DYNAMICS OF MIGRATION AND COMMUTING TO THE URBAN CENTRES OF SLOVENIA, 2000-2011

DINAMIKA SELITEV IN DELOVNE MOBILNOSTI V URBANA SREDIŠČA SLOVENIJE, 2000–2011

Samo Drobne, Tina Rajar, Anka Lisec

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ABSTRACT

In this paper, the dynamics of migration and commuting into the urban centres of Slovenia in 2000–2011 is presented. The influence of the attractiveness of urban centres, the influence of the emissiveness of migration and commuting flows in the origin and the influence of the distance between origins and destinations on migration and commuting flows into the urban centres in Slovenia were analysed in a spatial interaction model. The dynamics of the parameters were analysed for the period before (2000-2007) and in the economic crisis (2008-2011). According the Spatial Development Strategy of Slovenia, the urban centres of Slovenia were considered at four levels: national urban centres of international importance, urban centres of national significance, urban centres of inter-regional significance and urban centres of inter-municipal significance.

KEY WORDS

migration, commuting, dynamics, urban centres, Slovenia

IZVLEČEK

V prispevku predstavimo dinamiko selitev in delovne mobilnosti v izbrana urbana središča Slovenije v letih 2000–2011. Vpliv privlačnosti urbanih središč, vpliv oddajanja tokov selivcev in vozačev na delo v izvoru ter vpliv razdalje med izvorom in ponorom na selitve in delovno mobilnost v urbana središča Slovenije smo analizirali v prostorskem interakcijskem modelu. Dinamiko preučevanih vplivov smo analizirali ter primerjali za obdobje pred pojavom gospodarske krize v Sloveniji (2000–2007) in med njo (2008–2011). Urbana središča Slovenije smo obravnavali glede na njihovo opredelitev v Strategiji prostorskega razvoja Slovenije na štirih ravneh: nacionalna središča mednarodnega pomena, središča nacionalnega pomena, središča regionalnega pomena in središča medobčinskega pomena.

KLJUČNE BESEDE

selitev, delovna mobilnost, dinamika, urbana središča, Slovenija

1 INTRODUCTION

The interrelations between migration and commuting have been investigated by many scientists. Evers and Van der Veen (1985), for instance, argued that commuting can be considered as a substitute to migration if work and residence are geographically separated, but that they can be also considered as a complement if a person chooses to move away from their workplace locality, and then commutes to work on a daily basis. The latter is one of the main causes of suburbanisation. If there are conditions that allow (daily) commuting, people often choose to commute instead of moving closer to their work. And vice versa: poor commuting conditions can be perceived as a prerequisite for moving.

Better transport (reduction of travel time, increase in travel comfort etc.) and work conditions (flexible working time, occasional work from home etc.) thus have a significant effect on our decisions related to longer commutes. Lundholm (2010) found that, in fact, the willingness to take on longer commutes creates the conditions that moderate the decision to migrate. This leads to the conclusion that improved commuting conditions both impede and facilitate migration.

The aim of this paper is to represent the impact of attractiveness of chosen urban centres (destinations), the impact of origin municipalities in Slovenia (i.e. origins) and the impact of the distance between the origin and the destination to migration and commuting flows to analysed urban centres of Slovenia and the dynamics of these influences in a period of twelve years (2000–2011). In this period, the economic crisis has affected countries throughout the world and had a profound effect on the labour market in Slovenia. Slovenia, an open national economy, has been strongly affected due to the decrease in demand, which quickly reflected in the labour market in the form of rising unemployment rates and changes of structural characteristics of the labour market (Kajzer, 2011). As early as in 2008, the OECD Country Statistical Profile for Slovenia (2009) suggested that, suddenly, the real Gross Domestic Product (GDP) growth rate of Slovenia started to decline, while in the same year, the average annual inflation rate reached its peak. Therefore, the investigated period was divided into the period before the crisis (2000–2007) and the period during the crisis (2008–2011). Also, using Lee's theory of migration (1966), we tested some of the hypotheses that were adapted and expanded to commuting: Hypothesis 1: The volume of migration and commuting tends to change with time (in our case, the volume increases with time); Hypothesis 2: The readiness for both long-distance internal migrations and commuting increases with time; Hypothesis 3: During an economic crisis, the volume of migrants and commuters changes Hypothesis 4: During an economic crisis the impact of the distance to the decision to migrate or commute changes.

In the continuation of the paper, we first address the development of the polycentric urban system in Slovenia defining the urban centres included in the analysis; then, we present the most important characteristics of internal migration and commuting in Slovenia for the recent period. Later, the research methodology and the results, along with evaluation, are presented. The paper is completed with the conclusions.

2 THE CONCEPT OF SLOVENIA'S URBAN SYSTEM

The concept of Slovenia's urban system, as defined in the Spatial Development Strategy of Slovenia (SPRS, 2004), originates from the 1970's, with the definitions of a coordinated spatial development adopted in the Resolution on the main spatial planning goals and guidelines (Official Gazette of the SRS, 43/1973). In SPRS (2004), in total 50 urban centres with 61 towns and other urban settlements are defined, including the conurbations, at all levels of investigation. The most important regional centres (or urban centres of national significance) are (SPRS, 2004): Ljubljana, Maribor, conurbation Koper–Izola–Piran, Celje, Kranj, Novo mesto, Nova Gorica, Murska Sobota, Velenje, Postojna, Ptuj, and conurbations Slovenj Gradec–Ravne na Koroškem–Dravograd, Jesenice–Radovljica, Zagorje ob Savi–Trbovlje–Hrastnik, and Krško–

Brežice–Sevnica. Indeed, their gravitation areas are not clearly defined and may overlap. Ljubljana, Maribor and conurbation Koper–Izola–Piran are recognized as national urban centres of international significance. Figure 1 shows the concept of settlement by defining the hierarchy of urban centres of Slovenia (SPRS, 2004) in:

a) 3 national urban centres of international significance: Ljubljana, Maribor and coastal conurbation (Koper–Izola–Piran);

b) 12 urban centres of national significance: 8 towns (Murska Sobota, Ptuj, Celje, Velenje, Kranj, Novo mesto, Postojna, Nova Gorica) and 4 conurbations (Jesenice–Radovljica; Zagorje ob Savi–Trbovlje–Hrastnik; Slovenj Gradec–Ravne na Koroškem–Dravograd; Brežice–Krško–Sevnica);

c) 15 urban centres of regional significance: 13 towns and 2 conurbations (Domžale–Kamnik; Šmarje pri Jelšah–Rogaška Slatina);

d) 20 urban centres of inter-municipal significance.

National urban centres of international significance (a) and urban centres of national significance (b) combined can be also perceived as regional urban centres of Slovenia; of which there are 12 centres of statistical regions at the NUTS 3 level. In 2008, the Government of the Republic of Slovenia (RS) nominated the towns of Ptuj and Velenje as the centres of two new (administrative) provinces at the NUTS 3 level, while for the Jesenice–Radovljica conurbation in the Gorenjska statistical region no such official recommendation was made.

