskiy 2001; Leetmaa and Tammaru, 2007; Leetmaa, 2008; Brade et al. 2010; Krisjane and Berzins, 2012; Mezentsev et al., 2012; Mezentsev et al., 2014; Brade et al. 2014; Nefedova et al., 2016; Mezentsev and Mezentseva 2017; Gnatiuk 2018). Although such a shift is predicted by the SUD model, the underlying mechanism of suburban growth in post-socialist cities is different from classical Western suburbanization (e.g. Hirt 2007; Leetmaa, 2008). A stage of reurbanization, which has been considered as hypothetical in the 1980s, has been proven for many European cities (Cheshire 1995; Herfert 2007; Kabisch and Haase, 2011), although problematic issues related to the complex understanding of reurbanization were outlined by Glatter and Siedhoff (2008). In recent decades, the SUD model itself have been tested for a limited number of post-socialist cities, including Prague (Klusáček et al., 2009; Sýkora and Posová, 2011), Bratislava (Novotný, 2012) and other functional urban regions of Slovakia (Bezák, 1999), Kherson in Ukraine (Malchykova and Pylypenko, 2017). Apart from the aforementioned methodological weaknesses of the original SUD model (Sýkora and Posová, 2011), these researches showed that it cannot correctly predict the trajectories of FURs between the stages and phases of development since it does not include local (national) economic, political and social context neither external factors influencing urban development (Novotný, 2012). The pace of stage change can be rapid and the changes themselves uncertain (Malchykova and Pylypenko, 2017). Therefore, the model is considered to be hardly applicable for predicting the further urban development, but it is a suitable tool for categorization of the regions into the clearly defined stages and phases of the urban development (Sýkora and Posová, 2011; Novotný, 2012).

DATA AND METHODS

In this article, two methodological approaches are tested. The first one is the SUD model in the interpretation by Osada (2003), which allows distinguishing consequent stages (urbanization, suburbanization, desurbanization, and reurbanization) and phases (in terms of absolute or relative centralization/decentralization) of urban development. The second one is alternative method of classifying forms of urbanization (Sýkora and Posová, 2011; Posová and Sýkora, 2011), which uses combination of growth or decline of an entire urban region and the centralization or decentralization within an urban region, distinguishing between urbanization, suburbanization, desurbanization and reurbanization, and considering them as units for classification rather than sequential stages.

Both models are working with a functional urban region (FUR), often referenced also as a functional urban area (FUA). In our case, the Kyiv functional urban region (KFUR) includes the city of Kyiv (core) and its hinterland (ring). The delimita-

tion of the FUR is one of the key methodological issues for testing the SUD model in real world. The OECD defines the hinterland as all municipalities with at least 15% of their employed residents working in a certain urban core (OECD, 2013). However, beyond the developed world, the scarcity of respective data creates a huge problem for application of such an approach. Possible alternatives include gravity approach (Vries et al., 2009; Goh et al., 2012; Persyn and Torfs, 2015; Ahlfeldt and Wendland, 2016) and radiation model (Simini et al., 2012; Masucci et al., 2013), or the concept of accessibility, including time limits to access the central city and road availability (Gajovic, 2013; Rodrigues da Silva et al., 2014; Guérois et al., 2014; Meijers et al., 2015; Moisés Obaco et al., 2017).

Reliable official statistics on commuting in Ukraine is absent. At the same time, in the conditions of post-Soviet transformations (increasing number of private cars, diversifying ways of commuting, simplified accounting of employees at enterprises, etc.), it is problematic to adequately estimate the number of suburban residents working in Kyiv. Manshylina (2015) outlined the limits of Kyiv suburban area based on the (1) public transport accessibility, (2) indicators of functions (production, service, and housing), and (3) stability of connections with the central city. Kyiv suburban area, according to this methodology, includes 9 administrative districts and 7 cities of regional significance within the Kyiv oblast (in Ukraine, oblasts are the first-order administrative units, while districts and cities of regional significance are the second-order administrative units). This delimitation generally coincides with the 1.5-hour isochrones of public transport accessibility from Kyiv, and with the limits of Kyiv suburban area according to the Draft General Plan of Kyiv and its Suburban Zone until 2025 (Department for Architecture and Planning, 2015). However, in our opinion, taking into account exclusively public transport unjustifiably narrows the limits of Kyiv ring; Manshylina (2015) herself considers the 2.0-hour isochrones by public transport as a limit of Kyiv metropolitan region. Therefore, we decided to expand the limits of Kyiv ring using 1.5-hour isochrones of motor vehicle accessibility from Kyiv, since a lot of commuters use private cars for accessing the central city. According to this criterion, the KFUR includes 16 administrative districts and 11 cities of regional significance of Kyiv oblast, 3 administrative districts and 1 city of regional significance of Zhytomyr oblast and 1 administrative district of Chernihiv oblast (district was included into the KFUR if more than a half of its population is living within the 1.5-hour isochrones) (Fig. 1). In these limits, population of the KFUR, core and ring in 2002 was 4 314 421, 2 611 327, and 1 703 085 registered inhabitants, and in 2020 – 4 649 658, 2 967 360, and 1 682 298 registered inhabitants respectively.

