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Monograph

**Global geographical networks of international migration
and the Hungarian case within the Carpathian Basin,
2011-2017**

Hungarian Central Statistical Office

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Dr. Áron Kincses

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1 Introduction

Globalization has been recognised and observed for decades. It is considered social phenomenon with excessive impact on the economy. In the globalised world of the 21st century, more complex systems have to be understood and interpreted than ever before. In response to the emergence of globalisation, new, usable tools and methods for the sound measurement of such changing phenomenon need to be found. As various activities (business, migration etc.) fall into networks, network theory is an innovative tool and approach in our globalised world that can help us handle the complexity of this century. However, so far it has not featured in mainstream official statistics.

Globalisation and migration have posed many challenges, thus network theory can offer a possible solution for capturing the essence and benefits of new phenomena. Through the networks of migration countries' (from where and to where migrants move) some of the most important and tangible outcomes of network analysis in international migration statistics and demography can be understood.

As one of the results of the first part of this research, the existing hubs of international migration will be presented. Global migration destinations attract international migrants from greater distances, while migration connectivity between countries is constantly increasing. At the same time, most countries have few connections with other countries through migration, while few countries have many. This network is interconnected by hubs with multiple connectivity capabilities. There is no average receiving country or average sending country. The network is, however not fully centralised and none of its members has a relationship collecting monopoly with limitless growth. Due to its multiple centres, this type of network is much more resilient to external influences, so as long as migration plays a demographic and economic driving force, in the current global regulatory environment international migration will expand, its directions can only be influenced locally.

Hungary has a unique role in international migration. Much more is being said about Hungary's emigrants these days (Blaskó Zs. – Gödri I., 2016; Siskáné et al., 2017; Egedy Tamás, 2017), than about the foreigners arriving legally to Hungary, or about Hungarian ethnicities emigrating from the other countries of the Carpathian Basin. The second part of this book analyses the facts and figures about foreign born population in Hungary, focusing on migrants arriving to Hungary from the Carpathian Basin and their geographical networks.

The research introduces the current global migration trends, as well as the global migration networks followed by a picture of the present migration situation in Hungary. It presents the foreign born population living in Hungary in numbers, as well as the socio-demographic and economic characteristics from the perspective of the source and target territories, revealing the source areas of migration and the impact on the Hungarian ethnic population in the Carpathian Basin. Last, but not least, linking the two main parts of this book, the geographical networks of international migration within the Carpathian Basin from the Hungarian point of view will be analysed.

The analysis interprets those involved in international migration in broad terms; as such, it is not solely focused on the movements of foreign citizens, but rather examines the effects of migration together with the naturalized Hungarians born abroad.

2 The framework for the analysis, the data sources

The data of the global migration part of the analyses were obtained from the UN Migration Database (United Nations, 2017). The territorial level of the analysis is the country, and the UCINET NetDraw software was used to calculate and display networks (Borgatti et al., 2002).

In the case of Hungarian focused analysis, there are several types of available data sources on foreign nationals, mostly in the shape of administrative records. These are registers created by a given administrative organisation (for example, for the purposes of taxes, social insurance, etc.) to support the implementation of its own statutory administrative tasks (Gárdos É. et al., 2008). In these cases, statistical and research needs do not primarily determine the concept and the content, the units of the target population, the reference time of the data and definitions. Another difficulty is that the content and structure of the register may suffer changes as a result of changes in legislation. All this means that, in some cases, it is difficult to obtain information directly from these data systems to meet scientific needs.

The advantage of census data over administrative data is that everyone can be linked to their habitual place of residence, along with all the variables of the survey. This provides the opportunity of gaining insight into the living conditions and economic, educational and social backgrounds of Hungary's inhabitants in territorial breakdowns for statistical purposes. The census is conducted throughout the country at a single point in time, with the same content, and on the basis of uniform methodology. Surveys were also carried out for Hungarian citizens who habitually live in the national territory, or if they are staying abroad, only temporarily (12 months or less) so; moreover, foreign nationals and stateless persons who stay in the country's territory for a given period of time are also listed. Among the foreign nationals not included are members of diplomatic bodies and their family members; members of foreign armed forces on the basis of resolutions by the Parliament or government, as well as people in the country for the purposes of tourism (resting, hiking, hunting, etc.), personal visits, medical treatments, business meetings, etc. However,

this information is not available as often as in administrative records.

I used these two types of statistical data sources. I worked with the 2011 and 2017 stock data of the Hungarian migration databases as they are relevant to the topic (Personal Data and Address Registers, the Ministry of Interior's Records of Foreign Residents for the Census, microcensus). The data underlying the analyses were not directly available, I had to make use of separate classifications for the assessment of territorial impacts. The mapping of the source settlements and regions of international migration in the Carpathian Basin enables a deeper understanding of the migration processes affecting the Carpathian Basin. Currently, country classifications are automated in administrative sources, the list of foreign settlements posed a number of challenges: typing errors, instructions, and the city names in different languages made progress difficult. Many large cities have been recorded under many different ways, and in many cases, settlements that were formerly independent were included¹.

Both data sources contain such information that is missing from the other file (for example, the microcensus contains data related to education and economic activity which are not part of the Ministry of Interior's database; however, the administrative database contains the birth settlements). For this reason, it was necessary to link both files².

1 Just a few examples:

- The village of yore of Székelyhidegkút (Vidacutu Român in Romanian, Kaltenbrunnen in German) is today a village in Romania, in Harghita County. It emerged from the unification of Magyarhidegkút and Oláhhidegkút in 1926. The northern part of the village is Hungarian -, the western part of Oláhhidegkút, currently a part of the Hidegkút settlement. - Hidegkút (Vidăcut in Romanian) is a village in the Romanian Harghita County. It belongs administratively to Székelyandrásfalva.
- Horthyvára: Máriamajor (Степановићево/Stepanovićevo in Serbian, between 1941 and 1944 Horthyvára; in 1941-it was called Bácsbadikfalva for a short period), today belongs to the Újvidék township in Serbia, in Vojvodina, in the Southern-Bácska district.
- Kadicsfalva - (Cadiseni) is today a part of the city of Székelyudvarhely (According to the chronicles, in 1566 it was known as Kadichfalva).
- Csekelaka (Cecălaca in Romanian) village in Romania, in the Maros County. Today, it belongs to the Cintos Township.

2 Marcell Kovács, Director of the Population Census and Demographic Statistics Department, and his experts, Zita Ináncsi and János Novák, provided essential assistance to this work. I sincerely thank them for their support here.

To this end, I employed a multistage key system using sex, year and month of birth, name of settlement, public domain and house number information. Where necessary, I used a rate estimate.

In 2011, I added administrative data to the census (this is the source of official statistics data in the census reference year), while in 2017, I added the microcensus information to the Ministry of Interior's database (in the years when there is no census, official statistics are provided by the administrative records). Therefore, the 2017 distributions may slightly differ from the microcensus results.

The analysis of international migrants is often limited to foreign nationals living in a given country. However, the group involved in migration is much wider and its structure is more nuanced. When assessing the effects and extent of immigration, naturalisations and foreign born citizens, whose number significantly exceeds that of foreign nationals cannot be neglected. Therefore, this study focuses on the foreign-born population (whether it is still of foreign national or citizen of the given country).

3 Global geographical networks of international migration

3.1 Migration trends around the world

Migration is an interdisciplinary phenomenon, related mainly to demographics, economics, history, geography, political science and sociology. Consequently, its interpretation and definition also emphasise different aspects. This chapter focuses more on geographical, statistical, mathematical-networking theoretical elements.

A detailed analysis of the root causes, main trends and effects of migration is not the purpose of this study, it goes beyond its limits. As an introduction, only the major global demographic trends and economic aspects are mentioned, which have a marked impact on the volume, direction and composition of global migration.

Due to the spatial differentiation of development in the world, the demographic situation of various countries and societies is different, and there are different phases of demographic transitions (Oded G., 2012). All societies have passed through the phases of classical demographic transition throughout their development (Andorka R., 2006): nutrition and health conditions improve, resulting in a decrease in childhood mortality rate; thus, the proportion of surviving children in the population and life expectancy increase. A couple of decades later, a growing, mobile, young adult cohort develops, and this group is the most receptive to emigration. Due to the differences in development in different territories, 'population explosions' do not reach different countries all at once. These demographic phenomena were decisive in the late 19th century, when Europeans flocked across the oceans; and from the second half of the 20th century, with the migration of third-country migrants to developed countries.

The consequence of the divergence in demographic trends over time is that, the situation of many developed countries has become characterised by a decrease in birth rates, a further increase in life expectancy, and an acceleration of the phenomenon of ageing. On the other hand, the population of developing countries is growing dynamically. Thus, the share of the population of developed societies

continues to decrease compared to those developed (Hatton T. – Williamson J., 2005). Consequently there is a population shortage on one side, while on the other there is a strong surplus, and the relative surplus could potentially become international migrants.

The current migration trends in the world are therefore different from that of previous centuries in that the number of migrants is overwhelming, and that they come from areas that show huge social, cultural and economic differences in comparison to their host countries (Hatton T. – Williamson J., 2005). In the case of large host countries, the consequence is that immigrants usually lag behind in terms of qualifications, skills and experience compared to the domestic population (Rédei M., 2007).

When examining the economic dimension of migration, it is important to emphasise that in the era of globalisation, income gaps between countries are growing at an accelerating rate; development is uneven (Kofman E. – Youngs G., 2003). The widening gap in terms of quality of life between poor and rich countries stimulate the growth of human movements. Parallel to this, the financial opportunities of migrants are constantly improving. With the explosive development of transportation technology, our world continues to shrink, and the cost of long-distance movements is now so low that a growing proportion of people in peripheral countries are also able to engage in the global migration processes (Hatton T. – Williamson J., 2005).

However, economic globalisation is far less clear about the impact of the volume of migration. The liberalisation of commerce, the development of networks of enterprise groups and technical development all foster the geographical mobility of activities, enabling companies to take their products across different regions, making it easier to supply remote customers (Krugman P. – A. J. Venables, 1996; A. J. Venables, 1998), thus influencing the localisation of economic activities. The free flow of goods, capital, labour and services accelerated corporate mergers, the concentration of capital, as well as the partial relocation of production to low-wage countries. The reason is that multinational companies quickly realized that people's mobility is much more limited than the movement of goods

(E. Kofman – G. Youngs, 2003). Thus, production has shifted towards more favourable transportation costs and consumer markets (Kurtán L., 2005, Krugman P., 1998, Friedman T., 2006), while strategic development activities have remained in the home countries for the most part.

Two seemingly contradicting trends occur simultaneously: on the one hand, never before have such human flows been experienced, and on the other, the proportion of activities and people engaged in them staying in place geographically is increasing (Rédei M., 2007). Therefore, one of the key questions of the future is: how does the global business aspect of production relate to individual migration decisions of the mobile work force, and, moreover, through what kind of national and international migration frameworks, as well as sustainability strategies, is this achieved?