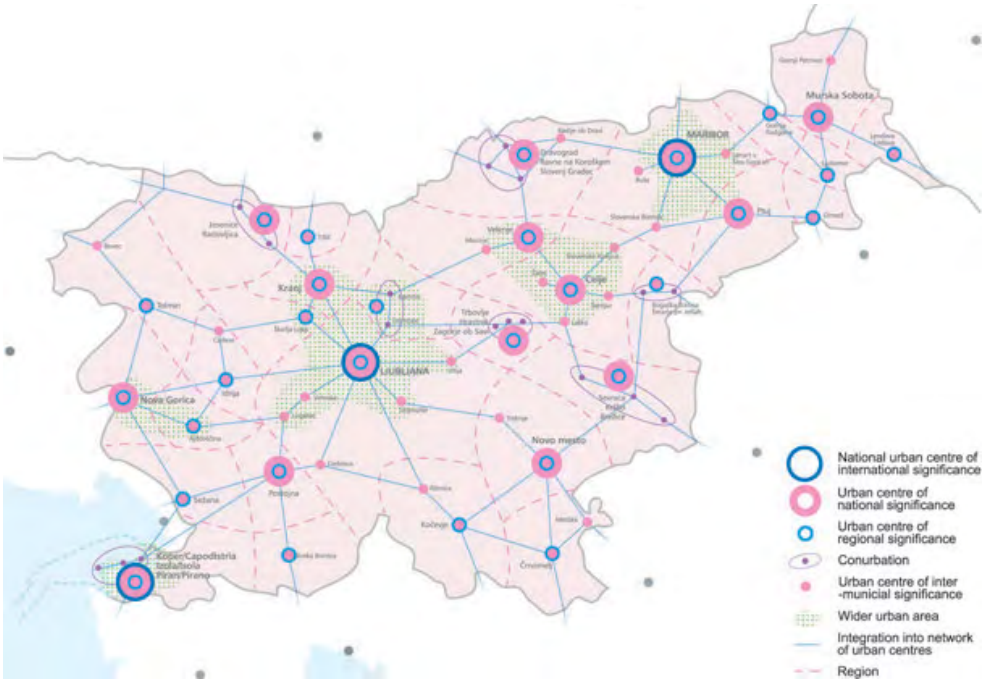

Figure 1: Hierarchy of urban centres with wider urban and functional urban areas in the concept of the polycentric urban system of Slovenia (SPRS, 2004: 24).

The concept of polycentric urban development (SPRS, 2004) emphasizes the improved (equal) accessibility to public services, i.e. administration, employment, services and knowledge, which are, in general, located in urban centres. They represent the important transport nodes of both Slovenia and Central Europe. Therefore, the concept of polycentric development (3–12–15–20) of regional and local (urban) centres coincides with the concept of a coordinated regional development and the design of infrastructure development along the main European corridors in Slovenia, i.e. corridors V and X (Zavodnik Lamovšek and Drobne, 2011; Zavodnik Lamovšek et al., 2008).

The workplaces and economic activities in Slovenia are concentrated in the (wider) urban areas of Ljubljana, Maribor, Celje, coastal conurbation Koper–Izola–Piran, followed by Kranj, Novo mesto, Velenje, and Nova Gorica. Most of workers commute to work in the 8 aforementioned employment (regional) centres, followed by other urban centres of national significance (SPRS, 2004).

3 INTERNAL MIGRATIONS AND COMMUTING IN SLOVENIA

In a broad sense, the notion of migration characterises the geographical movement of people or groups of people, frequently resulting in the permanent change of residence (Bevc et al., 2004). In terms of mobility across the state border, we distinguish between internal and international migrations.

After World War II, internal migration was significantly affected by deagrarization, industrialization and urbanization, which caused strong migration pathways from the countryside to urban areas. In the first decades, major urban centres saw the fastest growth, especially at the expense of deagrarization of rural areas (UMAR, 2009). In the 1970's, the Slovenian concept of polycentric urban and regional development was put into practice, which enabled the development of several (also smaller) urban centres. The relatively high motorization level and the solid road infrastructure, which enabled good accessibility to workplaces, had important implications for the emergence of a distinct social class, i.e. part-time farmers. Hence, in the 1970's in Slovenia, commuting was the dominating substitute for migration (UMAR, 2009). This was a time when the volume of internal migrations among the settlements of Slovenia was high indeed, mostly at the expense of intensive home building industry in Slovenia (Bevc et al., 2004): internal migrations between the settlement of Slovenia were most frequent in 1976 (65,000), then, until the mid-1990's, their number decreased (to 26,000); afterwards, it started to increase again.

In 1991, at the time of Slovenia's declaration of independence, the number of internal migrants decreased. The change of administrative and territorial regulation in 1995, when 147 new – smaller – municipalities replaced the 64 previous – large – municipalities brought about the change in the structure of internal migration. The volume of inter-municipal migrations increased, while the volume of migrations between the settlements within the same municipality decreased; mostly, these migrations were newly considered as inter-municipal (UMAR, 2009). However, compared to migrations, the volume of inter-municipal commuting in Slovenia in the first decade after the independence was relatively high and it increased faster than inter-

municipal migrations (Bevc et al., 2004).[1]

In the period investigated in this paper (2000–2011), internal migrations had the following characteristics. The results of the 2002 census (SURS, 2002) suggested that in 2002 every other inhabitant of Slovenia changed the settlement of residence. Bevc et al. (2004) find that the change of residence and marriage were among the main reasons of migration between settlements during 2000–2004, while with longer-distance migrations (e.g. between statistical regions) the change of employment was also found to be an important reason. The migrations between the municipalities of the same region presented the largest part of internal migrations (approx. 40%), followed by the migrations between the settlements of the same municipality, while almost a quarter of all internal migrations were those between statistical regions (Bevc et al., 2004). Between 2005 and 2007 there were between 32,000 and 39,000 officially registered changes of permanent residence of the citizens of the Republic of Slovenia. Along the years, the number grew; however, in terms of volume, the migrations between the municipalities of Slovenia were the most numerous (SURS, 2006, 2007, 2008). In 2008, 106,248 citizens of Slovenia (5%) changed their settlement of residence, particularly the young population who mostly migrated to other municipalities, while the rest migrated to other settlements within the same municipality. Foreigners were more mobile than the citizens of Slovenia (SURS, 2009a). However, the sudden increase in the registered number of migrations in 2008 was primarily the consequence of the changed methodology of data collection on internal migrations of population. In the same year, for the first time the data on internal migrations of foreign citizens in Slovenia were published, using the same methodology as that used for the citizens of Slovenia (SURS, 2009b, 2011b). In 2009, 96,602 cases of internal migrations were registered by the citizens of Slovenia, i.e. 9.1% less than in 2008, while all other internal migration characteristics of both the citizens of Slovenia and foreigners remained unchanged (SURS, 2010). In 2010, the growth in the volume of internal migrations became evident again; 106,551 cases of internal migrations were registered by the citizens of Slovenia, which is a 10.3% increase compared to the year before (SURS, 2011a). Figure 2 shows the number of migrants between the municipalities of Slovenia in the investigated period.