We used a net migration rate per 1,000 inhabitants as a key indicator for the SUD model, because it allows to avoid the effect of the size imbalance between the structural components of the urban region and is suitable for the post-socialist

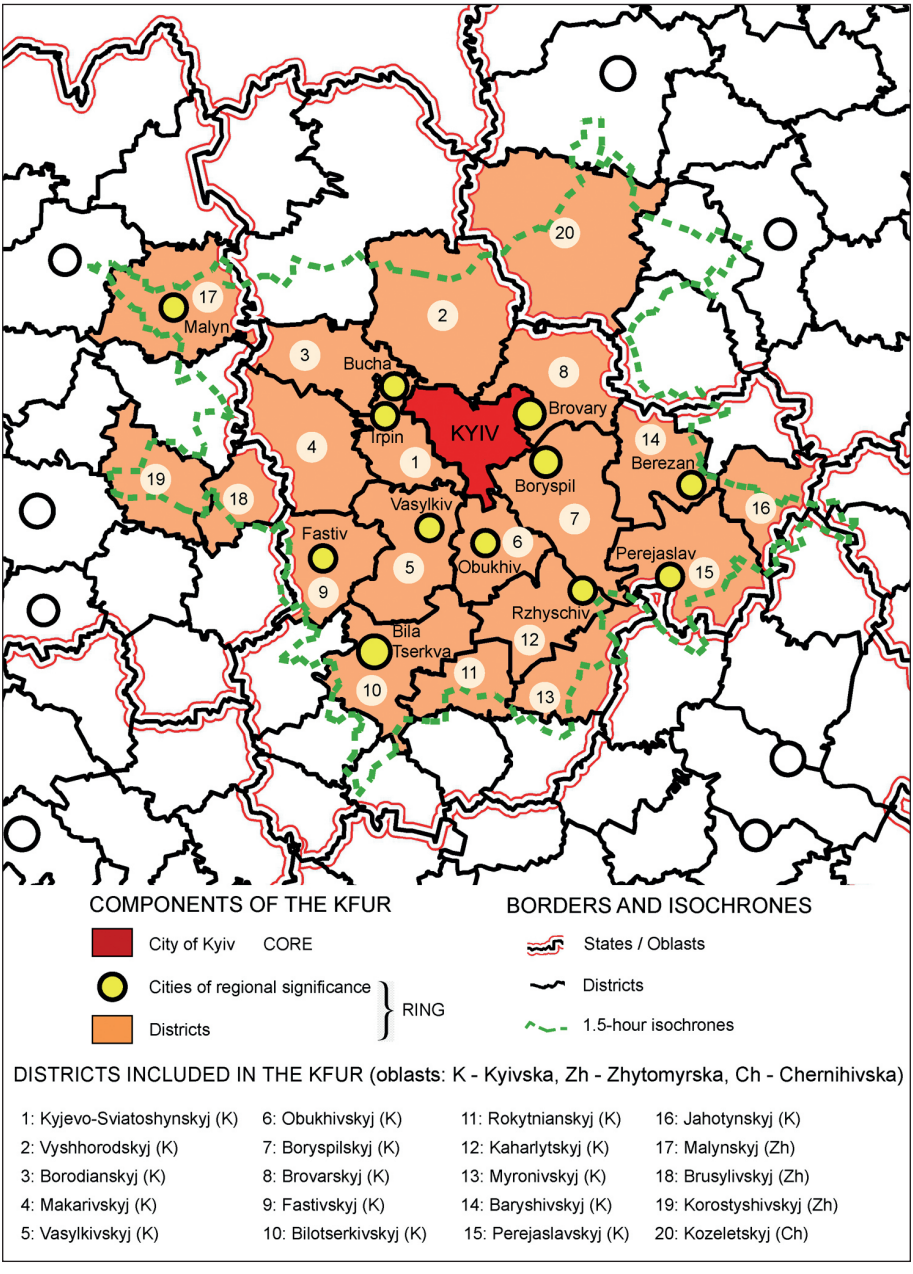

Fig. 1
Limits and spatial structure of the KFUR
Source: elaborated by the authors

context of the overall population shrinkage in the country (Sýkora and Posová, 2011; Novotný, 2012). It was calculated annually for the period of 2002-2019 for the KFUR and its components (core and ring):

Core: migration balance for Kyiv divided by the population of Kyiv in the middle of the respective year;

Ring: the sum of the migration balances of urban and rural settlements with the ring divided by the total population of the ring (calculated as a sum of populations of respective cities, townships and villages) in the middle of the respective year;

KFUR: the sum of the migration balances of Kyiv and urban and rural settlements within the ring, divided by the total population of the central city and ring.

For the alternative approach (Sýkora and Posová, 2011), average annual absolute numbers of population for the core, ring and KFUR in total were used to calculate the shares of the population in the core and the ring to the total population of the KFUR.

The data on the population and migration for the studied area in 2002-2020 were taken from the State Statistics Service of Ukraine. The available migration statistics includes annual numbers of arrivals and departures per districts and cities of regional significance, as well as separate cities, townships, and the remainder of rural areas. The available statistics does not distinguish between the internal and international migration flows. Although the impact of international migration on urban development in Ukraine is not negligible, we suppose its recorded volume to be too low to impact general trends of urban development at regional level. It should be also remembered that internally displaced persons due to the Donbas military conflict and annexation of Crimea, which had not changed the official registration place, drop from the official statistics. When calculating net migration rates for 2002, data from the 2001 census were taken as an initial value and data of January 1, 2003 was taken as the final value for the calculation of the mid-year population.