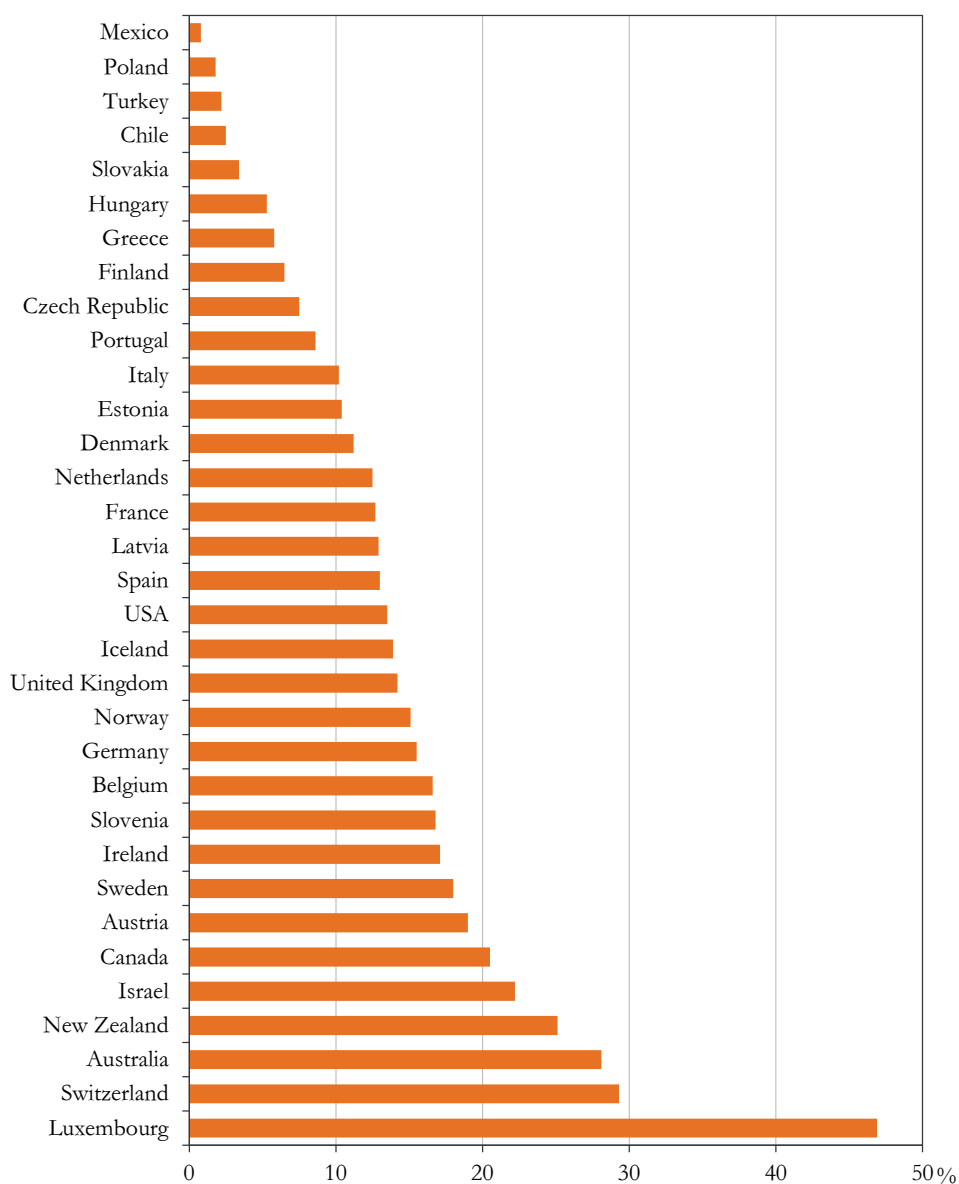
To evaluate the full picture, it must be understood that migration has an effect not only on the hosting country, but on the source countries as well. Consider demographic losses or the 'brain drain' phenomenon. These processes may weaken the competitiveness and sustainability of the source countries, planting the seeds for new emigration waves in the future.

The main question is: in view of the low fertility rates and aging of Western societies, could immigration be a partial solution to solving the difficulties of maintaining the pension system? The theoretical answer is that this depends on the effectiveness of migration management, the characteristics of the migrants, the population policies of the target country, and its wider population strategies.

The above mentioned global tendencies have also been experienced in Hungary: the current foreign population living in the country is composed of 159 different countries; that is to say, there is almost no corner of the world from where citizens have not come to Hungary. The vast majority of those arriving from outside of Europe are not native Hungarian speakers. The proportion of people coming from Europe is steadily decreasing: while in 1995, 89% of foreigners arrived from within the continent, this ratio decreased to 65% by 2017.

Figure 1

*The proportion of the population born abroad
in individual countries, 2017**



* For Poland data is only available for the year 2011.

Source: OECD, SOPEMI, 2018.

At the same time, Hungary is not considered a typical host country in a global sense. On the one hand, the volume of migration and its proportion to the resident population is considerably smaller than it is in larger host countries (Figure 1); on the other, the prevailing global trends in migration have only had a minor impact. Hungary (albeit to a decreasing extent) continues to be a target for Europeans, but this rather a feature of short-distance international migration.

Within Europe, the importance of the neighbouring countries is tied to cross-border linguistic and cultural relations. However, this is a one-way movement, meaning there are more arrivals from the neighbouring countries into Hungary than vice versa. Thus, the consequences of the peace treaties that brought an end to World War I and World War II are still decisive in the migration processes of the Carpathian Basin today (Tóth P., 2005). As such, one can distinguish between two layers of international migration to Hungary: global and Carpathian Basin origin-based movements, each covering migration groups of different characteristics.

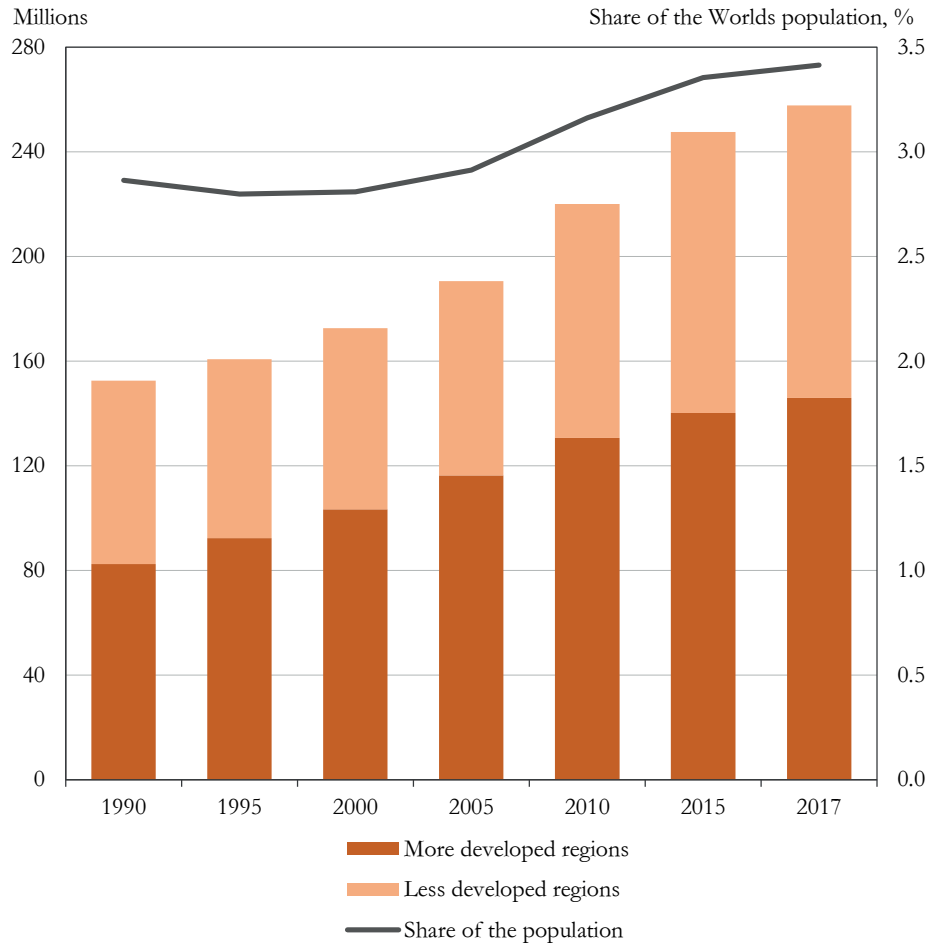
Therefore, in the case of Hungary, not only are domestic circumstances decisive in the study of international migration, but also the general condition of the population that declares itself Hungarian in the neighbouring countries. The economic situation and minority policies in these countries (and not only the attracting effect of Hungary) is decisive in the extent of and need for legal international migration that the country can and should count on currently and in the coming decades (Tóth P., 1997). This is also why it is important to have data collected that is as detailed as possible on international migration affecting Hungary, particularly where it concerns neighbouring countries. Who is coming, where they come from, why they come to Hungary, what are their characteristics, where do they settle, what effects do they have it on the target country and country of origin? – These are the questions I attempt to answer in this book.

3.2 The volume of international migration in the world and the relations between countries

In 2017, 258 million people in the world did not live in the country in which they had been born. Most of them lived in developed countries. In 1990, 2.9% of the world's population were international migrants, which increased to 3.4% in 2017. If trends of the 1990s and 2017s continue, by 2040, 372 million people will be international migrants, 4% of the world's then-population.

Figure 2

Foreign born population in the World, 1990–2017



Source: UN, 2017.

In 2017, the most foreign-born citizen lived in the USA, although Germany, Saudi Arabia and Russia also had a population of more than 10 million people of foreign origin. While in the USA, Germany, Canada and Saudi Arabia the number of foreign-linked populations doubled since 1990, in Russia, India, Iran, Ukraine, Pakistan their numbers stagnated or decreased.

Table 1

Top 10 receiving countries (persons), 1990, 2017

1990		2017	
Country	Total	Country	Total
United States of America	20 134 790	United States of America	47 412 413
Russian Federation	11 516 298	Germany	12 044 115
India	7 362 652	Saudi Arabia	11 774 584
Ukraine	6 481 438	Russian Federation	11 650 842
Pakistan	6 203 799	United Kingdom	8 799 334
France	5 897 267	United Arab Emirates	8 059 782
Germany	5 601 544	France	7 902 783
Saudi Arabia	4 830 679	Canada	7 849 479
Canada	4 327 805	Australia	7 008 050
Iran (Islamic Republic of)	4 290 497	Spain	5 931 689

Source: own calculation, based on the database of UN, 2017.

Most people move from countries with large populations, like India, China, Mexico, Russia, or from near crisis- and war zones. Migration in the 21st century is characterised by the increase in pensioner migration (Hubert A. et al, 2004, Illés S., 2013) and that at older age from developed countries (e.g. the United Kingdom). Its main driving forces are the better use of the purchasing power of pensions, the

recreational opportunities, or the search for a more favourable climate (Warnes T., 2009).

Table 2

Top 10 sending countries (persons), 1990, 2017

1990		2017	
Country	Total	Country	Total
Russian Federation	12 664 537	India	16 587 720
Afghanistan	6 724 681	Mexico	12 964 882
India	6 718 862	Russian Federation	10 635 994
Ukraine	5 549 477	China	9 962 058
Bangladesh	5 451 546	Bangladesh	7 499 919
Mexico	4 394 684	Syrian Arab Republic	6 864 445
China	4 229 860	Pakistan	5 978 635
United Kingdom	3 795 662	Ukraine	5 941 653
Italy	3 416 421	Philippines	5 680 682
Pakistan	3 341 574	United Kingdom	4 921 309

Source: own calculation, based on the database of UN, 2017.

Migration shows strong territorial concentration. In 2017 (like in 1990), 80% of migrants lived in 14% of the countries, while half of the migrant population lived in nine countries. In international migration there are centres (large receiver countries), global migration destinations that attract migrants from a greater distance. The foreign-born population living in these centres is diversified by country of birth. However, the relationship between volumes and migration relations among counties is more complex³.

³ Between 1990 and 2017, the number of migrants increased by 71.6%. The number of migration links between countries increased by 7.9% and the average number of migrants across one migration connection increased by 58.9%.

Table 3

*Top 10 source - and sending countries with the most connections,
1990, 2017*

Destination		Source	
Country	Number of connections (source countries)	Country	Number of connections (number of countries where a resident born in the source country lives)
1990			
Australia	211	United States of America	157
Greece	209	United Kingdom	140
France	206	China	138
United Kingdom	203	France	135
Denmark	196	Canada	123
Chile	196	Germany	122
Canada	194	India	122
Austria	192	Italy	106
Italy	184	Australia	105
Ireland	179	Russian Federation	100
2017			
Chile	210	United States of America	162
Australia	206	United Kingdom	146
United Kingdom	205	China	143
France	205	France	138
Canada	197	India	130
Ireland	195	Canada	127
Italy	193	Germany	125
Austria	192	Italy	111
Denmark	186	Australia	108
Greece	186	Russian Federation	102

Source: own calculation, based on the database of UN, 2017.

Chile, as a destination country shows the largest interconnectedness in the world. In 2017, people from 210 different countries chose this country as their new residence (Hungary had 159 connections in 2017). In Chile, almost everyone except the Mapuche Indians is immigrant or descendant of immigrants. 16th-century Spanish settlers and those 19th-century Germans, followed by tens of thousands of Croats after the Dalmatian phylloxera epidemic emigrated to Chile. In the 20th century, many Europeans fleeing world wars and after them chose this country as their new home. These migration networks have survived to this day. Meanwhile, Chile has become the richest country in South America, thus, as a result of development, from the closer and more distant neighbours more and more people choose Chile as their new place of residence (Soltész B., 2019)⁴.