The changes in the volume and pathways of commuting between the municipalities of Slovenia between 2000 and 2009 were studied by Bole (2011). He found that as early as in 2000, the commuting routes showed the great spatial range of Ljubljana in particular, especially due to the high level of urbanisation and metropolitanisation, and favourable traffic connections with the motorway and railway; to some extent, this also applied to Maribor and Celje. Not only did the spatial range of the individual employment (urban) centres in relation to the neighbouring municipalities increase, the mobility between the employment centres themselves increased as well (Koper–Ljubljana, Celje–Ljubljana, Novo mesto–Ljubljana). Overall, the increased range and volume of commuting to Ljubljana, Maribor, Koper and Celje (Bole, 2011) is noted. Similar conclusions were drawn by Drobne (2012) who argues that the willingness for longer commuting

[1] Nevertheless, many findings suggest that, in comparison to other European countries, commuting in Slovenia is rather small. The reasons are to be found in the smallness of Slovenia, lack of suitable housing (reasonable rent price, reasonable purchase price, lease), unwillingness of population to seek work in other, more distant towns, the persistence of the ideal of the Slovenes to own a house (or, at least, an apartment), much of home building is done on inherited land, i.e. in the settlement of residence or in its vicinity (Bevc et al., 2004; Bole, 2004, 2011; UMAR, 2009).

was, in general, increasing until 2006, followed by a slight decline in 2007 and 2008, and a new increase until the end of the investigated period in 2010. Furthermore, Bole (2011) analysed the individual major routes. He found that the volume of commuting to Ljubljana increased from almost all directions, both from the near municipalities (Grosuplje, Kamnik, Vrhnika) and the more distant municipalities outside the Osrednjeslovenska (Central Slovenian) region (Postojna, Koper, Novo mesto, Celje etc.). The growth of commuters to Maribor was smaller. The commuting to Murska Sobota decreased from most directions. Also, the attractiveness of Novo mesto and Kranj in relation to some proximate distances decreased. Figure 2 shows internal migrations and commuting between the municipalities of Slovenia during 2000–2011.

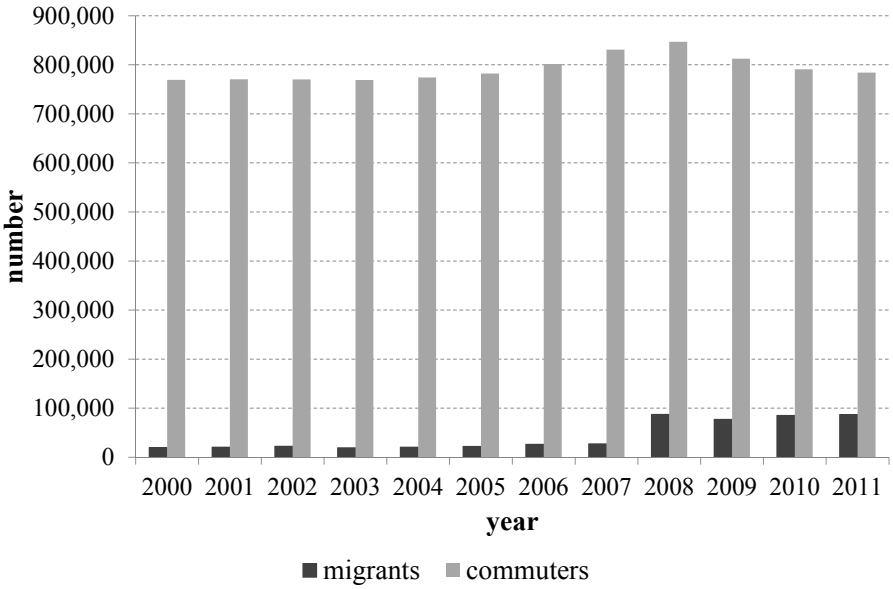

Figure 2: The volume of internal migrations and commuting between the municipalities of Slovenia during 2000–2011 (source: SURS, 2012a,b).

4 METHODOLOGY

4.1 Materials

Table 1 provides a list of urban centres in Slovenia, according to SPRS (2004), which are included in the concept of the polycentric system. They are divided in relation to their hierarchical roles in the urban system of Slovenia. The centres with a higher position in the hierarchy of urban centres are, at the same time, listed among all centres with the lower position. The impact of attraction of the chosen urban centres to the flows of migrations and commuting was analysed at four levels: national urban centres of international significance (NSMP), urban centres of national significance (SNP), urban centres of regional significance (SRP) and urban centres of inter-municipal significance (SMP).

National urban centres of international significance (NSMP)	*Urban centres of national significance (SNP)*	*Urban centres of regional significance (SRP)*	*Urban centres of inter-municipal significance (SMP)*
Ljubljana Maribor *Conurbation:* Koper, Izola, Piran	Murska Sobota Celje Nova Gorica Novo Mesto Postojna Kranj Ptuj Velenje *Conurbation:* Hrastnik, Trbovlje, Zagorje ob Savi *Conurbation:* Jesenice, Radovljica *Conurbation:* Brežice, Krško, Sevnica *Conurbation:* Ravne na Koroškem, Slovenj Gradec, Dravograd	Ajdovščina Idrija Črnomelj Kočevje Lendava Gornja Radgona Ljutomer Ormož Ilirska Bistrica Sežana Tržič Škofja Loka Tolmin *Conurbation:* Domžale, Kamnik *Conurbation:* Rogaška Slatina, Šmarje pri Jelšah	Bovec Cerknica Cerkno Logatec Vrhnika Ribnica Gornji Petrovci Grosuplje Litija Trebnje Metlika Laško Žalec Mozirje Šentjur Ruše Slovenska Bistrica Slovenske Konjice Radlje ob Dravi Lenart v Slovenskih Goricah

Table 1: The role of urban centres in the hierarchy of the urban network of Slovenia (SPRS, 2004).

The data on the inter-municipal migrations are kept by the Statistical Office of the RS (SURS, 2011b), based on the Central Population Register. The problem arising from the data capture methodology in the database of inter-municipal migrations has been caused by the change in the methodology of data capture, which was introduced in 2008. Until and including 2007, only the citizens of Slovenia were included in the studies of internal migrations. Since 2008, in the analyses of internal migrations all the inhabitants of the Republic of Slovenia have been considered, and not exclusively its citizens. Temporary residence lasting more than one year has been considered as internal commuting (SURS, 2009b, 2011b). This is why the data on the 2008–2011 migrations are no longer directly comparable to the 2000–2007 data. In our analysis, we compared the trends of the analysed parameter before the economic crisis (2000–2007) and during the crisis (2008–2011).

The data on inter-municipal commuting were acquired from the Statistical Register of Employment (SRDAP), which keeps the data on the place of residence and place of work of the persons in employment (SURS, 2010b). SRDAP contains data on persons in paid employment and self-employed persons who are at least 15 years old and who are employed on the territory

of the Republic of Slovenia (with the exception of farmers). The problems arising from the data capture methodology into the SRDAP database are the following: (a) incorrect data about the place of residence or place of work, (b) changed methodology of data collection in 2009, (c) lack of data on the actual commuting of the employed persons, (d) changes in the composition of the municipalities. Ad a) The problem of the incorrect data on the place of residence or place of work can only be solved by simultaneous analysis of all data, as with the increase in the number of observations, the relative error is reduced. Ad b) A major change in data collection happened in 2008 when for the citizens of the Republic of Slovenia permanent residence was considered, and for foreigners temporary residence was taken into account. Since 2009, temporary residence has been taken into consideration for the citizens of RS also, which is, from the viewpoint of studying the actual commuting, more appropriate (SURS, 2010b). In our application, this problem has small significance, since, based on Bole (2011), we may assume that the error is evenly distributed nation-wide. The SRDAP database does not provide the data on the actual commuting of the employed persons. Ad c) In recent decades, the nature of work processes has fundamentally changed. There is an increasing number of jobs where part of the work process can be done from home; hence, the workers travel to their work locality only several times a week or less. This phenomenon does not affect the analysis of spatial interactions, as, indeed, the interactions still exist, despite the work from home. Ad d) The problem of change of municipalities; in the period of 2000–2011 the number of municipalities changed twice (in 2002 one new municipality was added, while in 2006, 17 new municipalities were established). When studying spatial interactions, we assume that this problem does not affect the results of the analysis significantly.