RESULTS

Based on the net migration rates in 2002-2019 for the core, ring and the KFUR in general, we identified certain stages of urban development according to the SUD model (Osada, 2003). In 2002-2010, the KFUR was at the stage of urbanization (II) with its relative centralization: both core and ring were growing in terms of migration, but the core was growing faster than the ring () (Fig. 2, compare with Table. 1). However, starting from 2005, net migration rate in the core steadily decreased, while net migration rate in the ring slowly increased, creating background for the following change of stages.

Interesting stage fluctuations were observed after 2010. In 2011, ring started to slightly overwhelm the core and the KFUR in terms of migration growth (). Such a pattern corresponds to the suburbanization (I) stage with relative decentralization. However, the following period of 2012-2013 was marked by the next burst of the migration attractiveness of Kyiv (), causing increase in the migration attractiveness of the KFUR; the ring was also intensively growing, with smaller rates those of the KFUR and the core. According to the model, this pattern should be interpreted as the urbanization (II) stage with relative centralization of population.

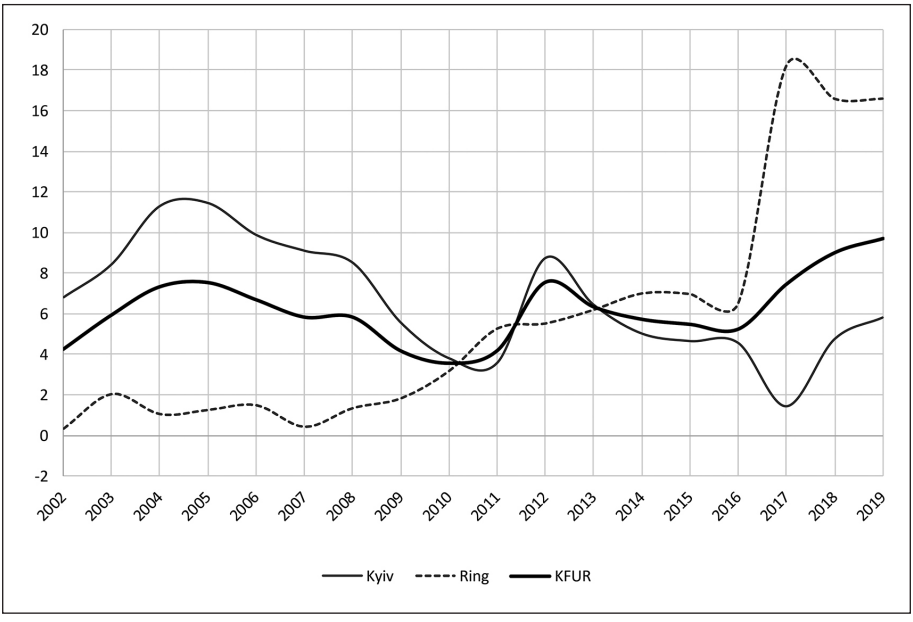

Fig. 2
Net migration rates for KFUR and its components, 2002-2019
Source: State Statistics Service of Ukraine, own calculations

Since 2014, net migration rate in the ring continuously overwhelms the net migration rate in the core (), both permanently been positive. At first, migration attractiveness of the ring only slightly surpassed that of the core. However, starting from 2016, net migration rate in ring showed very quick and significant growth, while net migration rate in the core, on the contrary, showed significant decline. According to the model, the period of 2014-2019 corresponds to suburbanization (I) stage with relative decentralization of population.

Taking into account the full sequence of patterns, we may suggest that the period of 2011-2013 is a proto-suburbanization stage with the transition from

relative centralization to relative decentralization, so-called inter-stage. Probably, the time frame of this inter-stage should be expanded to 2011-2015, since clear migration trends typical for the stage of suburbanization (I) are evident only starting from 2016.

Thus, we may suggest three urban development patterns in the KFUR: 1. Urbanization-II (2002-2010): Kyiv is the main destination for migrants (), although the ring is also growing; 2. Urbanization-II/Suburbanization-I or proto-suburbanization (2011-2013, possibly 2011-2016): Kyiv and the ring alternate as main destination for migrants (); 3. Suburbanization-I (2014-2019, possibly 2016-2019): ring is growing faster than Kyiv (), but both have positive values of the net migration rate.

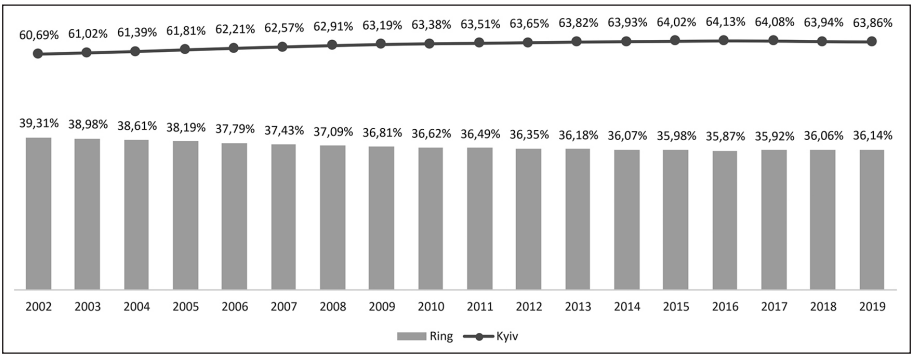

Fig. 3
Shares of the core and ring population in the KFUR, 2002-2019
Source: State Statistics Service of Ukraine, own calculations

However, the results described above should be treated with caution, especially with regard to trends in population centralization / decentralization. Sýkora and Posová (2011) criticize the original SUD model for the use of population/migration growth rate in identifying (de)centralization patterns. Instead, they suggest using the relationship between the population of a core and a ring as a criterion of (de) centralization. According to their approach, development of the KFUR in 2002-2016 should be classified as urbanization. In particular, in 2014-2016 the share of the core in the population of the KFUR was growing () despite the more rapid migration growth of the ring (); the SUD model classified this pattern as suburbanization (I) stage (compare Table 1, Table 2 and Fig. 2, Fig. 3). Since 2017, the development of the KFUR is classified as a stage/form of suburbanization according to both the SUD model and the approach of Sýkora and Posová (2011): the share of the ring in the population of the KFUR begins to grow (), which means, according to the second approach, the transition to suburbanization form of urban development.