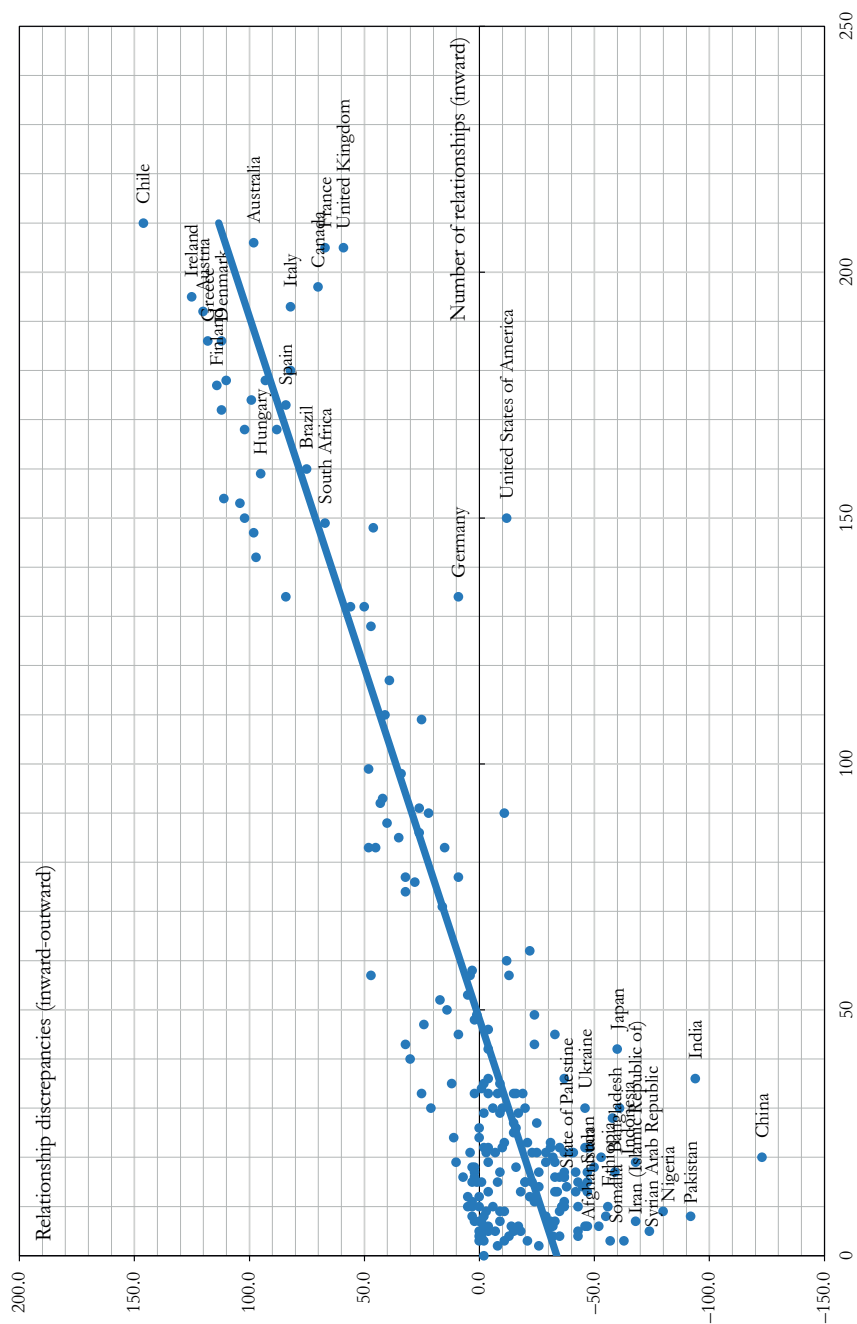
The USA is acknowledged as a host country. Migrants from 150 different countries arrived in this centre territory, but people live in even more countries – 162 in total – who were born in the USA. Large receiving countries, where the composition of immigrants by country of birth is diverse and have many inward links, are often also widespread sending countries; people from Germany, the USA, Canada, France and Britain move to many other countries. This phenomenon can partly be explained by the migration at older age as mentioned above and partly by the return of descendants of immigrants (G. Gmelch, 1980). However, this data also highlights that in the age of globalisation, migration is not a one-way movement.

Besides Chile most countries of the European Union, Australia, Brazil, South Africa are the countries where people arrive from many different countries, however from there people migrate to few other countries. People emigrate from countries with large population (China, India, Japan) and countries close to crisis zones (Syria, Ukraine, Somalia, Afghanistan) to many other countries (Sirkeci Ibrahim et al., 2015), while immigration takes place from relatively few countries (e.g. People living in India were born in 36 different countries, but those who were born in India live in 130 countries).

⁴ In Chile mass protests began in October 2019 due to the increase in the price of metro tickets. Demonstrations are driven by large inequalities in the country, low pensions and salaries, as well as high prices for electricity, gas supply, university education and health care.

Figure 3

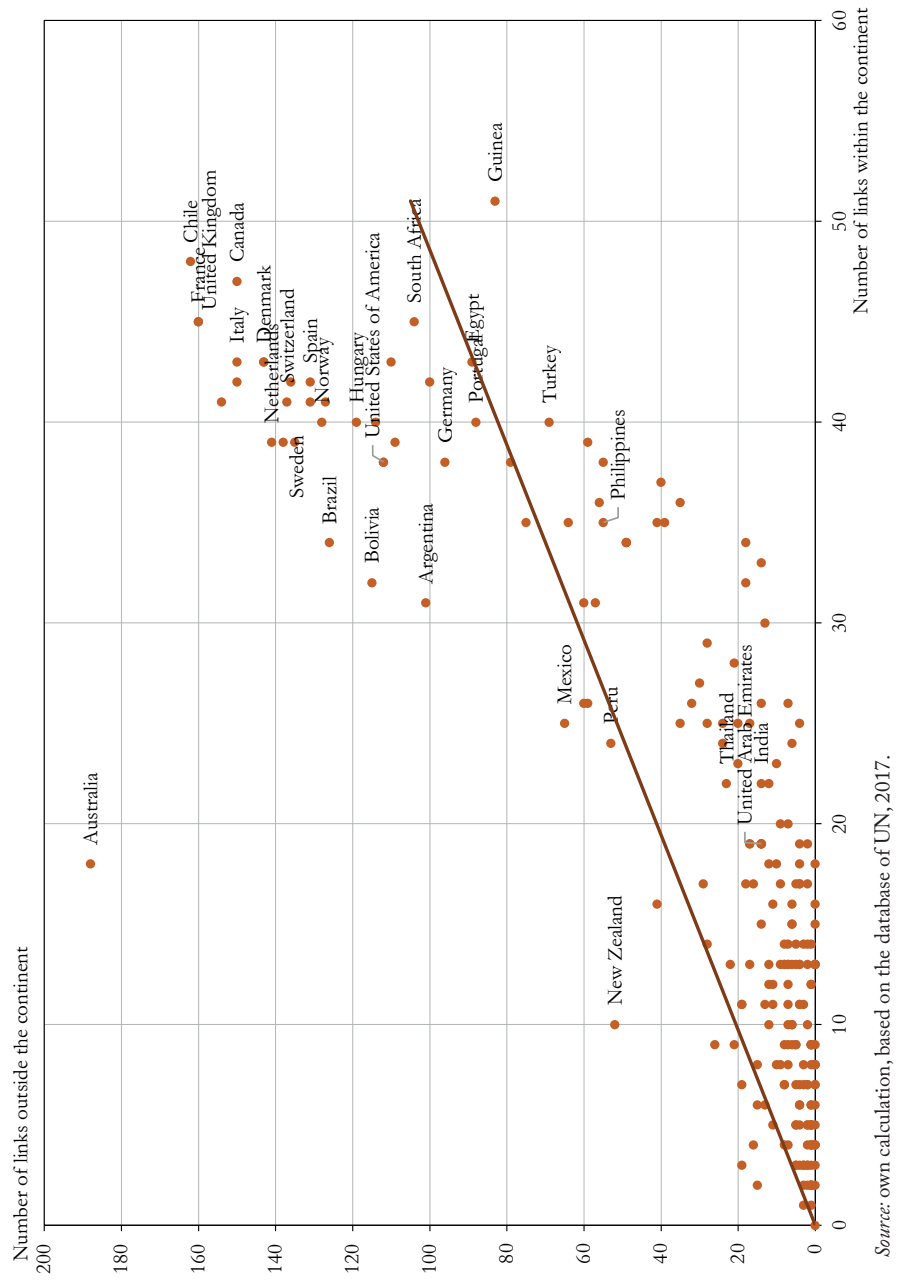
Migration relationships between countries, 2017



Source: own calculation, based on the database of UN, 2017.

Figure 4

Regional and global distribution of migration relations between source countries, 2017



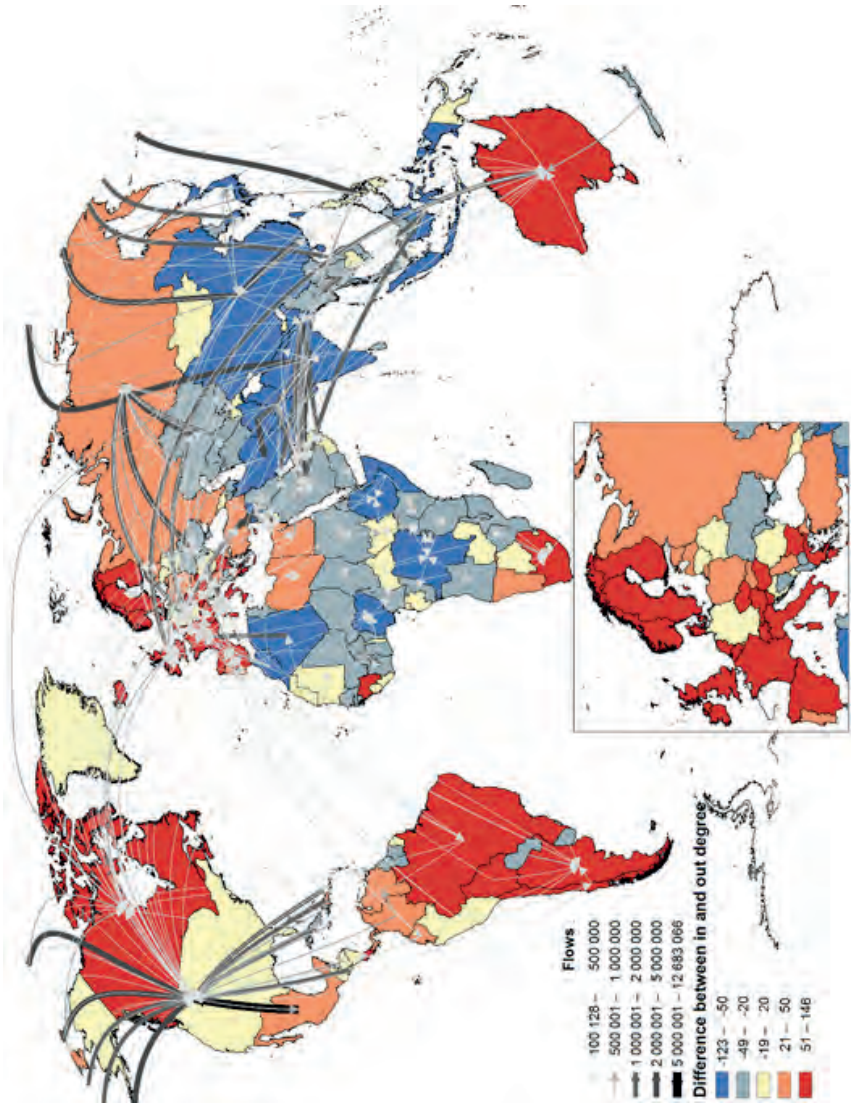
Source: own calculation, based on the database of UN, 2017.

Most relations of certain countries, the major migration source areas can be determined within a given continent, while other countries attract migrants globally. The following diagram clearly identifies that countries which are not very attractive within its continent or have few connections, those are not popular at global level either. The exception is caused by the geographical uniqueness (e.g. Australia and New Zealand). Local destinations (Thailand, India and the United Arab Emirates) can be clearly identified, while global migration centres definitely have many links within and outside the continent, more outside than inside. Here, *inter alia*, the USA, Chile, Canada, South Africa and Switzerland can be mentioned.