The data on travel time using a personal vehicle between the municipal centres, by year, for the period of 2000–2010 were adopted from the research 'The accessibility and the flow of human resources between Slovenian regions at NUTS 3 and NUTS 5 levels' (Drobne and Bogataj, 2011a,b), carried out in the framework of ESPON – ATTREG ('The Attractiveness of European region and cities for residents and visitors') project. The travel times between municipal centres for 2011 were additionally calculated, with consideration of the relevant conditions. The data on state roads were obtained from the Slovenian Roads Agency (DRSC, 2012), while spatial data on municipalities and their centres were acquired from the Surveying and Mapping Authority of the Republic of Slovenia (GURS, 2012).

4.2 Method

The impacts of attraction, emissivity and distance to migration and commuting flows to chosen urban centres of Slovenia were analysed using the Spatial Interaction Model – SIM (Cesario, 1973, 1974):

$$I_{ij} = k\, E_i\, A_j\, f(d_{ij}) \tag{1}$$

where I_{ij} is the interaction between origin i and destination j, k is the proportionality constant, E_i is emissivity in origin i, A_j is the attraction in destination j, and $f(d_{ij})$ is the function of the distance between origin i and destination j.

In our analysis, the general term for the emissivity in origin, E_i, was replaced by the number of inhabitants (population) in the origin, P_i, while the attraction in the destination, A_j, was replaced by the number of inhabitants (population) in the destination, P_j. In the analysis of interactions of commuting, the general term for interaction I_{ij} was replaced by C_{ij}, and, in the case of migration, by M_{ij}. In the analysis, the urban centres and origins were, due to data availability, replaced by municipalities, while the distance between the origin and the destination was considered as the time of travel using a personal vehicle between the origin and the destination – in our case between municipal centres – $d(t)_{ij}$. Travel times changed with years, as did the commuting conditions. In the calculation of travel times in network models, we considered the dynamics of building state roads (motorways, highways and other state roads) and the effect of toll facilities to travel speed; the latter was defined in two ways: before 2008, when toll charges were still imposed and travel on toll road sections took more time; and from 2008 onwards, when personal vehicles and one-track motor vehicles may pass the toll station at reduced speed, without stopping (Drobne and Bogataj, 2011a,b).

The effects of emissivity, attraction and distance between migration and commuting flows were evaluated in the regression analysis using regression coefficients $\beta_1(\bullet)$, $\beta_2(\bullet)$ and $\gamma(\bullet)$, where $\bullet$ signifies that, separately, the effects on migration flows and commuting flows were estimated.

Considering the fact that the distance between the origin and the destination is inversely proportional to the flows (see e.g. Stewart, 1941, 1942, 1948; Zipf, 1946; Taylor, 1975; Haynes and Fortheringham, 1984; Fortheringham and O'Kelly, 1989), in the case of the interaction model of inter-municipal migrations we obtain the following:

$$M_{ij} = k \frac{P_i^{\beta_1(M)} P_j^{\beta_2(M)}}{d(t)_{ij}^{\gamma(M)}}, \tag{2}$$

And for the case of the interaction model of commuting:

$$C_{ij} = k \frac{P_i^{\beta_1(C)} P_j^{\beta_2(C)}}{d(t)_{ij}^{\gamma(C)}}. \tag{3}$$

The estimated parameters were compared amongst themselves and by year. Separately, we analysed the connectivity between migrations and commuting and the trend of the impact of the analysed parameters before the onset of the economic crisis in Slovenia (2000–2007) and during the crisis (2008–2011 for migrations and 2009–2011 for commuting).

5 RESULTS

Tables 2 to 5 show the dynamics of migration and commuting to urban centres of Slovenia during 2000–2011. With the change of data capture methodologies, in 2008 the number of registered migrants between the municipalities of Slovenia increased by more than 21,500 foreign citizens, while the total number of labour commuters in 2009 did not change – for some commuters, however, their temporary residence, instead of permanent residence, was registered.

The analysis of the growth rate of migrations and commuting suggests that the volume of

both migration and commuting flows to all analysed urban centres of Slovenia before the crisis constantly increased (with the exception of 2003 when the number of migrants to urban centres of inter-municipal significance temporarily reduced when compared to the reference year of 2000). The number of inter-municipal migrants in Slovenia grew faster than the number of inter-municipal commuters. The highest growth rate was achieved by migrant flows (1.62) and commuting flows (1.46) to national urban centres of international significance (Ljubljana, Maribor and conurbation Koper–Izola–Piran). Prior to the economic crisis, the growth rate of migration flows was the same for both urban centres of national significance and urban centres of regional significance (1.49); however, it was lower for migration flows to urban centres of inter-municipal significance (1.41). Before the crisis in Slovenia, the volume of commuter flows to urban centres on all three lower levels was similar (1.33–1.34).

In the second half of 2008, the crisis set in in Slovenia also. In 2009, the volume of migrant flows to all urban centres of Slovenia decreased. The volume of migrations to national urban centres of international significance (Ljubljana, Maribor and conurbation Koper–Izola–Piran) decreased the most, that is, by 19%, while the volume of migrations to urban centres at lower levels reduced by 12–14%. In the next two years, the volume of migrations to urban centres started to increase again; however, the pace of the increase was slowest in major urban centres, i.e. national urban centres of international significance. The change in commuting due to the onset of the crisis cannot be analysed from 2008 on but only from 2009 on, owing to the changed data capture methodology. 2010 is the first year considered in the analysis of the change of commuting. In 2010, the volume of commuters to Ljubljana, Maribor and conurbation Koper–Izola–Piran remained at the same level, while the volume into other urban centres at lower levels slightly decreased (by 1%). Then, the growth rate of commuting to urban centres at higher levels, with the exception of that to urban centres of inter-municipal significance, increased again by 1%; the increase to national urban centres of international significance was 2%. The volume of commuting flows to urban centres of inter-municipal significance remained at the same level as was that in 2010.

Year	*Migrants (M) to NSMP*	*Commuters (C) to NSMP*	*M growth rate to NSMP*	*C growth rate to NSMP*
2000	3,167	104,694	*in relation to 2000*	*in relation to 2000*
2001	3,427	108,032	1.08	1.03
2002	6,120	111,900	1.93	1.07
2003	3,396	116,760	1.07	1.12
2004	3,814	121,796	1.20	1.16
2005	4,049	128,619	1.28	1.23
2006	5,025	137,783	1.59	1.32
2007	5,138	146,910	1.62	1.40
2008	26,640	153,375	*in relation to 2008*	1.46
2009	21,675	149,084	0.81	*in relation to 2009*
2010	23,168	148,838	0.87	1.00
2011	23,615	152,069	0.89	1.02

Table 2: The volume and growth rate of migrants (M) and commuters (C) to national urban centres of international significance (NSMP) in Slovenia during 2000–2011.