DISCUSSION

Unlike the post-socialist metropolises of the Central Europe, which experienced absolute decentralization in the 1990s – early 2000s (Lisowski, 2005; Sýkora and Posová, 2011; Novotný, 2012), in particular accelerated growth of the suburban areas (Pichler-Milanović, 2014; Kovács and Tosics, 2014; Sýkora and Mulícek, 2014; Stanilov and Hirt, 2014; Leetmaa et al., 2014), a stable centralization is observed in the KFUR until the beginning of 2010s. According to the available data, Kyiv retained positive values of the net migration not only for the period of 2003-2019 (on which this study is based), but also in the previous period of 1991-2001, except for 1994 and 1996, when the values were negative and zero, respectively. Unlike Prague and Bratislava, where in 1990s and early 2000s rings were growing in terms of migration together with the migration outflow from the cores (Sýkora and Posová, 2011; Novotný, 2012), migration attractiveness of the KFUR ring started to grow only in the second half of the 2000s, and a clear transition to the suburbanization stage/form is apparent only in the 2010s, i.e. with a 10-year delay. Thus, Kyiv may be treated as an intermediate case between the post-socialist capitals of the Central Europe, characterized by distinct decentralization pattern, and Moscow, where steady centralization persists despite the start of suburbanization process (Brade et al., 2010; Brade et al., 2014).

What are the reasons for these differences in the post-Soviet context? In our opinion, they should be attributed to the lower level of social welfare in the post-Soviet countries like Ukraine, including late and small-scale formation of the middle class. Middle class is a key actor of a classical western-type suburbanization driven by environmental motives. The slow rate of reforms in Ukraine largely defined the delay in the suburban growth comparing with the post-socialist countries of the Central Europe. The relocation of upper- and middle-class families from the core to the ring in the KFUR gained momentum only in the third decade of post-socialist transition, triggered by the national economic revival in the country in the beginning of 2000s (Mezentsev and Mezentseva, 2017). Thus, the stage of intensive mass suburbanization (Borén and Gentile, 2007) or so-called suburban boom (Stanilov and Sýkora, 2014) is only beginning to gain momentum around the large cities in Ukraine.

Also, in the early transition period, big cities in the post-Soviet space concentrated opportunities for economic activity and converted into engines of economic growth towering over the stagnating hinterlands (Golubchikov, 2004; Stanilov, 2007; Stanilov and Sýkora, 2014). Thus, strong centralization in the early and middle period of transition may be attributed to the centripetal migration to the central city from the hinterland, including outside the ring. However, since 2010, the demand for housing in the capital has even increased, but in Kyiv there has been an acute shortage of good land plots for development. In addition, housing

in the capital is not affordable for many people coming from the other regions, so they benefit from buying a relatively cheap apartment in the close suburbia near the urban edge. Developers and administrations of suburban settlements are also interested in the housing construction: the first benefit from the cheaper land plots and getting construction permits easier, the latter receive growing revenues to local budgets and infrastructure development (Olijnyk et al., 2019).

Based on the available statistics on the net migration rate in Kyiv in 1991-2001 and the visible start of residential urbanization in the Kyiv's suburbia in 2000s (Mezentsev and Kliuiko, 2015; Mezentsev and Mezentseva, 2017), the first post-socialist decade of the KFUR development most likely may be classified as a stage of urbanization (I). That means that during the last 3 decades the KFUR almost consequently passed the stages of urbanization (I) – urbanization (II) – suburbanization (I), in full accordance with the SUD model. However, this does not mean that the SUD model perfectly works in the case of the KFUR or in post-Soviet space in general. First, the initial urbanization stage was not the normal development stage but was conditioned by the peculiarities of post-Soviet economic and social conditions. Second, the shift to decentralization via accelerated suburban growth is explained not only by the centrifugal migration with environmental motives, by also the centripetal migration with economic motives. Third, the transition between the stages is not clear, e.g. a rather long period of trend fluctuation, so called inter-phase between the urbanization (II) and suburbanization (I) is observed in 2010s. Probably, Malchykova and Pylypenko (2017), writing about the rapidly changing trends for Kherson, observed similar inter-phase period.

And last, but not the least: the migration patterns in the KFUR are very sensitive to the ongoing changes in the political situation, legislation, etc. We are going to illustrate this thesis with certain examples. Transition to suburbanization (I) stage in 2013-2016 was very slow and ambiguous due to the political, economic and military crisis in Ukraine, when people were on a knife edge and therefore cautiously invested in residential estate. With a relative improvement in 2017, in particular de-escalation of the Donbas military conflict, suburban growth resumed very rapidly. However, deeper or prolonged crisis could result in the return to urbanization or even desurbanization stage. Furthermore, according to the SUD model, now we may expect the KFUR to make transition to the suburbanization (II) stage with positive net migration rate in the ring and migration outflow in the core. However, according to the newly adopted version of the Ukrainian state construction rules (2019), it is forbidden to build residential buildings above 4 floors in the rural areas, where high-rise residential suburbanization is currently concentrated (Mezentsev and Kliuiko, 2015; Mezentsev and Mezentseva, 2017). This means that (1) large developers, seeking for profits, are likely to leave the suburbia and return to the city, (2) the population density in newly constructed suburban neighbourhoods will be lower than in the previous years of suburban boom. Together, these

processes may result in the return back to the urbanization (II) stage contrary to the expectations according to the SUD model.