It was analysed to which extent countries are linked to others by emigration and immigration, which countries can be considered centres by source and destination areas. Connecting the source and destination areas is necessary to understand the characteristics of international migration. There are also significant concentrations in the migration matrices presenting from and to trends between countries. The central role of the USA is demonstrated by the fact that as early as 1990, millions of people lived there who were born in Mexico (Douglas S. Massey, 2015) and Puerto Rico. From its population in 2017, the number of people born in China, the Dominican Republic, South Korea, India, Cuba, the Philippines, El Salvador, Puerto Rico, Mexico and Vietnam exceeded one million people per country. Germany also has more than one million people born in Poland, Kazakhstan, Russia and Turkey (Sirkeci Ibrahim et al., 2012) each. India's role is twofold, to the USA, Oman, Kuwait, Saudi Arabia and the United Arab Emirates it is a major sending country, and on the other hand millions arrive here from Bangladesh and Pakistan. Significant flows can be detected from Romania to Italy, from Myanmar to Thailand, from Palestine to Jordan, from Algeria to France, from Burkina Faso to Côte d'Ivoire, from Afghanistan to Iran and Pakistan, from Syria to Lebanon and Turkey. Movements usually take place towards richer areas. Some of these links can be traced back to colonial times (Adeyanju C. et al., 2011), in other cases leaving war zones plays an important role (Conte A., and Migali S., 2019). On average, the latter migrations are smaller, while the former involve longer distances.

Figure 5

The relation between source and destination areas by the number of migrants, 2017



Source: own calculation, based on the database of UN, 2017.

3.3 Global spatial migration networks

In the previous section, the foreign-linked population was examined according to the relationships of the country of birth and the current place of residence. In this chapter, the intrinsic characteristics of migration networks between countries is analysed in detail.

The analysis of the networks began in the second half of the 20th century (Erdős P. et al., 1959, 1960; Bollobás B. et al., 1976). It was an interesting and paradigm-shifting thesis of this era (Buchanan, M., 2003), that any two people on earth are connected by six steps away, called a familiarity relationship (six degrees of separation). After the initial graph theory, today network theory has become a new discipline with recognized abstractions. This was based on research showing that all networks, whether living or lifeless, in kind or artificial, are based on partially identical organizing principles. That is, the internet, human connections, the neuron network of the brain in their internal properties are very similar. (Barabási A. L., 2008, 2016).

The network is the complexity of nodes and links that connect them in pairs. The degree of nodes represent the number of links a given node has to other nodes. The degree distribution (p_k) plays a key role in network theory. The reason is that p_k determines many network phenomena, from network robustness to the ability to evolve. The average degrees of a network can be expressed as:

$\langle k \rangle = \sum_{i=1}^N i \cdot p_i$, where $\sum_{i=1}^N p_i = 1$ és $p_i = \frac{N_i}{N}$ (N_i is the number of degree- i nodes)⁵⁶.

In other form: $\langle k \rangle = \frac{2L}{N}$, where L is the number of total links, N is the number of total nodes, because $L = \frac{1}{2} \sum_{i=1}^N k_i$, where k_i is the degree of node- i .

⁵ $N_i = N \cdot p_i$

⁶ Once the average degree exceeds $\langle k \rangle = 1$, a giant component should emerge that contains a finite fraction of all nodes. Hence only for $\langle k \rangle > 1$, the nodes organize themselves into a recognizable network. For $\langle k \rangle > \ln N$ all components are absorbed by the giant component, resulting in a single connected network.

Based on degree distributions, it can be theoretically differentiated between two types of networks: random and scale-free networks (Barabási, 2010). The degrees of a random network follow the Poisson distribution:⁷:

$$p_k = e^{-\langle k \rangle} \frac{\langle k \rangle^k}{k!},$$

which in case of rare networks is similar to a bell curve. In other words, most nodes have about the same number of links and the probability of nodes with a large and small number of links is low. A national road system usually resembles a random network, where nodes are the settlements and links are highways (Barabási, 2008).

As with most networks, people-to-people links are most accurately described by the scale-free (power-law distribution) network:

$$p_k = \frac{k^{-\gamma}}{\zeta(\gamma)},$$

where $\zeta(\gamma)$ is the Riemann-zeta function: $\zeta(\gamma) = \sum_{k=1}^{\infty} k^{-\gamma}$ (Bombieri, 1992)⁸.

The degree distribution according to the power-law function predicts that most nodes in the network have only a few links to other nodes, which are held together by a few highly connected centres (Barabási A. L., 2008). This peculiarity generates the "small world" phenomenon. In other words, distance in a scale-free network is shorter than in a similar but randomly arranged one, so all nodes are close to the centres. Once these centres, the "hubs" are present in a network, its behaviour will fundamentally be changed (Barabási, 2016, Batiston et al., 2017).

The key difference between random and scale-free networks is rooted in the different shapes of the Poisson and that of the power-law function. Random networks have an internal "scale". In other words, nodes in a random network have comparable degrees, and $\langle k \rangle$, the average degree serves as the "scale" of the random network. Scale-free networks lack a scale; thus, the average degree does not advise us so much on the network. When a node is randomly selected, we do not know what to expect: the selected node's degree could be tiny or arbitrarily large. Hence, networks do not have a meaningful internal

⁷ $\langle k \rangle \ll N$ if the distribution is binomial.

⁸ Details on zeta function are available at:

<http://mathworld.wolfram.com/RiemannZetaFunction.html>

scale, but are “scale-free” (Barabási, 2017). The presence of hubs and the small world phenomenon are universal characteristics of the scale-free network.

For the chapter, network theory is paramount because of the links between countries connected by international migration. Thus, nodes are the countries. There is a link between two countries if international migration between these two countries exist, i.e. someone moved from his/her place of birth to the other country, his/her current place of residence with certain restrictions, regardless of how many people moved. The unweighted network considers movements above a threshold. The reason is that a small number of international migrants do not necessarily mean real migration relationship between two big countries. Namely, two countries are only connected in the net by edge, if the number of migrants between the two countries is relevant and asymmetric, i.e.

$$q(A, B) = \frac{M[A \rightarrow B] - M[B \rightarrow A]}{N(A) + N(B)}$$

is above a μ fixed threshold. Where $M[X \rightarrow Y]$ is the number of population born in country X and living in country Y, $N(X)$ is the resident population of country, $\mu \in \{-1; +1\}$, $\mu \in \mathbb{R}$.

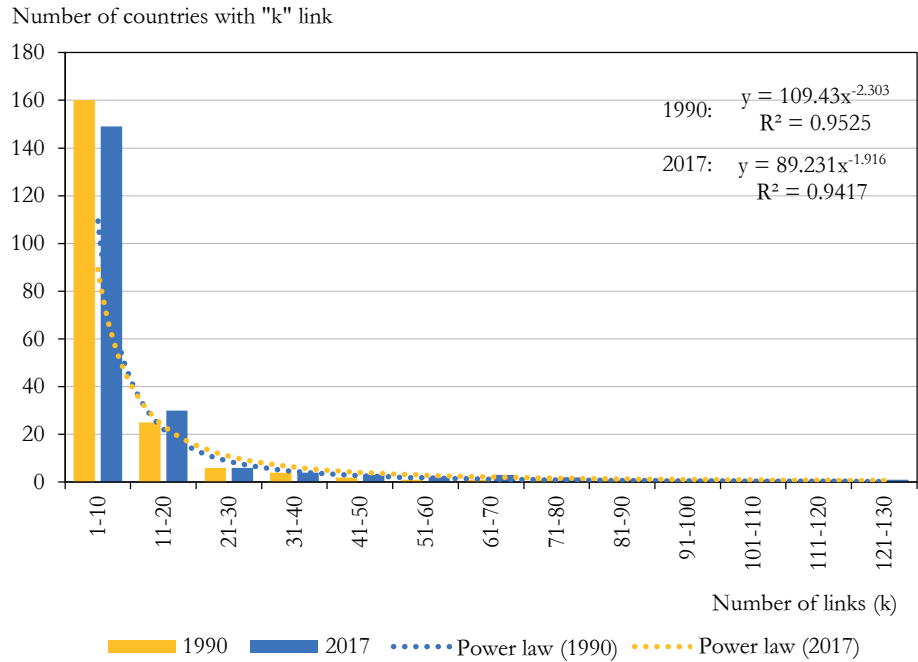
If $q(A, B) > \mu$, a migration bond is created from country A to country B, and if not, there is no such link between the two countries. This allows different nets to be edited depending on the μ parameter.

An analysis of the country's relations systems presents how diverse migration is, how “embedded” the process is in the region. Links between countries and those dynamics involve changes in the volume of future migrations. In case of degree reduction (if a country will have fewer links to other countries due to migration) it is likely that the respective sending areas are depleted or the receiving countries are saturated, the earlier migration waves were reduced or other areas became more attractive to new arrivals. Provided that degrees increase, the number of links increases, which may foresee further increase in the number of migrants due to the growth of the potentially accessible population.

By determining the degrees, it is possible to examine how many countries have a given number of degree (link). The question is whether it is possible to find a random, scale-free or other kind of topology.

Figure 6

Degree distribution of immigration by country, 1990, 2017



Source: own calculation, based on the database of UN, 2017.

The number of countries with a given number of links decreases by the number of links by quasi-power law function⁹, the network of (im)migrations is scale-free with a good approximation¹⁰. In such scale-free networks, the average degree does not provide sufficient information about the network. For a randomly chosen country, the number of expatriate population living there may be very low or high. This means that there is no country of average migration.

⁹ Calculated with $\mu=0,006$ which means that in the migration network those links were taken into account, where the difference of migrant population between the two given countries exceeds 0,6% of the resident population of these countries.

¹⁰ In 2017: $\mu=0,004$, $R^2=0,896$; $\mu=0,005$, $R^2=0,913$; $\mu=0,006$, $R^2=0,942$; $\mu=0,007$, $R^2=0,937$. Thus hereafter $\mu=0,006$ was applied as threshold.

The reason for scale-free topology found in the migration network is that countries with multiple links will be much more attractive to migrants than those with fewer degrees. Integration into the new environment is successfully achieved where it is facilitated by previous family and friendly relationships. The "trampled path" of emigration is to liaise with those already displaced, which also has a significant impact on future migration decisions (Haug S., 20018, Rédei M., 2007, Kis T., 2007). This is justified by the fact that family reunification is still one of the main purpose of accessing a country, while on the other hand, the new arrivals often settle near their relatives and acquaintances. So with more links to a country, migration is much more effortless, a larger number of potential migrant population and information can be accessed through family, friends, relatives and acquaintances. A migrant is more likely to choose a popular country or settlement with many connections, about which more information is available than one that he or she knows little about. Thus, the emergence of migration networks can be the main influence on the direction and volume of migrations, in addition to income disparities and migration distances.

3.4 Topology of global migration networks

Once the scale-free peculiarity was recognized in the degree distribution of migration networks, it is possible to examine in detail the intrinsic characteristics, the topology of the networks (density, centralisation, distance between nodes, centre-periphery test), moreover it is also possible to draw conclusions on the nature of migration.

The density of a network¹¹ is the total number of existing ties divided by the total number of possible ties (each country would be linked to all other countries by migration).

¹¹ The density of a binary network is the total number of ties divided by the total number of possible ties. For a valued network it is the total of all values divided by the number of possible ties. The density of a network is simply the average value of the binary entries and so density and average value are the same. If the network or matrix has been partitioned this routine finds these values within and between the partitions. This is the same as finding the average value in each matrix block. The routine will perform the analysis for non-square matrices (Borgatti et al., 2002).

Table 4

Density of the migration network, 1990, 2017

Year	Density	Deviation (SD)
1990	0.033	0.789
2017	0.045	0.2072

Source: own calculation, based on the database of UN, 2017.

In 2017, density of the migration network was 4.5%. Connectivity is constantly increasing, migration assists in expanding relationships between countries and people's flow between countries is intensified. There is also migration between areas where there was no link in the past.

The applied programme used can help us calculate how far each country is on average through migration¹² (the geodesic distance between two countries is the length of the shortest migration route between them and the route between two points equals the number of contacts). For example, the distance between the USA and China is one because there is a person living in the USA who was born in China, however the distance of Albania and Afghanistan is two (there is no direct migration between the two countries), people migrate from Afghanistan to Italy and then from Italy to Albania. This peculiarity is asymmetrical for managed networks, the distance between Afghanistan and Albania is three: people move from Albania to Georgia, from Georgia to Tajikistan and then from there to Afghanistan.

The average distance between countries was 4.667 in 1990 and reduced to 4.075 in 2017. This also means that the interconnectedness of the countries is significant and has increased slightly during the period considered. Countries around the world have an average of 4 migration links, with nearly 21% of all potential pairs of countries directly or through another country. It implies that migration distances between countries are as small as that of the people¹³.

¹² The length of a path is the number of edges it contains. The distance between two nodes is the length of the shortest path. The distance matrix can be converted to a nearness matrix by taking reciprocals of the distances.