year	Migrants (M) to SNP	Commuters (C) to SNP	M growth rate to SNP	C growth rate to SNP
2000	6,616	189,839	*in relation to 2000*	*in relation to 2000*
2001	7,067	194,164	1.07	1.02
2002	11,044	198,663	1.67	1.05
2003	6,739	205,095	1.02	1.08
2004	7,331	213,604	1.11	1.13
2005	7,992	222,288	1.21	1.17
2006	9,725	231,823	1.47	1.22
2007	9,887	246,002	1.49	1.30
2008	41,687	254,519	*in relation to 2008*	1.34
2009	36,047	245,872	0.86	*in relation to 2009*
2010	39,411	243,541	0.95	0.99
2011	40,600	245,445	0.97	1.00

Table 3: The volume and growth rate of migrants (M) and commuters (C) to urban centres of national significance (SNP) in Slovenia during 2000–2011.

year	Migrants (M) to SRP	Commuters (C) to SRP	M growth rate to SRP	C growth rate to SRP
2000	8,846	216,480	*in relation to 2000*	*in relation to 2000*
2001	9,256	221,544	1.05	1.02
2002	13,395	226,376	1.51	1.05
2003	8,983	233,949	1.02	1.08
2004	9,834	242,923	1.11	1.12
2005	10,698	251,601	1.21	1.16
2006	12,811	262,595	1.45	1.21
2007	13,179	279,275	1.49	1.29
2008	50,708	288,223	*in relation to 2008*	1.33
2009	43,905	277,564	0.87	*in relation to 2009*
2010	48,405	274,999	0.95	0.99
2011	49,904	277,337	0.98	1.00

Table 4: The volume and growth rate of migrants (M) and commuters (C) to urban centres of regional significance (SRP) in Slovenia during 2000–2011.

Migrations can be perceived as a substitute or a complement to commuting. To this end, we analysed the relationship between migrations and commuting to urban centres of Slovenia at different levels of investigation and in different time sections. Table 6 shows the correlation coefficients between migration flows and commuting flows to urban centres of Slovenia at four levels of investigation, before and during the economic crisis. Prior to the economic crisis in Slovenia, migration flows and commuting flows were positively correlated. This was especially true for the flows to urban centres of regional and inter-municipal significance where, with less than a 10% risk, it can be argued that the volume of commuting increased with the increase in migration flows, and vice versa. We assume that after 2008 the flows to urban centres of national significance and urban centres at lower levels changed: Migration flows and commuting flows became negatively correlated (note: this assumption cannot be statistically tested, as only data for three years could be included in the analysis, i.e. 2009–2011).

year	*Migrants (M) to SMP*	*Commuters (C) to SMP*	*M growth rate to SMP*	*C growth rate to SMP*
2000	11,975	240,380	*in relation to 2000*	*in relation to 2000*
2001	12,386	246,093	1.03	1.02
2002	15,788	251,430	1.32	1.05
2003	11,771	260,392	0.98	1.08
2004	12,904	270,124	1.08	1.12
2005	14,031	279,710	1.17	1.16
2006	16,750	292,399	1.40	1.22
2007	16,883	311,070	1.41	1.29
2008	60,480	320,722	*in relation to 2008*	1.33
2009	52,927	308,644	0.88	*in relation to 2009*
2010	58,135	305,624	0.96	0.99
2011	59,563	306,860	0.98	0.99

Table 5: The volume and growth rate of migrants (M) and commuters (C) to urban centres of inter-municipal significance (SMP) in Slovenia during 2000–2011.

Flows related to the level of investigation	*2000–2007*	*2009–2011*
To national urban centres of intern. significance (NSPM)	(0.45)	(0.63)
to urban centres of national significance (SNP)	(0.48)	(-0.43)
To urban centres of regional significance (SRP)	0.62	(-0.35)
To urban centres of inter-municipal significance (SMP)	0.73	(-0.81)

Table 6: The correlation between migration and commuting flows to urban centres in Slovenia before and during the economic crisis (note: statistically insignificant correlation coefficients, $\alpha > 0.1$, are in brackets).

The results of modelling the effects of emissivity, attraction and distance to migration flows (*M*) and commuting flows (*C*) are shown in Tables 7 to 10. The results of regression analyses of models (2) and (3) are shown separately for the flows to national urban centres of international significance (NSMP, Table 7), to urban centres of national significance (SNP, Table 8), to urban centres of regional significance (SRP, Table 9) and to urban centres of inter-municipal significance (SMP, Table 10). The estimations of the analysed parameters have high statistical significance, as all P values are very low.

The general interaction model (1), where the characteristics of emissivity and attraction were replaced by the size of population in the origin and the destination, respectively, better explains commuting than migrations (proportions of the adjusted explained variance, *adj.* R^2 (%), are higher for *C* than for *M* at all levels of investigation). We find that the decision to commute is more rational in the sense of the Cesario model (1) than the decision to migrate which may be influenced by many other factors (e.g. psychological factors). Despite the high simplifications used in the analysis of the parameters affecting the interactions – in the origin and the destination only the number of inhabitants as a total sum of all characteristics of emissivity and attraction was taken into account – the proportions of the explained variance are relatively high. The highest are those for commuting to Ljubljana, Maribor and conurbation Koper–Izola–Piran where the highest level of explanation was achieved by model (3) right at the beginning of the crisis in

Slovenia (adjusted R^2 = 87.9%), while the migration model (2) gained in its explanatory power also during the crisis (to adjusted R^2 = 76.2%). Generally, the explanatory roles of models (2) and (3) grew in the investigated period.

The dynamics of the impact of emissivity, i.e. the population in origin (β_1), the impact of attraction, i.e. the population in the destination of the analysed urban centres (β_2), and the impact of distance (γ) to migration flows (M) and commuting flows (C) to urban centres were analysed by comparing the regression coefficients prior to the onset of the economic crisis in Slovenia (2000–2007) and during the crisis (2008–2011 for migrations and 2009–2011 for commuting). Tables 7–10 show the estimations of these impacts (of regression coefficients), while their more detailed variations, by year, are shown in Figures A-1 to A-3 in the Annex. Figures 3 and 4 show the general rules of the dynamics of the analysed factors before and during the crisis.

Migrants (M)to national urban centres of international significance (NSMP)													
parameter	*symbol in (2)*	*2000*	*2001*	*2002*	*2003*	*2004*	*2005*	*2006*	*2007*	*2008*	*2009*	*2010*	*2011*
N		955	955	955	960	960	960	960	1,045	1,045	1,045	1,045	1,045
adj. R^2(%)		54.0	56.8	58.2	60.1	56.1	58.0	61.6	60.6	75.8	75.6	75.7	76.2
constant	*k(M)*	6E-04	4E-04	3E-02	2E-04	3E-04	2E-04	5E-04	4E-04	2E-07	6E-07	7E-07	7E-07
P_i	$\beta_1(M)$	0.78	0.73	0.59	0.87	0.83	0.78	0.82	0.84	0.95	1.09	1.08	1.05
P_j	$\beta_2(M)$	0.48	0.58	0.48	0.53	0.55	0.62	0.61	0.59	1.29	1.07	1.11	1.10
$d(t)_{ij}$	$\gamma(M)$	1.19	1.25	1.71	1.25	1.26	1.30	1.48	1.47	1.32	1.26	1.38	1.28
Commuters (C) to national urban centres of international significance (NSMP)													
parameter	*symbol in (3)*	*2000*	*2001*	*2002*	*2003*	*2004*	*2005*	*2006*	*2007*	*2008*	*2009*	*2010*	*2011*
N		955	955	955	960	960	960	960	1,045	1,045	1,045	1,045	1,045
adj. R^2(%)		81.6	83.0	84.0	84.4	84.4	85.0	85.9	87.6	87.9	87.8	87.8	87.9
constant	*k(C)*	9E-04	7E-04	5E-04	3E-04	8E-05	7E-05	4E-05	2E-05	2E-05	4E-05	3E-05	2E-05
P_i	$\beta_1(C)$	0.62	0.62	0.62	0.64	0.64	0.64	0.67	0.69	0.71	0.67	0.66	0.67
P_j	$\beta_2(C)$	1.01	1.03	1.06	1.09	1.18	1.20	1.23	1.26	1.25	1.26	1.27	1.31
$d(t)_{ij}$	$\gamma(C)$	1.61	1.60	1.61	1.60	1.52	1.52	1.50	1.48	1.52	1.55	1.56	1.49

Table 7: The results of regression analysis of migration flows (M) in model (2) and commuting flows (C) in model (3) to national urban centres of international significance (NSMP) (note: the estimations of all regression coefficients are highly significant; all P-values << 0.0001).