The KFUR illustrates the differences between the SUD model and the approach proposed by Sýkora and Posová (2011). In particular, two models differently determine the beginning of the stage/form of suburbanization in the KFUR. What is more important for identifying the stage/form of suburbanization: the share of ring population or the faster growth in the ring comparing with a core? In our opinion, both are important and relevant for the *process* of suburbanization. However, the SUD model deceptively uses the terms of centralization/decentralization. For example, in 2014-2019, the population within the KFUR concentrated in the core, but the SUD model defines this stage as relative decentralization. At the first glance, the approach of Sýkora and Posová (2011) works more correctly in this case. However, its reliability may be in turn questioned since it addresses both migrations and natural growth. In case of the KFUR, the share of the core increased partly due to the natural increase, and the share of the ring decreased partly to the natural decrease.

Also, we believe that the names of the stages/forms of urban development should capture the dominant process (e.g. suburbanization process), and the SUD model appears to be more sensitive in catching suburbanization process. In particular, in the KFUR, distinct start of suburban development relates to the end of 2000s, but the approach of Sýkora and Posová (2011) detects suburbanization form of urban development only in the end of 2010s. The problem is that centralization should not be equated with urbanization/reurbanization, and decentralization with suburbanization/desurbanization, if we treat them all as processes rather than the conventional stages or forms. Therefore, both approaches are possible as instruments for cognition if the respective stages/phases of urban development are considered as conventional terms for classification of urban regions (cf. Ouředníček, 2005; Novotný, 2012).

Although a need for theorizing is undeniable, we assume that shifting from the conventional stages/forms to tangible processes is a more effective way of studying all the diversity of urban development forms and trajectories. Supporting Ouředníček (2005), we believe that cities really go through different stages of development, but different kinds of cities may go through specific sequences of stages, and each of these stages may be represented by unique combination of individual processes (for example, simultaneous suburbanization and reurbanization) depending on local conditions. In particular, the pattern of residential suburbanization in the metropolitan areas in the post-socialist period varies in different countries and regions, which is conditioned by the imposition of the socialist heritage, globalization impact and individual peculiarities of development (Brade et al., 2010). Consequently, real urban regions display a number of variations of the spatial dynamics and patterns of suburbanization (Stanilov and Sýkora, 2014).

CONCLUSIONS

Testing the SUD model (Osada, 2003) allowed identifying three consequent stages of urban development in the KFUR: urbanization (II) (2002-2010), inter-phase of proto-suburbanization (2011-2013): urbanization (II)/suburbanization (I), and suburbanization (I) (2014-2019). The use of approach proposed by Sýkora and Posová (2011) also revealed the transition from urbanization to suburbanization, although in different time frames. The revealed migration pattern substantially differs from the patterns of urban evolution in the post-socialist countries of the Central Europe due to specific social, economic and political conditions in the post-Soviet space. At the same time, common trends of accelerated suburban development, typical for the whole post-socialist realm, are also observed, but with notable delay.

Despite certain deficiencies, both approaches are suitable instruments for classifying functional urban regions in terms of overall growth/decline and inner centralization/decentralization. However, shift from conventional stages/forms to processes of urban development seems to be a more perspective approach. Since the SUD model does not take into account external factors influencing the urban development, in particular socio-economic and political crises, it has limited potential to predict the future development of the urban region. Especially this is true for post-Soviet countries with their unstable economic, social and political conditions.

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REFERENCES

AHLFELDT, G. M., WENDLAND, N. (2016). The spatial decay in commuting probabilities: Employment potential vs. commuting gravity. *Economics Letters*, 143, 125-129.

BEZÁK, A. (1999). Development of urban and rural populations in Slovakia between 1970 and 1995. *Geographica Slovenica*, 31, 170-177.

BORÉN, T., GENTILE, M. (2007). Metropolitan processes in post-communist states: an introduction. *Geografiska Annaler B*, 89, 2, 95-110.

BRADE, I., MAKHROVA, A., NEFEDOVA, T. (2014). Suburbanization of Moscow's urban region. In Stanilov, K., Sýkora, L., eds., *Confronting Suburbanization: Urban Decentralization in Postsocialist Central and Eastern Europe*. Wiley-Blackwell, pp. 97-132.

BRADE, I., SMIGIEL, C., KOVACS, Z. (2010). Suburban residential development in postsocialist urban regions: the case of Moscow, Sofia and Budapest. In Kilper,

H., ed., *German Annual of Spatial Research and Policy 2009. New Disparities in Spatial Development in Europe*. Berlin: Springer, pp. 79-104.

BROWN, D., SCHAFFT, K.A. (2002). Population deconcentration in Hungary during the post-socialist transition. *Journal of Rural Studies*, 18, 233-244.

CHAMPION, T. (2001). Urbanization, suburbanization, counterurbanization and reurbanization. In Paddison, R., ed., *Handbook of Urban Studies*. SAGE Publications Ltd, pp. 143-161.