¹³ https://en.wikipedia.org/wiki/Six_degrees_of_separation

Table 4

Distance of migration between countries, 2001, 2017
(%)

Distance	1990	2017
1	4.8	6.3
2	12.1	15.0
3	16.8	20.3
4	18.5	20.0
5	16.7	17.9
6	12.2	10.8
7	7.5	5.4
8	4.6	2.5
9	3.0	1.1
10–15	3.8	0.7
Total	100.0	100.0

Source: own calculation, based on the database of UN, 2017.

With help of density within the migration network we can determined the considering centre and peripheral areas. This is based on an iterative procedure that divides the countries of the network into two parts in such a way that the density of the centre part is maximum¹⁴.

Table 6

Density rates of centre-peripheral areas, 2017

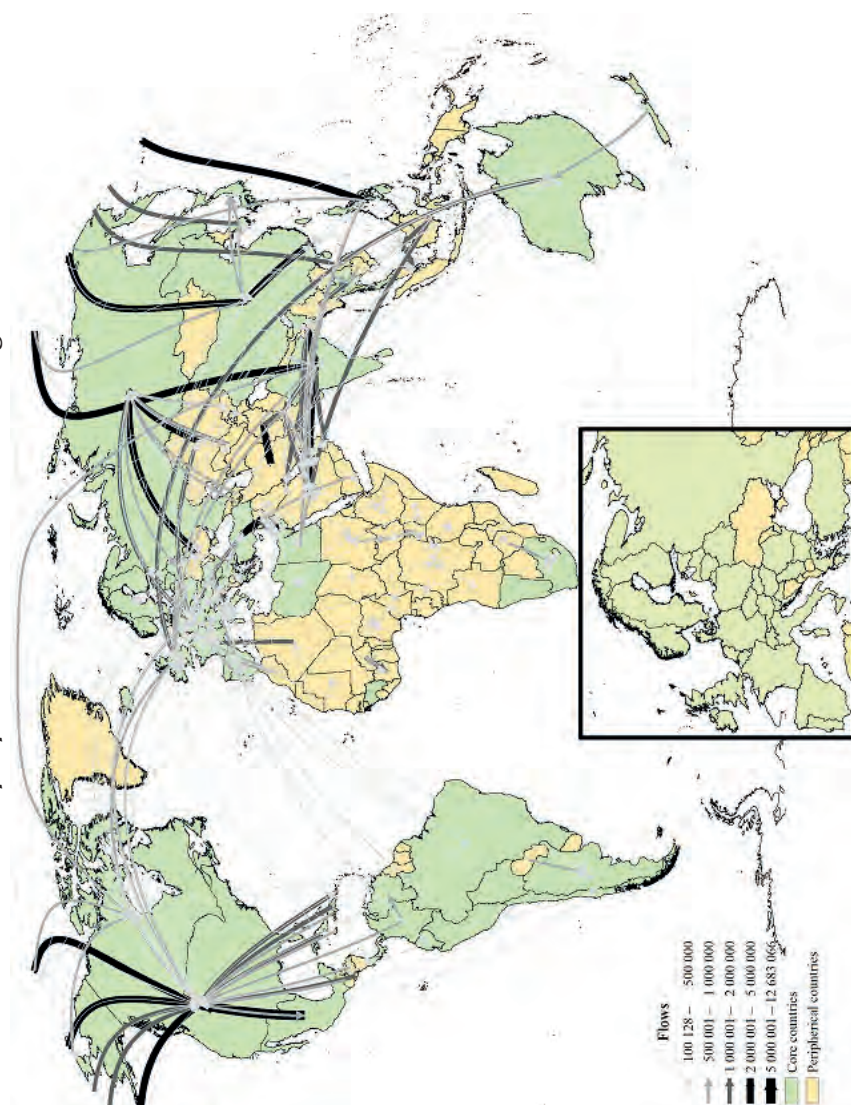
2017	Centrum	Periphery
Centrum	0.326	0.019
Periphery	0.102	0.022

Source: own calculation, based on the database of UN, 2017.

¹⁴ Fits a core/periphery model to the data network, and identifies which actors belong in the core and which belong in the periphery. The algorithm uses in-degree for binary data as a starting partition and eigenvector for valued data together with a number of random partitions. A hill climbing technique is used to improve the initial partitions and the best fit is reported. The fit function is the correlation between the permuted data matrix and an ideal structure matrix consisting of ones in the core block interactions and zeros in the peripheral block interactions (Borgatti et al., 2002).

Figure 7

Centre and peripheral areas in international migration, 2017



Source: own calculation, based on the database of UN, 2017.

According to the procedure, North America, the greater part of Europe, Australia, New Zealand, Israel, South Africa, Russia, Turkey, Philippines, Syria, Iraq, Lebanon and Sri Lanka belong to the core areas, while in this respect the other countries can be considered peripheral area. The links between the centre areas are strong, while there is almost no link between the other areas. On the other hand, there is a considerable migration from the peripheral area to the centre, the density of this is five times the rate of reverse movements.

While density expresses a general level of network cohesion, centralisation the extent to which connections are clustered around nodes. Centralization – or rationalization of the network – demonstrates how unequal is the distribution of the connections of the items (on a scale of 0–100, where 100 represents a fully centralized network). The analysis was also carried out on a directional and symmetrical network. The designation of outDegree refers to emigrations, while network inDegree to the analysis by immigrations, and in symmetrical cases the relationship between two countries is independent of the direction of migration.

Table 7

Centralization in migration networks, 1990, 2017

	(%)	
	1990	2017
Out degree	11.90	10.70
In degree	36.69	52.01
Symmetric	34.39	48.57

Source: own calculation, based on the database of UN, 2017.

Table 8

Characteristics of centrality analysis in case of directed and symmetric networks, 1990, 2017

Charac- teristics	1990			2017		
	OutDe- gree	InDegree	Degree	OutDe- gree	InDegree	Degree
Mean	7,621	7,621	15,241	10,384	10,384	20,767
Std Dev	6,196	12,925	14,083	8,041	19,248	20,167
Sum	1768	1768	3536	2409	2409	4818
Variance	38,391	167,054	198,321	64,659	370,495	406,704
SSQ	22380	52230	99904	40015	110969	194412
MCSSQ	8906,621	38756,621	46010,484	15000,857	85954,859	94355,43
Euc Norm	149,599	228,539	316,076	200,037	333,12	440,922
N of Obs	232	232	232	232	232	232

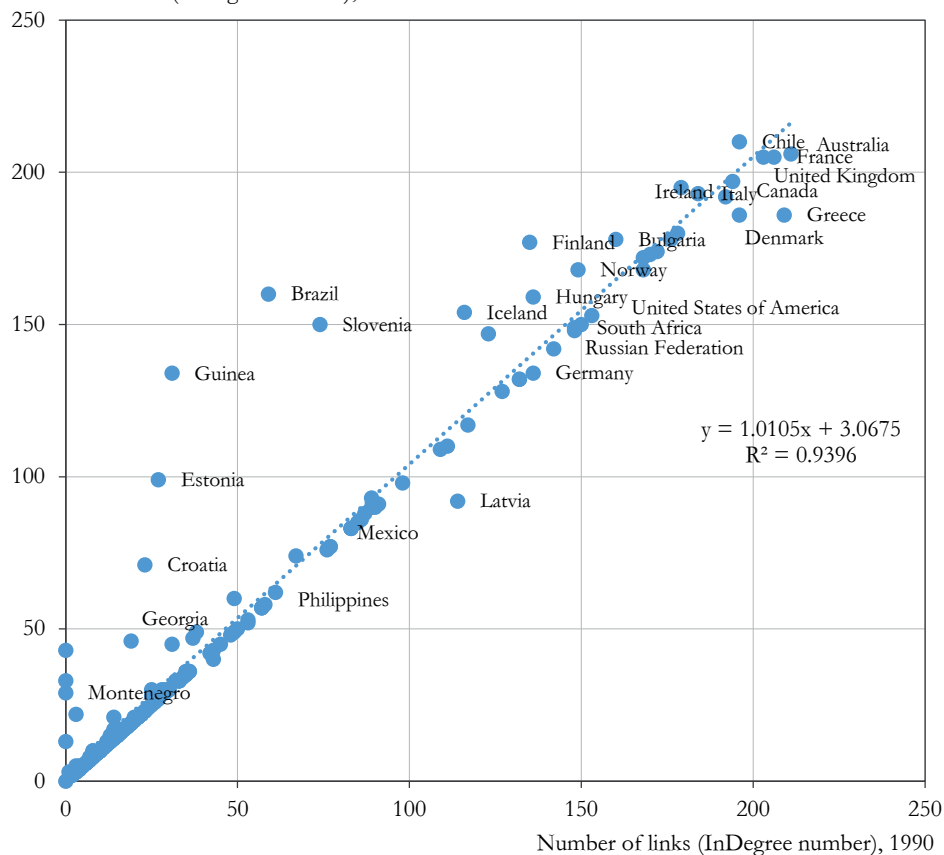
Source: own calculation, based on the database of UN, 2017.

Emigrations are much less concentrated than immigration. The moderately strong degree of centralisation shows that most countries have few links with other countries through migration (numerous small degree nodes), while few have many links. The network is, however not fully centralised and none of its members has an unlimited growing relationship collecting potential or monopoly. Furthermore there are several central elements of the network, and there is room for "link-enhancing competition" between the elements. After all, the connection within the network varies, some countries are more connected to others, while others may lose their attractive abilities. Examples of the former one are Guinea, Estonia, Brazil and Slovenia, while Latvia, Denmark or Greece are countries that have lost some of their attractiveness. This, nevertheless does not mean that it is also associated with a reduction in the number of migrants every time, as more people can arrive through fewer connections.

Figure 8

Number of migration source countries of a given country, 1990, 2017

Number of links (InDegree number), 2017



Source: own calculation, based on the database of UN, 2017.

The variance of the number of links in 2017 is explained by 94% of the number of links between the countries in 1990.

4 International migrants living in Hungary

4.1 The role of migration in Hungarian population development and in shaping the ethnic spatial structure

It is a fact that the processes involved in migratory movements have the potential to play a significant role in population development. This is especially true in the case of Hungary. The transformation of the Hungarian ethnic spatial structure since the conquest in the Carpathian Basin can be divided into four main periods. The first (in the period between the 10th and 15th centuries) mainly consisted of the settlement of non-inhabited areas and the Hungarian expansion that took place at the expense of other nations; the second (from the 16th to 18th centuries) was characterised by the significant decline of ethnic Hungarians as a result of the Ottoman (Turkish) occupation, the wars of liberation and the subsequent resettlement. In the third period, (from the 19th to the early 20th century), due to social factors which resulted from predominantly Hungarisation, the regeneration of the medieval Hungarian ethnic territories, the Hungarian ethnic expansion and the loss of territory of the other ethnics groups unfolded and accelerated, which could only be halted by the Trianon Peace Treaty and the division of the historical Hungarian state territory. In the fourth period, which is still in progress, within the territory of the Trianon country, an increased Hungarian ethnic advancement, past the Trianon borders, a general decline was observed in ethnic-territory Hungarians as Slovaks, Rusyns, Romanians, Serbs, Croats and Slovenians advanced. This was only interrupted by a short, temporary Hungarian ethnic expansion as the result of the revisions between 1938 and 1944 (Kocsis K, 2002, 2003, 2015; Kocsi K. et al., 2015).

The third demographic disaster¹⁵ was a turning point in the population development of Hungarians in the Carpathian Basin. After the Great War, due to the artificial intervention in the domestic

¹⁵ The first demographic disaster was the Tatar invasion; the second was the Ottoman occupation; and the third was the Trianon Peace Treaty, after the "Great War"; while the fourth was caused by the loss of World War II. Following the 1956 Revolution there was also a significant loss of population, but it is not measurable as in the four demographic catastrophes above.

population principles, what had been until the organic processes of population development (which helped through the first two disasters) were halted (Tóth P., 2018). In fact, the population development of Hungarians in the Carpathian Basin is interrelated; it was a mutually supportive dual process. One element of this process was the continuous population development determined by the fertility of the ethnically unified Hungarians, and modified by mortality. The other element of the process consisted of members of the other populations assimilating into the Hungarians. Within the framework of the “Hungarian Empire”, the results of both processes ensured the thriving growth of the Hungarian population beyond the natural rate, which enabled Hungarians to overcome their demographic disasters by 1918. This also means that following the third demographic disaster, in the case of Hungarians caught between the new borders, the practices of the pre-1918 period no longer, or just barely, determined the development of the Hungarian population. With the partition of the country the (domestic) movement that had worked until then came to a halt, by which non-Hungarians, or people of mixed nationalities who migrated to the central areas inhabited by a Hungarian majority, assimilated to those living there, increasing the numbers of Hungarians. After 1918, internal migration served only the territorial redistribution of the population; movements were made from the new border areas towards the centre (Tóth P., 2010, 2018).