Migrants (M) to urban centres of national significance (SNP)													
parameter	*symbol in (2)*	*2000*	*2001*	*2002*	*2003*	*2004*	*2005*	*2006*	*2007*	*2008*	*2009*	*2010*	*2011*
N		4,584	4,584	4,584	4,608	4,608	4,608	4,608	5,016	5,016	5,016	5,016	5,016
adj. R^2(%)		42.4	45.0	47.0	45.9	44.5	47.2	48.3	47.8	61.0	58.8	61.0	60.1
constant	*k(M)*	2E-03	1E-03	4E-03	4E-04	9E-04	1E-03	9E-04	4E-04	1E-07	2E-07	2E-07	2E-07
P_i	$\beta_1(M)$	0.43	0.45	0.44	0.50	0.45	0.44	0.48	0.52	0.84	0.88	0.90	0.92
P_j	$\beta_2(M)$	0.60	0.65	0.63	0.68	0.67	0.69	0.73	0.74	1.45	1.33	1.34	1.32
$d(t)_{ij}$	$\gamma(M)$	1.12	1.18	1.38	1.13	1.19	1.27	1.36	1.28	1.48	1.37	1.47	1.42
Commuters (C) to urban centres of national significance (SNP)													
parameter	*symbol in (3)*	*2000*	*2001*	*2002*	*2003*	*2004*	*2005*	*2006*	*2007*	*2008*	*2009*	*2010*	*2011*
N		4,584	4,584	4,584	4,608	4,608	4,608	4,608	5,016	5,016	5,016	5,016	5,016
adj. R^2(%)		67.0	68.4	68.8	69.6	70.6	71.0	70.8	71.6	72.5	73.1	73.2	73.3
constant	*k(C)*	6E-03	5E-03	4E-03	3E-03	2E-03	1E-03	7E-04	4E-04	4E-04	7E-04	7E-04	6E-04
P_i	$\beta_1(C)$	0.33	0.34	0.34	0.36	0.37	0.38	0.41	0.42	0.44	0.42	0.42	0.42
P_j	$\beta_2(C)$	1.05	1.07	1.09	1.12	1.16	1.19	1.21	1.25	1.26	1.24	1.24	1.25
$d(t)_{ij}$	$\gamma(C)$	1.67	1.69	1.72	1.73	1.75	1.76	1.71	1.70	1.74	1.79	1.79	1.78

Table 8: The results of regression analysis of migration flows (M) in model (2) and commuting flows (C) in model (3) to urban centres of national significance (SNP) (note: the estimations of all regression coefficients are highly significant; all P-values << 0.0001).

Migrants (M) to urban centres of regional significance (SRP)													
parameter	*symbol in (2)*	*2000*	*2001*	*2002*	*2003*	*2004*	*2005*	*2006*	*2007*	*2008*	*2009*	*2010*	*2011*
N		7,831	7,831	7,831	7,872	7,872	7,872	7,872	8,569	8,569	8,569	8,569	8,569
adj. R^2(%)		38.9	40.7	42.9	41.4	41.2	43.0	44.4	43.8	56.2	55.3	57.4	56.6
constant	*k(M)*	3E-03	2E-03	5E-03	9E-04	2E-03	2E-03	2E-03	1E-03	1E-06	2E-06	2E-06	1E-06
P_i	$\beta_1(M)$	0.37	0.38	0.39	0.43	0.39	0.39	0.42	0.46	0.79	0.80	0.83	0.85
P_j	$\beta_2(M)$	0.54	0.58	0.58	0.62	0.60	0.63	0.66	0.66	1.25	1.19	1.20	1.22
$d(t)_{ij}$	$\gamma(M)$	1.03	1.07	1.23	1.03	1.10	1.15	1.25	1.17	1.47	1.40	1.48	1.42
Commuters (C) to urban centres of regional significance (SRP)													
parameter	*symbol in (3)*	*2000*	*2001*	*2002*	*2003*	*2004*	*2005*	*2006*	*2007*	*2008*	*2009*	*2010*	*2011*
N		7,831	7,831	7,831	7,872	7,872	7,872	7,872	8,569	8,569	8,569	8,569	8,569
adj. R^2(%)		61.3	62.6	63.3	64.0	64.9	65.3	65.8	66.1	67.2	67.6	67.9	67.9
constant	*k(C)*	1E-02	1E-02	1E-02	1E-02	7E-03	6E-03	4E-03	3E-03	3E-03	5E-03	5E-03	4E-03
P_i	$\beta_1(C)$	0.28	0.28	0.28	0.30	0.31	0.32	0.34	0.36	0.37	0.35	0.35	0.36
P_j	$\beta_2(C)$	0.92	0.95	0.96	0.98	1.01	1.03	1.06	1.06	1.08	1.05	1.06	1.06
$d(t)_{ij}$	$\gamma(C)$	1.46	1.49	1.54	1.55	1.57	1.59	1.58	1.58	1.63	1.66	1.66	1.66

Table 9: The results of regression analysis of migration flows (M) in model (2) and commuting flows (C) in model (3) to urban centres of regional significance (SRP) (note: the estimations of all regression coefficients are highly significant; all P-values << 0.0001).

Migrants (M) to urban centres of inter-municipal significance (SMP)													
parameter	*symbol in (2)*	*2000*	*2001*	*2002*	*2003*	*2004*	*2005*	*2006*	*2007*	*2008*	*2009*	*2010*	*2011*
N		11,651	11,651	11,651	11,712	11,712	11,712	11,712	12,749	12,749	12,749	12,749	12,749
adj. R^2(%)		35,7	37,1	38,4	37,2	37,1	38,9	40,3	40,0	50,5	50,5	52,6	52,1
constant	*k(M)*	2E-02	1E-02	2E-02	6E-03	1E-02	1E-02	1E-02	7E-03	6E-05	4E-05	4E-05	3E-05
P_i	$\beta_1(M)$	0.34	0.35	0.35	0.38	0.36	0.38	0.40	0.42	0.75	0.76	0.78	0.80
P_j	$\beta_2(M)$	0.38	0.41	0.42	0.44	0.41	0.44	0.46	0.47	0.88	0.87	0.89	0.90
$d(t)_{ij}$	$\gamma(M)$	0.96	1.01	1.10	0.96	1.02	1.07	1.15	1.10	1.41	1.33	1.41	1.37
Commuters (C) to urban centres of inter-municipal significance (SMP)													
parameter	*symbol in (3)*	*2000*	*2001*	*2002*	*2003*	*2004*	*2005*	*2006*	*2007*	*2008*	*2009*	*2010*	*2011*
N		11,651	11,651	11,651	11,712	11,712	11,712	11,712	12,749	12,749	12,749	12,749	12,749
adj. R^2(%)		53.2	54.1	54.7	55.3	56.1	56.6	57.2	57.3	58.7	59.0	59.1	58.7
constant	*k(C)*	1E-01	1E-01	1E-01	1E-01	9E-02	8E-02	7E-02	6E-02	5E-02	8E-02	8E-02	7E-02
P_i	$\beta_1(C)$	0.25	0.25	0.25	0.27	0.28	0.28	0.30	0.31	0.33	0.32	0.32	0.32
P_j	$\beta_2(C)$	0.63	0.64	0.66	0.67	0.70	0.72	0.73	0.73	0.75	0.72	0.72	0.74
$d(t)_{ij}$	$\gamma(C)$	1.29	1.32	1.35	1.37	1.38	1.41	1.42	1.42	1.46	1.48	1.48	1.47