CHESHIRE, P. (1995). A new phase of urban development in Western Europe? The evidence for the 1980s. *Urban Studies*, 32, 7, 1045-1063.

CHESHIRE, P., HAY, D.G. (1989). *Urban Problems in Western Europe – An Economic Analysis*. London: Unwin Hyman.

DENYSENKO, O. (2012). *Protsesy metropolizatsiji: svitohospodars'kyj aspect* [Процеси метрополізації: світогосподарський аспект]. Kyiv: NAS of Ukraine.

DEPARTMENT FOR ARCHITECTURE AND PLANNING (2015). Draft General Plan of Kyiv and its Suburban Zone until 2025. Access mode: https://kga.gov.ua/generalnij-plan/genplan2025.

DE VRIES, J.J., NIJKAMP, P., RIETVELD, P. (2009). Exponential or power distance-decay for commuting? An alternative specification. *Environment and Planning A*, 41, 2, 461- 480.

DREWETT, R., ROSSI, A. (1981). General urbanisation trends in Western Europe. In Klaassen, L.H., Molle, W.T.M., Paelinck J.H.P., eds., *Dynamic of Urban Development*. Hants: Gower, pp. 119-136.

FISHER, T. (2003). Differentiation of growth processes in the peri-urban region: an Australian case study. *Urban Studies*, 40, 3, 551-565.

FORD, T. (1999). Understanding Population Growth in the Peri-Urban Region. *International Journal of Population Geography*, 5, 4, 297-311.

GAJOVIC, V. (2013). Comparative analysis of different methods and obtained results for delineation of functional urban areas. *Spatium*, 29, 8-15.

GAŁKA, J., WARYCH-JURAS, A. (2018). Suburbanization and migration in Polish metropolitan areas during political transition. *Acta Geographica Slovenica*, 58, 2, 63-72.

GOH, S., LEE, K., PARK, J.S., CHOI, M.Y. (2012). Modification of the gravity model and application to the metropolitan Seoul subway system. *Physical Review E - Statistical, Nonlinear, and Soft Matter Physics*, 86, 2, 1-6.

GLATTER, J., SIEDHOFF, M. (2008). Reurbanisation: inflationary use of an iInsufficiently defined term? Comments on the definition of a key concept of urban geography, with selected findings for the city of Dresden. *Die Erde*, 139, 4, 289-308.

GNATIUK, O. (2017). Demographic dimension of suburbanization in Ukraine in the light of urban development theories. *Acta Universitatis Carolinae Geographica*, 52, 2, 13-25.

GOLUBCHIKOV, O. (2004). Urban planning in Russia: Towards the market. *European Planning Studies*, 12, 2, 230-247.

HALL, P.G., HAY, D.G. (1980). *Growth Centres in the European Urban System*. London: Heinemann.

HALLIDAY, J., COOMBES, M. (1995). In search of counterurbanisation: some evidence from Devon on the relationship between patterns of migration and motivation. *Journal of Rural Studies*, 11, 4, 433-446.

HERFERT, G. (2007). Regionale Polarisierung der demographischen Entwicklung in Ostdeutschland – Gleichwertigkeit der Lebensverhältnisse? *Raumforschung und Raumordnung,* 65, 435-455.

HIRT, S. (2007). Suburbanizing Sofia: characteristics of post-socialist peri-urban change. *Urban Geography* , 28, 755-780.

KABISCH, N., HAASE, D. (2011). Diversifying European agglomerations: Evidence of urban population trends for the 21st century. *Population Space and Place*, 17, 3, 236-253.

KLAASSEN, L.H., SCIMENI, G. (1981). Theoretical issues in urban dynamic. In Klaassen, L.H., Molle, W.T.M., Paelinck, J.H.P., eds., *Dynamic of Urban Development*. Hants: Gower, pp. 8-28.

KLUSÁČEK, P., MARTINÁT, S., MATZNETTER, W., WISBAUER, A. (2009). Urban development in selected Czech and Austrian city regions. *Acta Universitatis Palackianae Olomucensis – Geographica*, 40, 2, 27-57.

KOK, H., KOVÁCS, Z. (1999). The process of suburbanization in the metropolitan area of Budapest. *Netherlands Journal of Housing and Built Environment*, 14, 2, 119-141.

KOSTINSKIY, G. (2001). Post-Socialist Cities in Flux. In Paddison, R., ed., *Handbook of Urban Studies.* London: Sage Publications, pp. 451-465.

KOVÁCS, Z., TOSICS, I. (2014). Urban Sprawl on the Danube: The Impacts of Suburbanization in Budapest. In Stanilov, K., Sýkora, L., eds., *Confronting Suburbanization: Urban Decentralization in Postsocialist Central and Eastern Europe*. Wiley-Blackwell, pp. 33-64.

KRISJANE, Z., BERZINS, M. (2012). Post-socialist urban trends: new patterns and motivations for migration in the suburban areas of Riga, Latvia. *Urban Studies*, 49, 2, 289-306.

LEETMAA, K. (2008). *Residential Suburbanisation in the Tallinn Metropolitan Area*. Tartu: Tartu University Press.

LEETMAA, K., KÄHRIK, A., NUGA, M., TAMMARU, T. (2014). Suburbanization of Moscow's urban region. In Stanilov, K., Sýkora, L., eds., *Confronting Suburbanization: Urban Decentralization in Postsocialist Central and Eastern Europe*. Wiley-Blackwell, pp. 192-224.