The role of international migration in population replacement changed after 1918. As a result, the majority of “foreigners” migrating to the country (namely, the migration of Hungarians living in neighbouring countries to Hungary) did not increase the number of Hungarians, but only the number of Hungarians living in Hungary. With the changes to the borders, the people who until then had been counted as national residents; nowadays, international migration in the long term is no longer a matter of increasing population numbers of Hungarians within the Carpathian-Basin, but paradoxically, it plays (to strengthen assimilations) a number in reducing those numbers (Kocsis K. et al, 2015, Tóth P., 2018).

Nevertheless, it is important to recognise that at the core of the structure of their respective groups, the Hungarians living in Hungary

or Hungarian-speaking communities in neighbouring countries, the development of their structure is independent of each other only at first glance. All that is taking place in the area of demographic processes in Hungary, is only a part of the demographic processes of the Hungarian linguistic community, but is not equivalent (Tóth P., 2018, Dövényi Z., et al, 2008) to it.

4.2 Quantities and nationalities

Often times, international migrants living in Hungary are examined in simplified terms as foreign citizens residing in Hungary. Nevertheless, the population involved in migration is much larger and its structure much more nuanced.

If we examine the previously population only, we find that the number of foreign nationals in 2011, 143,197, increased by only 5.5% by 2017, when 151,132 foreign nationals lived in Hungary. Thanks to global migration trends, in 2017, for example, more Chinese citizens resided in Budapest than Romanians. However, this data needs further explanation.

When examining the effects and extent of immigration, we must not forget the effects of naturalization: Hungarian citizens who were born abroad but already reside in Hungary (the overwhelming majority were born abroad, as foreign citizens, and only became Hungarian citizens after migrating to Hungary; the smallest part of them were born abroad but already as Hungarian). Their number significantly exceeds that of foreign nationals. Together, the two groups mentioned cover the target population to be examined: the population of foreign origin living in Hungary (the group is composed of foreign citizens and Hungarian citizens born abroad). Within this group, the number of foreign citizens is showing steady decrease: from 37% in 2011 to 29% in 2017.

In 2017, the 'population of foreign origin' living in Hungary was already 521,258 (a 33% increase since 2011). Those emigrating Hungarians who returned to live to Hungary (127,000 people) are not included in this figure of the target population. These figures counter the statement that Hungary's international migration balance is negative (Melegh 2015; Juhász et al. 2017).

Table 9

Hungarian citizens born abroad and foreign nationals by major countries

Country of citizenship/ place of birth	2011			2017		
	Foreign citizens	Hungarians born abroad	Total of population of foreign origin	Foreign citizens	Hungarians born abroad	Total population of foreign origin
Romania	38 574	139 093	177 667	24 040	182387	206 427
Germany	16 987	7 294	24 281	18 627	16039	34 666
Slovakia	8 246	25 195	33 441	9 519	17376	26 895
Austria	3 936	2 897	6 833	4 021	7102	11 123
Great Britain	2 602	1 184	3 786	3 081	8578	11 659
France	2 201	1 123	3 324	2 523	2156	4 679
Netherlands	2 058	461	2 519	2 814	1208	4 022
EU28	85 414	183 761	269 175	76 270	248524	324 794
Ukraine	11 820	23 953	35 773	5 774	59272	65 046
Serbia	7 752	21 306	29 058	2 312	37497	39 809
Europe other	7 536	8 764	16 300	14 838	5 463	20 301
Europe total	112 522	237 785	350 307	99 194	350756	449 950
China	8852	939	9791	19 111	415	19 526
Vietnam	2358	728	3086	3 256	825	4 081
Iran	1 523	163	1 686	2 444	248	2 692
Asia other	9 571	2 930	12 501	15 126	5 051	20 177
Asia total	22 304	4 760	27 064	39 937	6539	46 476
United States	3 022	1 924	4 946	3198	5294	8 492
Canada	484	807	1 291	513	2218	2 731
America other	1 237	1 054	2 291	1 686	1 637	3 323
America total	4 743	3 785	8 528	5 397	9149	14 546
Nigeria	1 015	105	1 120	1475	192	1 667
Egypt	472	176	648	1182	567	1 749
Africa other	1 366	909	2 275	3 328	1 639	4 967
Africa total	2 853	1 190	4 043	5 985	2398	8 383
Australia and Oceania	775	350	1 125	619	1284	1 903
Total	143 197	247 870	391 067	151 132	370 126	521 258

Source: Hungarian Central Statistical Office (HCSO).

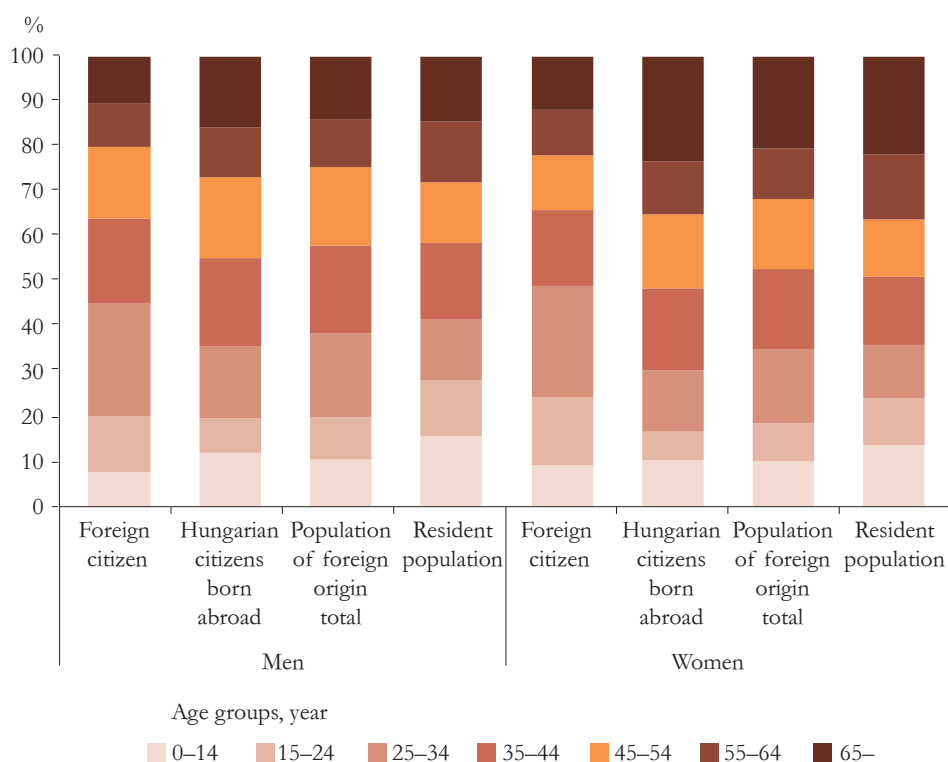
At the same time, it is important to note that the majority of the naturalized migrants arrive from neighboring countries. In 2011, 288,024 people living in Hungary had arrived from the Carpathian Basin countries. In 2017, their numbers increased by 22% (to 352,506 people, of which 313,000 were Hungarian). Today, the number of people born in Romania living in Hungary is higher than the total population of Debrecen, the second largest settlement in the country. During the period under review the neighboring countries saw a dynamic rise in numbers, the largest share of which was in the case of Ukrainian migrants, at 81%.

4.3 Demographic, educational and labour market characteristics

Most studies point out that in Hungary, the foreign population is younger than the autochthon, indigenous population (Gödri I., 2012); and therefore, migration has a rejuvenating effect. This statement is true for foreign citizens (38.8 years of average age), particularly for women. However, Hungarian nationals born abroad are older (43.9 years old) than local residents (41.7 years). During the years under review, the average age of the foreign-born population decreased significantly (from 47.1 in 2011 to 42.6 years old). Beyond this is the gradual loss (caused by death) of the immigrants who arrived after the regime change and who have since then grown old. The population not born in Hungary has fewer children, and overall they have a higher proportion of people at an economically active age. This holds particularly true for foreign citizens.

Figure 9

*The resident population and the population of foreign origin
by age groups, January 1, 2017*

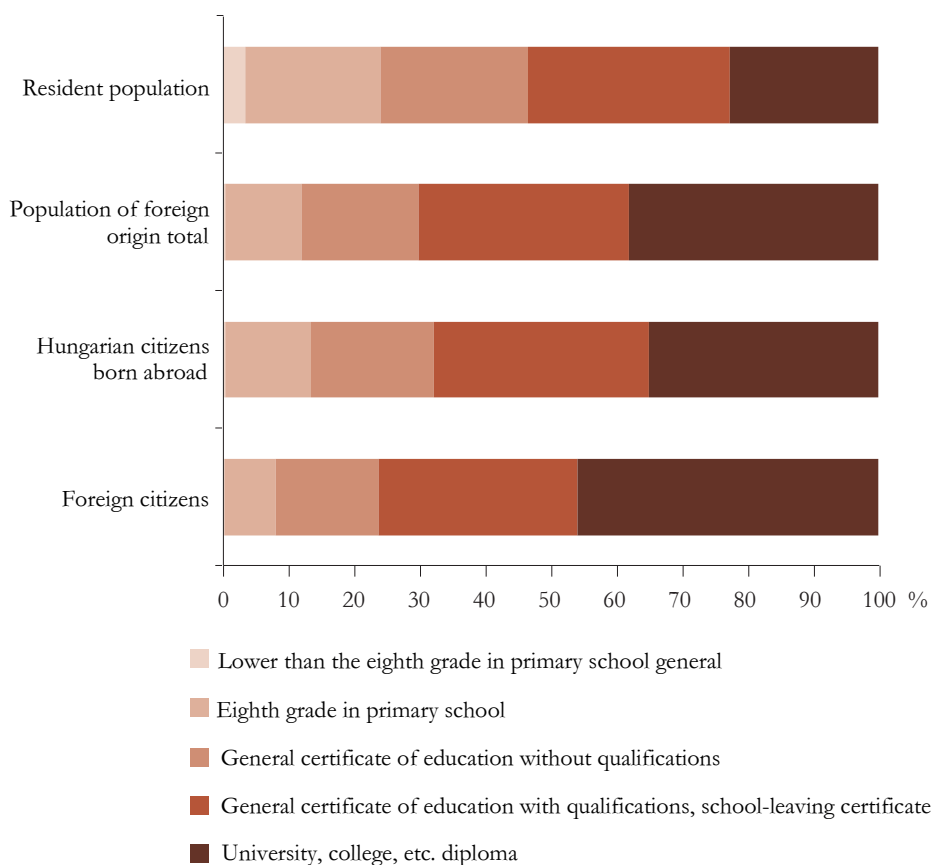


Source: own calculation, based on the database of UN, 2017.

The education levels of the population of foreign origin is higher than that of those born in Hungary: in 2017, the population of foreigners 24 years old and older living in Hungary is almost 46%; more than one third of Hungarian citizens born abroad had a higher education diploma. There are significant differences in education levels, which can be largely traced back to differences in age structure.

Figure 10

*Resident and population of foreign origin (25 years and older)
by education level, January 1, 2017*



Source: own calculation, based on the database of HCSO.

An association can be made between education levels and the high employment rate of international migrants since the change of regime in Hungary. The tendency in recent years has been that the economic activity of the resident population approaches that of the population of foreign origin, their unemployment rate being already more favourable than those of the other two groups examined. The majority of the economically inactive population receive either pension or childcare allowance. Both of these situations are more characteristic

of the autochthon population rather than of the population of foreign origin. Within the group of dependents, one tenth of the population are full-time students, while the rate for international migrants is significantly higher, ranging from 14 to 23%.