Table 10: The results of regression analysis of migration flows (M) in model (2) and commuting flows (C) in model (3) to urban centres of inter-municipal significance (SMP) (note: the estimations of all regression coefficients are highly significant; all P-values << 0.0001).

Before the crisis (Figure 3), the impact of all analysed factors to migration flows (M) grew – the impact of distance to migrations, $\gamma(M)$, to urban centres at all levels of investigation grew the most, meaning that in the period of 2000–2007 the willingness to long-distance migration decreased. Similarly, the impact of attraction of urban centres of national significance for migrants was increasing, followed by the increasing impact of attraction for migrations to national urban centres of international significance and to urban centres of regional significance; the slowest was the impact of attraction of centres of inter-municipal significance. In this period, the influence of the analysed factors to commuting grew, with the exception of the impact of the distance to commuting flows $\gamma(C)$, to national urban centres of international significance which decreased; this means that the willingness for longer commuting to Ljubljana, Maribor and conurbation Koper–Izola–Piran grew. This could be attributed to the dynamics of building the many sections of the motorway cross in Slovenia that connected many remote municipalities with the Capital City of Ljubljana; at the same time, the three urban centres of international significance were connected. The impact of the distance to work mobility to urban centres at lower levels grew: The willingness to commute from more remote places to urban centres at the lower levels of investigation decreased (particularly related to flows to urban centres of regional significance and urban centres of inter-municipal significance). The dynamics of the impact of attraction of urban centres to commuters was the highest for national urban centres of international significance whose influence to commuting flows during 2000–2008 increased; later, it decreased with lowering the level of investigation of urban centres in Slovenia. Similarly, the impact of emissivity to commuting flows to urban centres moderately increased on all levels.

In the second half of 2008 in Slovenia, with the onset of the economic crisis, the labour market started to change. In the next year, some sudden changes occurred in the impacts of the analysed factors to migration flows and commuting flows. By comparing Figures 3 and 4, the most obvious changes in the dynamics of the impacts of the analysed factors can be found. In terms of migrations, there are two major changes: firstly, in 2008–2011 the impact of attraction of urban centres at higher levels decreased extremely quickly, particularly at the level of national urban centres of international significance and urban centres of national significance (see also Figure A-2); and, secondly, the impact of the distance to migrants reduced for migration flows to urban centres of national significance and at lower levels, while the impact of the distance to migrations slowly started to increase for the flows to urban centres at the highest level of investigation (see also Figure A-3).

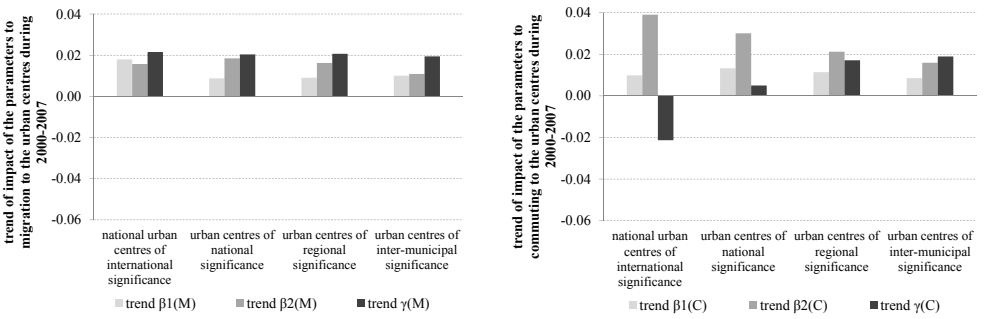

Figure 3: The comparison of the trends of impact of the number of inhabitants in origin (β_1), the number of inhabitants in destination (β_2) and distance (γ) to migrations (M) and commuting (C) to urban centres after SPRS (2004) during 2000–2007.

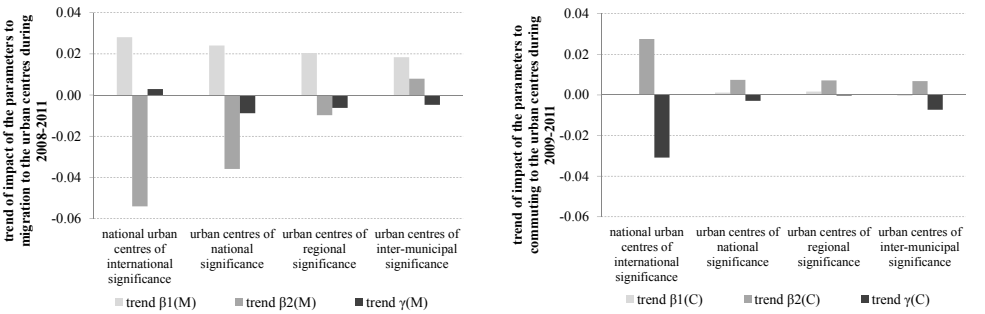

Figure 4: The comparison of the trends of impact of the number of inhabitants in origin (β_1), the number of inhabitants in destination (β_2) and distance (γ) to migrations (M, 2008–2011) and commuting (C, 2009–2011) to urban centres after SPRS (2004).

Ever since the onset of the crisis (2009–2011), the impact of the number of inhabitants in the origin, as the substitute for the general notion of emissivity, to commuting has remained unchanged. The impact of attraction of urban centres to commuting is still on the increase; however, it is significantly slower than that prior to the crisis. What changed the most was the dynamics of attraction of urban centres of national significance and centres at lower levels whose influence on commuting flows grows very slowly. Also, the growth of the impact of

Ljubljana, Maribor and conurbation Koper–Izola–Piran to commuting was cut almost in half. The economic crisis caused a considerable rise in unemployment, hence it was to be expected that the impact of distance to commuting flows to three major urban centres of Slovenia, as the largest employment centres, would continue to fall. During the crisis, the distance from Ljubljana, Maribor and conurbation Koper–Izola–Piran is becoming increasingly less important in the decision related to (even long-distance) commuting to these three urban centres.

6 CONCLUSIONS

In the paper, we presented the dynamics of migration and commuting to chosen urban centres of Slovenia during 2000–2011. To this end, we separately analysed the impact of attraction of urban centres, the impact of emissivity of origin municipalities, the impact of the distance between the origin and the destination to migration and commuting flows to the analysed urban centres in Slovenia, and the dynamics of these impacts in the period before the economic crisis in Slovenia (2000–2007) and during the crisis (2008–2011).