LEETMAA, K., TAMMARU, T. (2007). Suburbanisation in countries in transition: destinations of suburbanizers in the Tallinn metropolitan area. *Geografiska Annaler, Series B: Human Geography*, 89, 127-146.

LINDGREN, U. (2003). Who is the counter-urban mover? Evidence from the Swedish urban system. *International Journal of Population Geography*, 9, 5, 399-418.

LISOWSKI, A. (2005). Procesy centralizacji i decentralizacji w aglomeracji warszawskiej w latach 1950–2002. *Prace i Studia Geograficzne*, 35, 13-44.

MALCHYKOVA, D., PYLYPENKO, I. (2017). Vid "rozirvanoho" prostoru do metropolizatsiji i suburbanizatsii: Khersonska miska ahlomeratsija u novykh vymirakh urbohenezu [Від «розірваного» простору до метрополізації і субурбанізації: Херсонська міська агломерація у нових вимірах урбогенезу]. In Mezentsev, K., Olijnyk, Ya., Mezentseva, N., eds., *Urbanistychna Ukrajina: V Epitsentri Prostorovykh Zmin* [Урбаністична Україна: в епіцентрі просторових змін]. Kyiv: Feniks, pp. 326-338.

MANSHYLINA, T. (2015). *Suspil'no-heohrafichne doslidzhennia rozvytku mist-suputnykiv ta prymis'koji zony Kyjeva* [Суспільно-географічне дослідження розвитку міст-супутників та приміської зони Києва]. PhD thesis. Taras Shevchenko National University of Kyiv.

MASUCCI, A.P., SERRAS, J., JOHANSSON, A., BATTY, M. (2013). Gravity versus radiation models: On the importance of scale and heterogeneity in commuting flows. *Physical Review E - Statistical, Nonlinear, and Soft Matter Physics*, 88, 2, 1-9.

MATZNETTER, W. (2004). The Vienna and Bratislava urban regions: comparing urban development under (welfare) capitalism and (post-) communism. *European Spatial Research and Policy*, 11, 1, 61-77.

MEZENTSEV, K., KLIUIKO, T. (2015). Prostorovi transformatsiji zhytlovykh funktsij u prymis'kij zoni Kyjeva [Просторові трансформації житлових функцій у приміській зоні Києва]. *Human Geography Journal*, 18, 1, 87-93.

MEZENTSEV, K., BRADE, I., MEZENTSEVA, N. (2012). New social and economic processes in Kyiv's hinterland. *Human Geography Journal*, 12, 1, 156-160.

MEZENTSEV, K., BRADE, I., MEZENTSEVA, N. (2014). Suburbanizatsija v metropolitenskikh regionakh: opyt Ukrajiny [Субурбанизация в метрополитенских регионах: опыт Украины]. In Druzhinin, A. G., ed., *Pozicionirovanie Rossii i ee regionov v sovremennom mire: obshchestvenno-geograficheskij analiz i prognoz*. Saint-Petersburg – Rostov-on-Don, pp. 120-125.

MEZENTSEV, K., HAVRYLIUK, O. (2015). Testuvannia modeli dyferentsial'noji urbanizatsiji v Ukrajini [Тестування моделі диференціальної урбанізації в Україні]. *Ekonomichna ta Sotsialna Geografija*, 73, 15-26.

MEZENTSEV, K., MEZENTSEVA, N. (2012). Urbanizovani terytoriji Ukrajiny: prychyny ta naslidky transformatsiji u postradyans'kyj period [Урбанізовані території України: причини та наслідки трансформації у пострадянський період]. In

Berghauer, O., Genci, S., Dnistrianskyi, M., eds., *Social Geographical Challenges in the Eastern Central Europe of the XXI Century*, vol. 1. Uzhhorod: Lira, pp. 310-317.

MEZENTSEV, K., MEZENTSEVA, N. (2017). Zhytlova suburbanizatsija v Ukrajini: trendy ta vidminnosti [Житлова субурбанізація в Україні: тренди та відмінності]. In Mezentsev, K., Olijnyk, Ya., Mezentseva, N., eds., *Urbanistychna Ukrajina: V Epitsentri Prostorovykh Zmin* [Урбаністична Україна: в епіцентрі просторових змін]. Kyiv: Feniks, pp. 268-287.

NEFEDOVA, T.G., SLEPUKHINA, I., BRADE, I. (2016). Migration attractiveness of cities in the post-Soviet space: a case study of Russia, Ukraine, and Belarus. *Regional Research of Russia*, 6, 2, 131-143.

NOVOTNÝ, L. (2012). Trendy migracji i rozwój miejskiego regionu funkcjonalnego Bratysława. *Przestrzeń i forma*, 17, 381-394.

NUISSL, H., RINK, D. (2005). The 'production' of urban sprawl in Eastern Germany as a phenomenon of post-socialist transformation. *Cities*, 22, 2, 123-134.

NYSTRÖM, J. (1992). The cyclical urbanization model: a critical analysis. *Geografiska Annaler B*, 74, 2,133-144.

OECD. (2013). *Definition of Functional Urban Areas (FUA) for the OECD metropolitan database*.

OLIJNYK, YA., ZAPOTOTSKYI, S., ZAPOTOTSKA, V. (2019). *Rynok zhytla Kyjivskoho rehionu: suspilno-heohrafichnyj vymir* [Ринок житла Київського регіону : суспільно-географічний вимір]. Kyiv: Taras Shevchenko National University.