Table 10

The distribution of 25–64 year old international migrants and residents by economic activity, 2017

(%)

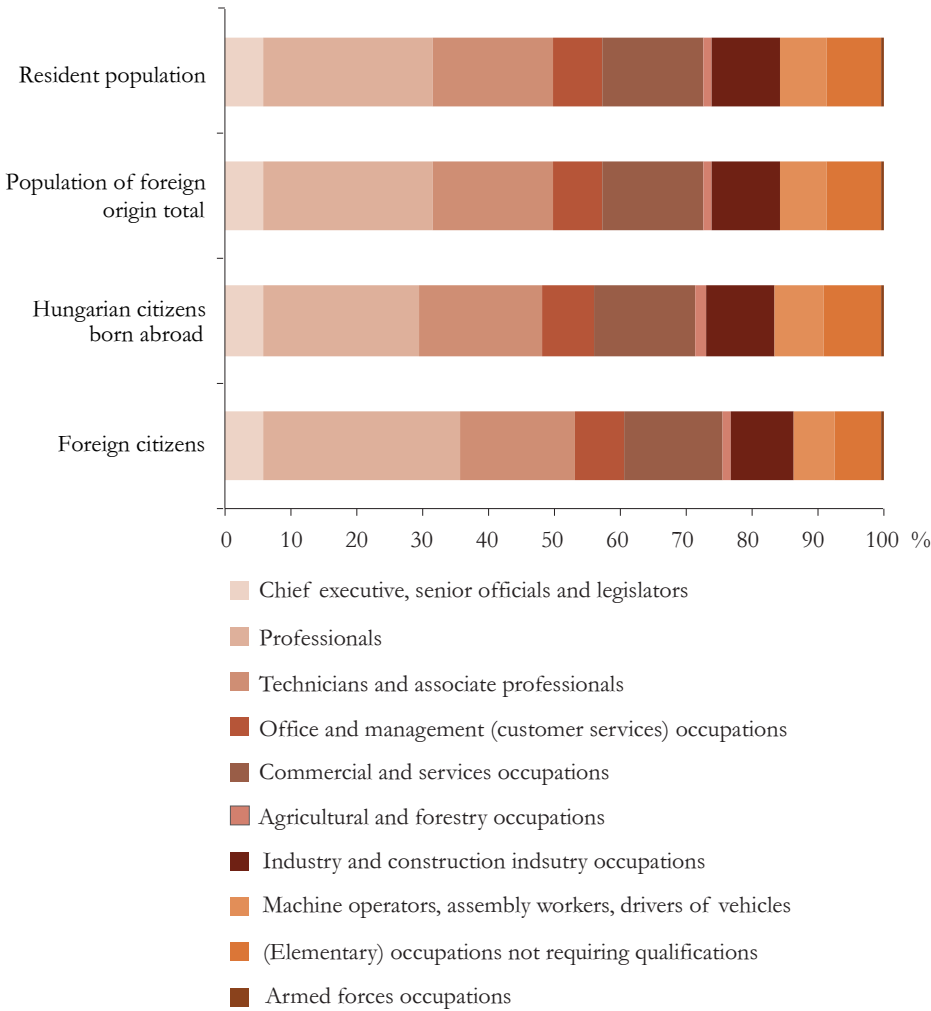
Economic activity	Foreign citizens	Hungarian citizens born abroad	Total population of foreign origin	Resident population
Employed	81.3	80.2	80.5	75.1
Unemployed	3.8	3.7	3.8	3.5
Total, economically active population	85.1	83.9	84.3	78.6
Economically inactive	7.6	11.0	10.0	17.3
Dependent	7.3	5.1	5.7	4.1
Total, economically inactive population	14.9	16.1	15.7	21.4
Total	100.0	100.0	100.0	100.0

Source: own calculation, based on the database of HCSO.

In terms of current and previous occupations, foreign citizens are slightly overrepresented in occupations in professionals requiring higher education compared to the resident population, which is predestined by the high proportion of those with higher education. Overall, the distribution of the foreign origin population by occupation is not significantly different from that of the resident population, which indicates that market demand has become decisive in Hungary in the recent period, to which the labour supply is adapting.

Figure 11

The distribution of 25–64 year old international migrants and resident population by occupational groups, 2017



Source: own calculation, based on the database of HCSO.

4.4 Territorial characteristics

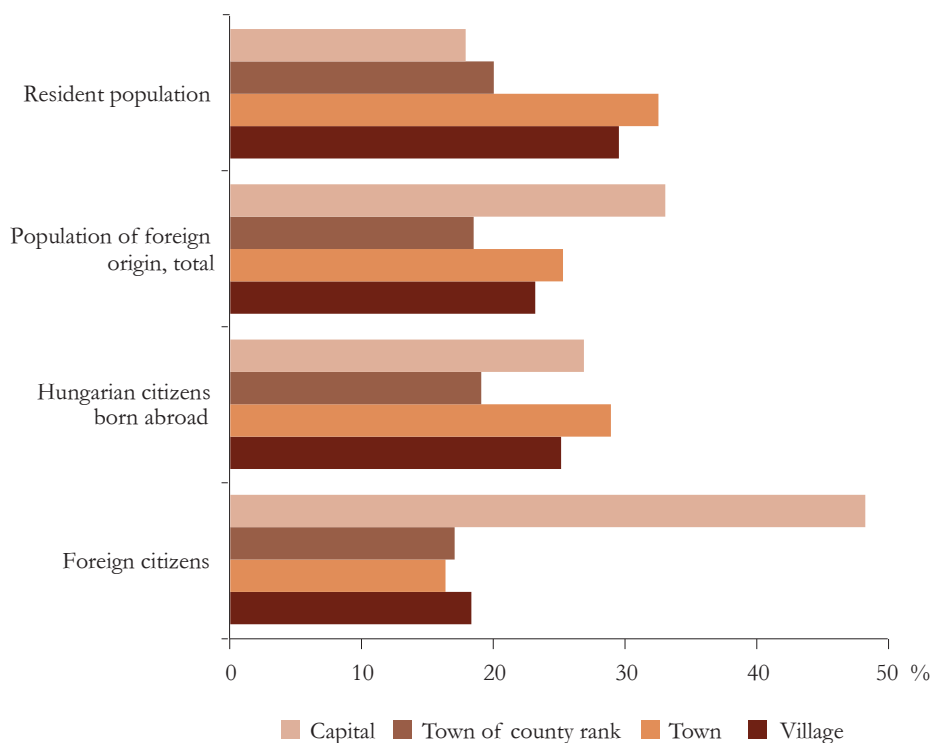
In the case of internal migration, it is true that social groups with better labour market positions migrate to regions that feature higher economic indicators, better image, and higher positions in the settlement hierarchy (Bálint L. et al., 2017). This also strengthens the

differences in the spatial social structure and the territorial separation of different prestigious social groups.

These findings are only partially characteristic of international migration. In addition to income opportunities, a more important role is played by the territorial location of the destinations and the natural environment (Dövényi Z., 2011). Therefore, the spatial distribution of the population of foreign origin is different than the distribution of the Hungarian-born population; thus, their influence is higher in the areas they prefer than in the national context.

Figure 12

Distribution of the population of foreign origin and resident population by current residence status, 2017



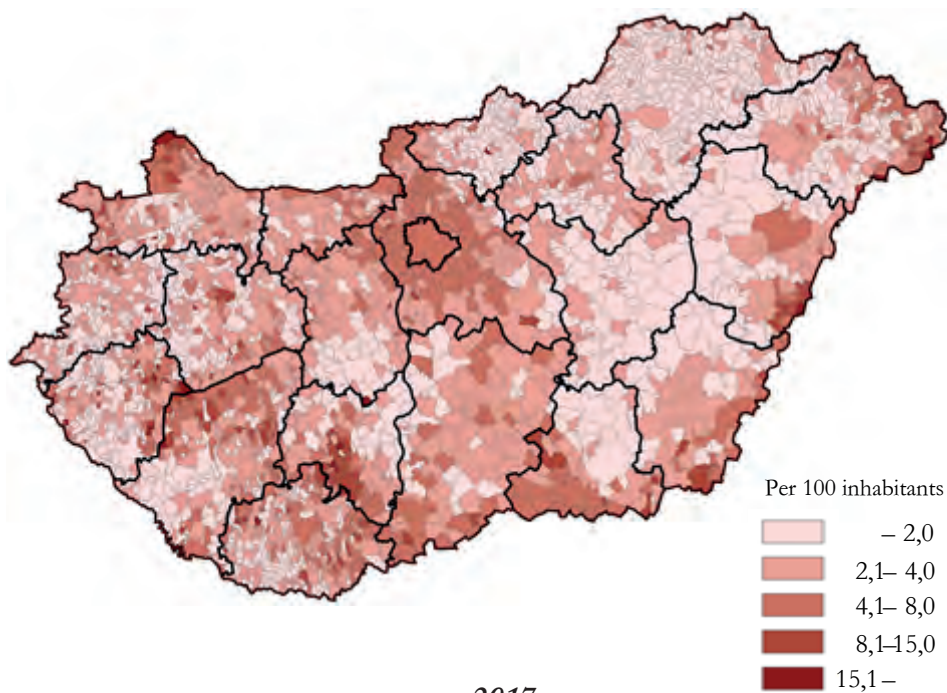
Source: own calculation, based on the database of HCSO.

Through the lens of migration, three regions exceed in which the examined migration groups are permanently and generally present in a larger numbers and proportion in Hungary: Central Hungary, the areas near the border and the Lake Balaton region.

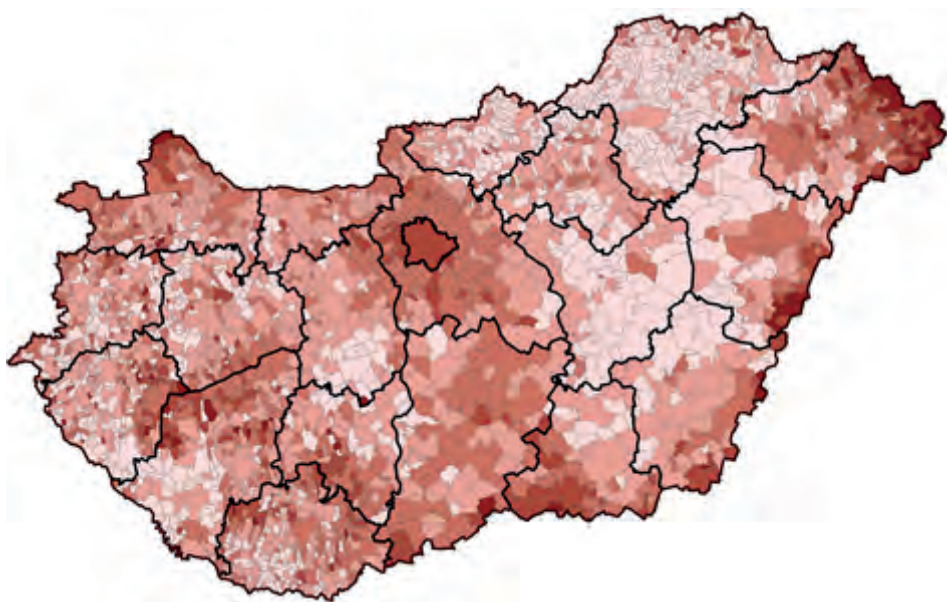
Figure 13

Proportion of population of foreign origin per 100 inhabitants

2011



2017

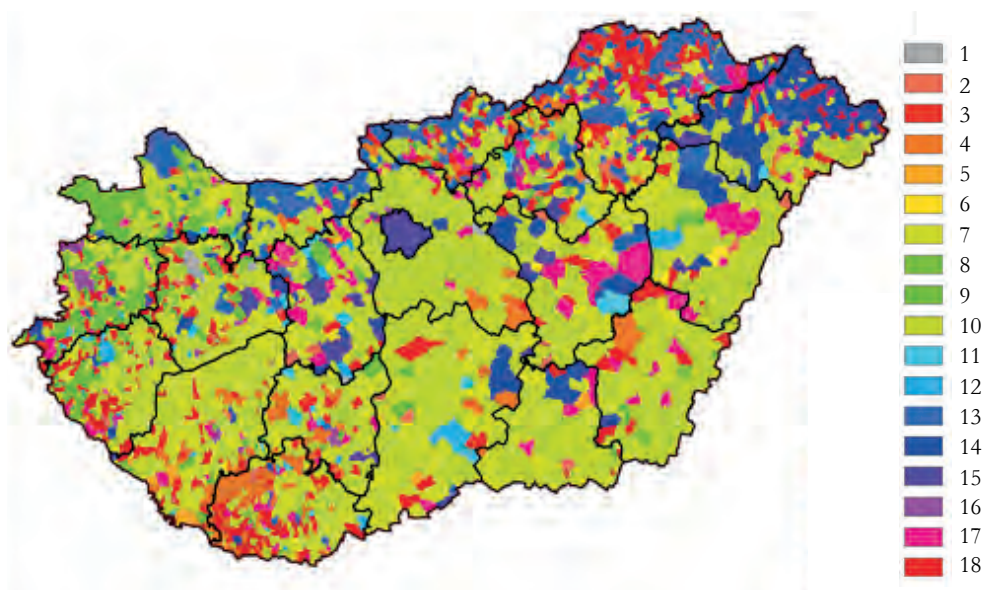


Source: own calculation, based on the database of HCSO.