Separately, four hypotheses related to mobility and commuting were tested. We proved that under normal circumstances on the labour market (in our case before the onset of the crisis in 2008) the volume of migration flows and commuting flows increased with time (*Hypothesis 1*). The hypothesis that the effect of the distance to migrations and commuting decreased with time (*Hypothesis 2*) was only partly confirmed. The results of the analysis of migration and commuting flows between the municipalities of Slovenian in the nine-year period indicated the decreasing impact of the distance to commuting to urban centres at the highest level of investigation (national urban centres of international significance, i.e. Ljubljana, Maribor and conurbation Koper–Izola–Piran), while at other levels the impact of the distance to the flows to urban centres increased. Such results can be explained by the improvements in the transport system; in the investigated period, the motorway cross was expediently built, connecting the aforementioned high-level urban centres to the majority of densely populated areas. However, our opinion is that a period of nine years is too short for this kind of migration flow analysis.

We also managed to confirm the hypotheses that during an economic crisis, the volume of both migrants and commuters changes (*Hypothesis 3*) and that during an economic crisis the impact of the distance to migrations and commuting changes (*Hypothesis 4*). While prior to the 2008 crisis, the number of migrants and commuters increased (relevant for the flows to all urban centres of Slovenia), the economic crisis caused a sudden drop in the size of such interactions. In general, the influence of distance to both migration flows and commuting flows to the urban centres of Slovenia decreased.

The paper analysed the influence of attraction of chosen urban centres, the impact of emissivity of the origin municipalities and the impact of the distance between the origin and the destination to migration flows and commuting flows to the analysed urban centres in Slovenia. In doing this, emissivity was replaced by the number of population in the origin municipality, and the attraction of the analysed urban centres was replaced by the number of population living in the municipalities. In the future, further insight in the effects of other important factors influencing

migrations and commuting between, and into, urban centres of Slovenia should be obtained; a study of the interactions among all municipalities of Slovenia was recently performed by Drobne and Bogataj (2011a,b), with the analysis of the effects of different environmental, economic, socio-cultural, institutional and other factors to migration and commuting flows between the municipalities in Slovenia. Next to the inclusion of the factors that would additionally explain the spatial interactions, the analysed flows can be analysed using other approaches; for example, the analysis of flows between rural and urban areas, as are the cases of the study by (Champion et al., 2009) and (Drobne, 2013), or the analysis of long-distance flows, that is, between functional regions, as is the case represented by (Lundholm, 2010).

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Annex:

The comparison of the dynamics of the impact of the population in the origin, population in the destination, and the distance to migration and commuting flows to urban centres, after SPRS (2004), during 2000–2011.

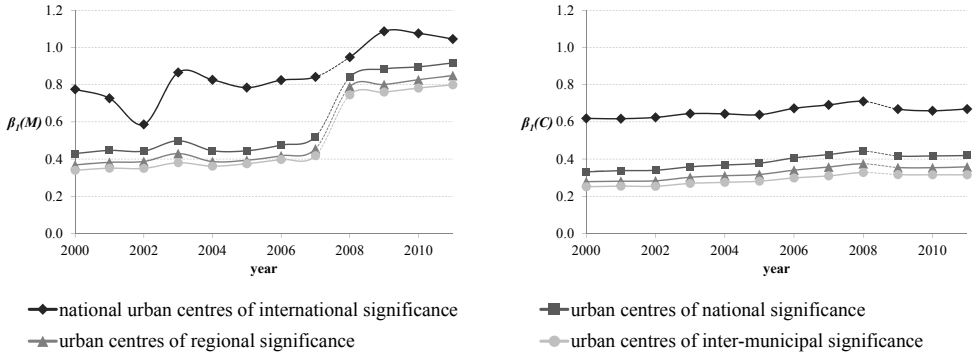

Figure A-1: The comparison of the dynamics of the influence of the population in the origin to migration flows $\beta_1(M)$ and commuting flows $\beta_1(C)$ to urban centres, after SPRS (2004), during 2000–2011.

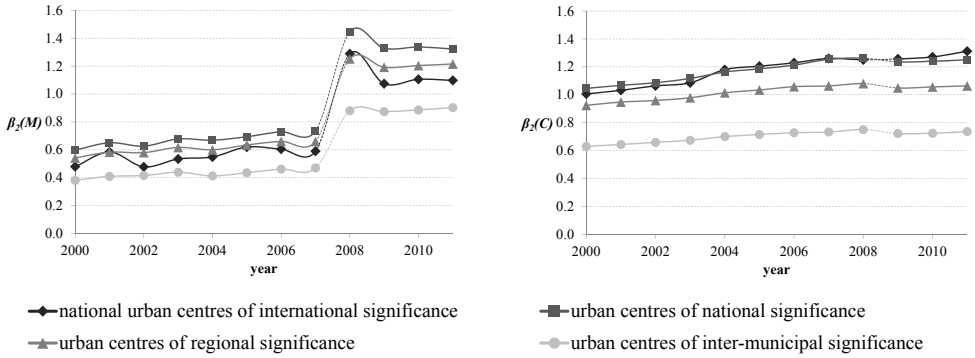

Figure A-2: The comparison of the dynamics of the influence of the population in the destination to migration flows $\beta_2(M)$ and commuting flows $\beta_2(C)$ to urban centres, after SPRS (2004), during 2000–2011.

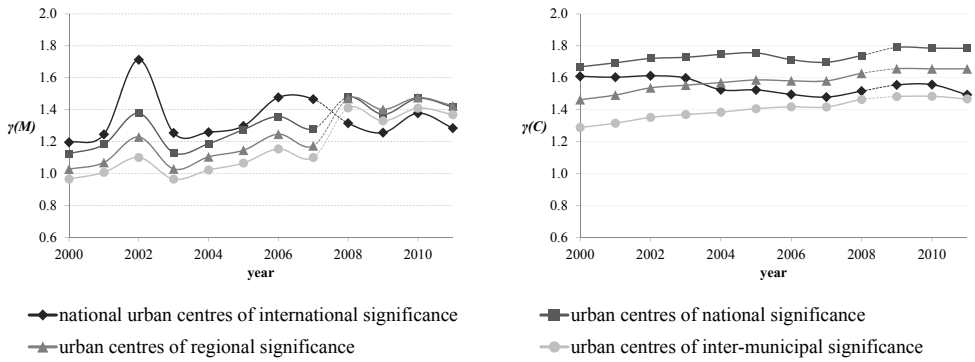

Figure A-3: The comparison of the dynamics of the influence of the distance between the origin and the destination to migration flows $\gamma(M)$ and commuting flows $\gamma(C)$ to urban centres, after SPRS (2004), during 2000–2011.

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Senior Lecturer Samo Drobne, MSc, BSc (Geod.)
University of Ljubljana, Faculty of Civil and Geodetic Engineering
Jamova cesta 2, SI-1000 Ljubljana, Slovenia
e-mail: samo.drobne@fgg.uni-lj.si

Tina Rajar, BSc (Geod.)
Žubina 36
SI-8213 Veliki Gaber, Slovenia
e-mail: tina.rajar@gmail.com

Assist. Prof. Anka Lisec, PhD, BSc (Geod.)
University of Ljubljana, Faculty of Civil and Geodetic Engineering
Jamova cesta 2, SI-1000 Ljubljana, Slovenia
e-mail: anka.lisec@fgg.uni-lj.si