OSADA, S. (2003). The Japanese urban system 1970–1990. *Progress in Planning*, 59, 3, 125-231.

OUŘEDNÍČEK, M. (2000). Teorie stádií vývoje měst a diferenciální urbanizace. *Geografie – Sborník České geografické společnosti*, 105, 4, 361-369.

OUŘEDNÍČEK, M. (2005): New suburban development in the post-socialist city: the case of Prague. In Eckardt, F., ed., *Paths of Urban Transformation*. Peter Lang, pp. 143-156.

OUŘEDNÍČEK, M. (2007). Differential suburban development in the Prague urban region. *Geografiska Annaler B*, 89, 111-125.

PERSYN, D., TORFS, W. (2015). A gravity equation for commuting with an application to estimating regional border effects in Belgium. *Journal of Economic Geography*, 16, 155-175.

PICHLER-MILANOVIĆ, N. (2014). Confronting suburbanization in Ljubljana: from "urbanization of the countryside to urban sprawl. In Stanilov, K., Sýkora, L., eds., *Confronting Suburbanization: Urban Decentralization in Postsocialist Central and Eastern Europe*. Wiley-Blackwell, pp. 65-96.

PIDGRUSHNYI, G., DENYSENKO, O. (2013). Kyjiv ta prylehla terytorija v systemi tsentro-peryferijnoji vzajemodiji [Київ та прилегла територія в системі центро-периферійної взаємодії]. *Ukrainian Geographical Journal*, 1, 27-35.

POSOVÁ, D., SÝKORA, L. (2011). Urbanizace a suburbanizace v městských regionech Prahy a Vídně: strukturální rozdíly v podmínkách odlišných politicko-ekonomických režimů. *Geografie*, 116, 3, 276-299.

RAŹNIAK, P., WINIARCZYK-RAŹNIAK, A. (2013). Spatial distribution and differences in migration patterns and revenues of gminas in the Kraków Metropolitan Area. *Bulletin of Geography. Socio-Economic Series*, 19, 73-86.

ROBERTS, S. (1991). A critical evaluation of the city life cycle idea. *Urban Geography*, 12, 5, 431-449.

RODRIGUES DA SILVA, A.N., MANZATO, G.G., PEREIRA, H.T.S. (2014). Defining functional urban regions in Bahia, Brazil, using roadway coverage and population density variables. *Journal of Transport Geography*, 36, 79-88.

SIMINI, F., GONZÁLEZ, M.C., MARITAN, A., BARABÁSI, A.-L. (2012). A universal model for mobility and migration patterns. *Nature*, 484, 96-100.

SJÖBERG, O. (1992). Underurbanisation and the zero urban growth hypotheses: diverted migration in Albania. *Geografiska Annaler B*, 74, 3-19.

STANILOV, K., ed. (2007). *The Postsocialist City: Restructuring of Urban Form and Space in Central and Eastern Europe after Communism*. Dordrecht: Springer.

STANILOV, K., HIRT, S. (2014). *Sprawling Sofia: postsocialist suburban growth in the Bulgarian capital*. In Stanilov, K., Sýkora, L., eds., *Confronting Suburbanization: Urban Decentralization in Postsocialist Central and Eastern Europe*. Wiley-Blackwell, pp. 163-191.

STANILOV, K., SÝKORA, L. (2014). Postsocialists suburbanization patterns and dynamics: a comparative perspective. In Stanilov, K., Sýkora, L., eds., *Confronting Suburbanization: Urban Decentralization in Postsocialist Central and Eastern Europe*. Wiley-Blackwell, pp. 256-295.

SÝKORA, L., CERMÁK, D. (1998). City growth and migration patterns in the context of 'communist' and 'transitory' periods in Prague's urban development. *Espace, Population, Sociétés*, 3, 405-416.

SÝKORA, L., MULÍCEK, O. (2014). Prague: urban growth and regional sprawl. In Stanilov, K., Sýkora, L., eds., *Confronting Suburbanization: Urban Decentralization in Postsocialist Central and Eastern Europe*. Wiley-Blackwell, pp. 133-162.

SÝKORA, L., NOVÁK, J. (2007). A city in motion: time-space activity and mobility patterns of suburban inhabitants and the structuration of the spatial organization of Prague metropolitan area. *Geografiska Annaler B,* 89, 2, 147-167.

SÝKORA, L., POSOVÁ, D. (2011). Formy urbanizace: kritické zhodnocení modelu stadií vývoje měst a návrh alternativní metody klasifikace forem urbanizace. *Geografie*, 116, 1, 1-22.

VAN DEN BERG, L. (1999). The urban life cycle and the role of a market-oriented revitalization policy in Western Europe. In Summers, A., Cheshire, P., Senn, L., eds., *Urban Change in the United States and Western Europe. Comparative Analysis*. Washington, DC: The Urban Institute Press, pp. 539-558.

VAN DEN BERG, L., DREWETT, R., KLAASSEN, L.H., ROSSI, A., VIJVERBERG, N.H.T. (1982). *A study of growth and decline*. Oxford: Pegasus.

VARTIANEN, P. (1989). Counterurbanization: a challenge for socio-theoretical geography. *Journal of Rural Studies*, 5, 123-136.

WOLFF, M. (2017). Understanding the role of centralization processes for cities – evidence from a spatial perspective of urban Europe 1990 – 2010. *Cities*, 75, 20-29.

ZAKIROVA, B. (2010). Shrinkage at the urban fringe: crisis or opportunity? *Berkeley Planning Journal,* 23,1, 58-82.