Budapest and the Pest County attract people from a greater distance, and the majority of non-European foreigners live here. Many of them are employed, younger on average, and have higher education. It is primarily economically active, highly qualified foreign citizens who settle down here. Over the past ten years, Budapest has become a global destination for migration. Nationwide, the proportion of foreign citizens making national income statements (no data are available for Hungarian citizens born abroad) is close to 2% of the resident population. They account for more than 3% of the income tax. In Central Hungary, these ratios are higher than 5%.

Figure 14

Hungary's settlements in order of most foreign citizens living there, 2017



Notes: 1 = American; 2 = English; 3 = Belgian; 4 = Dutch; 5 = Croatian; 6 = Polish; 7 = German; 8 = Italian; 9 = Austrian; 10 = Romanian; 11 = Swiss; 12 = Serbian; 13 = Slovak; 14 = Ukrainian; 15 = Chinese; 16 = Russian; 17 = other; 18 = no foreigners.

Source: own calculation, based on the database of HCSO.

In Hungary, where the majority of foreign citizens still continue to arrive from neighbouring countries, the location of the target areas also plays a decisive role in the distribution of the foreign population. Therefore, in making a choice of a new place of residence the border

regions also play an important role, in addition to the economic centres. In these settlements, the composition of citizenships is not as diverse; rather, most of the foreigners simply arrive from the other side of the border.

The region of Lake Balaton is chosen mainly by German, Austrian, Dutch, and Swiss pensioners; older people usually choose this area because their pensions provide them with higher purchasing power, as well as for the recreational opportunities and the value of a natural environment. In many cases, foreigners come as tourists before migrating (Kincses Á. et al., 2014) and then arrive having already detailed information about the target areas. The volume of elderly migration increased significantly in the period under review.

5. The Carpathian basin's territory sources of international migration to Hungary

5.1 Identifying the source territories

From a demographic, economic, social and geographic perspective, the focus of research on migration in Hungary is primarily on the impact in the receiving areas. Reasons are twofold. Analysing the consequences in Hungary requires this approach, on the other hand, emigration areas are difficult to identify for the most part, which makes research on the Carpathian Basin more difficult. Using official statistics, data links and classifications described in chapter 2 allow the elimination of this omission to study the wider migration processes, since demographic processes are not worth examining only within the current borders of the country. Therefore, the primary goal is to explore the migration source areas in the neighbouring countries, to learn more about the effects in the areas that send migrants, and to explore the overall picture of the situation in the Carpathian Basin between 2011 and 2017. Since, in case of foreigners or someone being already a Hungarian citizen, the observation of the effects of emigration is not relevant, the foreign origin population was considered collectively.

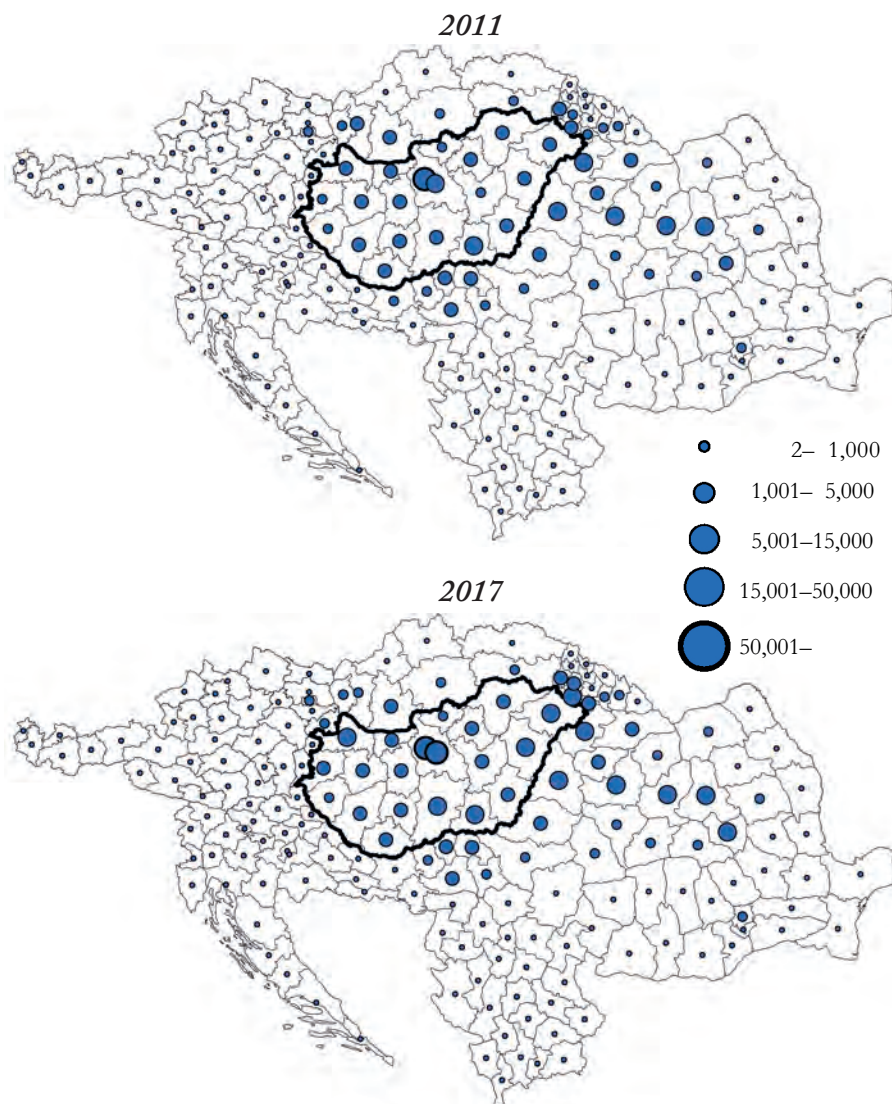
The migration processes are examined below according to the original place of birth (Romania, Ukraine, Serbia etc.) and the demographic, sociological and labour market variables of the migrants. The territory level of the study is the county (NUTS3). The latter territorial classification is available in most neighbouring countries, with the exception of Ukraine, where no such classification exists. The oblast level is more integrated, while the rajon is more detailed than this (Mezencev K., 2010). Since within Ukraine Transcarpathia has the most notable role (since the vast majority of those arriving from Ukraine originate from here), I used the finest classification.

In 2017, the population of foreign origin from Hungary's neighbouring countries living in Hungary was 352,506. Of these, 7,131 were born in Hungary, and 560 of them had never seen daylight in their country of nationality (for example, Romanian citizens born in Germany, or Serbian citizens born in Sweden). Thus, a total of

344,815 people who were born in one of the neighbouring countries (regardless of nationality) lived in Hungary in 2017. This represents a 24% increase compared to 2011.

Figure 15

*Population of foreign origin from the neighbouring countries living in Hungary by birth regions**



* The map displays the places of birth in the neighbouring countries of citizens living in Hungary, while in the Hungarian parts, one can see those who live in a given county but were born in nearby countries (I have used this solution on all the following maps of this book).

Source: own calculation, based on the database of HCSO.

On January 1, 2011, the majority of the population born abroad but now living in Hungary had been born in the counties of Mures (27,879 persons), Bihor (27,374 persons), Hargita (26 439 persons), Cluj (21,667 persons), Satu Mare (17,102 persons), in the Nitriansky kraj (13,742 persons), Covasna county (10,821 persons), Berehove rajon (9,301 persons), Severnobački okrug (8 877 persons), Uzhhorod rajon (7,958 persons) and the Severnobanatski okrug (7,668 persons). These are the Romanian, Transcarpathian, Vojvodina and Slovak areas where the proportion of Hungarian nationals is high (Kapitány 2015).

By 2017, only the order of the five major Transylvanian counties had changed (Hargita 35,613, Mures 32,433, Bihor 31,587, Satu Mare 20,075, and Cluj 19,540). The rest of the major source areas were Berehove rajon (19,429 persons), Covasna County (17,021), Severnobački okrug (12,769), Uzhhorod rajon (12,410), Severnobanatski okrug (11,687), Vynohradiv rajon (11,628) and the Nitriansky kraj (10,286)¹⁶.

From the major source regions, the areas where the 'emitting' role was strengthened for the years under review were Transcarpathia (at rajons level: Vynohradiv: 259%, Berehove: 209%, Mukachevo: 177%, Khust: 159%, Uzhhorod: 156%, Tiachiv: 131%), as well as the Bacau (243%) and Covasna (157%) counties.

For the following, more detailed, examinations, the regions of the surrounding countries into groups were organized. Romania's counties were divided into three parts. The first group is located near the border counties (Arad, Bihor, Caras Severin, Maramures, Salaj, Satu Mare, Timis); the second group is composed of the Transylvanian regions (Alba, Bistrita Nasaud, Brasov, Cluj, Covasna, Hargita, Mures, Hunedoara, Sibiu), and the third is composed of other individual territories.

There was distinguished between three different groups in the case of Ukraine, covering all the Ukrainian settlements in a complete but disjointed mode. In the first class, the districts near the border were categorized: rajons of Berehove, Mukachevo, Vynohradiv and Uzhhorod. The second group is the Carpathian mountainous area, the mostly inhabited by Rusyn rajons of Velykyi Bereznyi and Perechyn, and the region of Boykos – including the rajon of Svaliava, Volovets,

¹⁶ Table 10 of the study contains the number of Hungarians living in the Carpathian Basin by county.

Irshava and Mizhhiria –, in addition to the Hutsul region – Rakhiv district – and the Maramures Basin – the Khust and Tiachiv rajons. The third group consists of Ukraine's internal territory, beyond the Carpathian Mountains.

Serbia was also divided into three units. The first category covers Severnobački, Severnobanatski and Zapadnobački okrugs, all near the border; the second includes the areas of Južnobački, Južnobanatski and Sremski, while the third group consists of other territories, namely Serbian territories outside of Vojvodina.

The residences in Slovakia were broken down two parts. The first includes the krajs near the border (Banskobystrický, Nitriansky, Trnavský and Košický); the second covers the rest of the areas (Prešovský, Bratislavský, Trenčiansky, Žilinský).

In Austria three categories were distinguished. The first is Burgenland, the second covers the regions near the border (Vienna, Lower Austria and Styria), and the third includes the rest of the territory (Tirol, Salzburg, Vorarlberg, Carinthia and Upper Austria). Two categories were used for Croatia and Slovenia, respectively. In Croatia, the first group included the border counties (Osječko-baranjska, Koprivničko-križevačka, Međimurje, Virovitičko-podravska, Vukovarsko-srijemska), and the second the rest of the territory. In Slovenia, the first group included the Pomurska County by the border, while the second included the rest of the territory.

5.2 Demographic, labour market and sociological characteristics of population of foreign origin in relation to birth regions

In Hungary, the gender proportions of international migrants indicate an increase among women (Gödri I., 2011). However, the rate is not based on unified source regions, and strong territorial differences can be detected. The proportion of women born in the counties adjacent to Hungary is stable at 55–56%. Arrivals from Romania, Slovakia and Ukraine are also characterised by a surplus of women, which in the case of south Slovakia is almost two thirds. Serbia and Slovenia have a mild male surplus, although in the case of migrants from Vojvodina,

women are overrepresented; meanwhile, a strong male surplus can be measured in the rest of Serbia. In the case of Croatian and Austrian-born migrants, the gender rate is balanced.

The data for both 2011 and 2017 confirm that the average age of foreign citizens living in Hungary from western Slovakia, southern Serbia, and Romania (not including Transylvania) are among the highest, in many cases well above the 50 years average.

The proportion of people over the age of 65 is highest in those arriving from Slovakia, Romania (not including Transylvania), and the western provinces of Austria. The latter case is due to the higher purchasing power of pensions and the search for a more natural living environment (for example, in Hévíz) (Illés S., 2008). Behind the other cases is the aging of immigrants, as well as the possibility of higher social and health care in Hungary. Those 65 years or older population arriving from Ukraine is over 8,000. According to Hungarian law, they are eligible to receive their pension according to the Hungarian calculation, which is higher than what they would receive in Ukraine (Gellérné L. É. – Szigeti B., 2005)¹⁷.

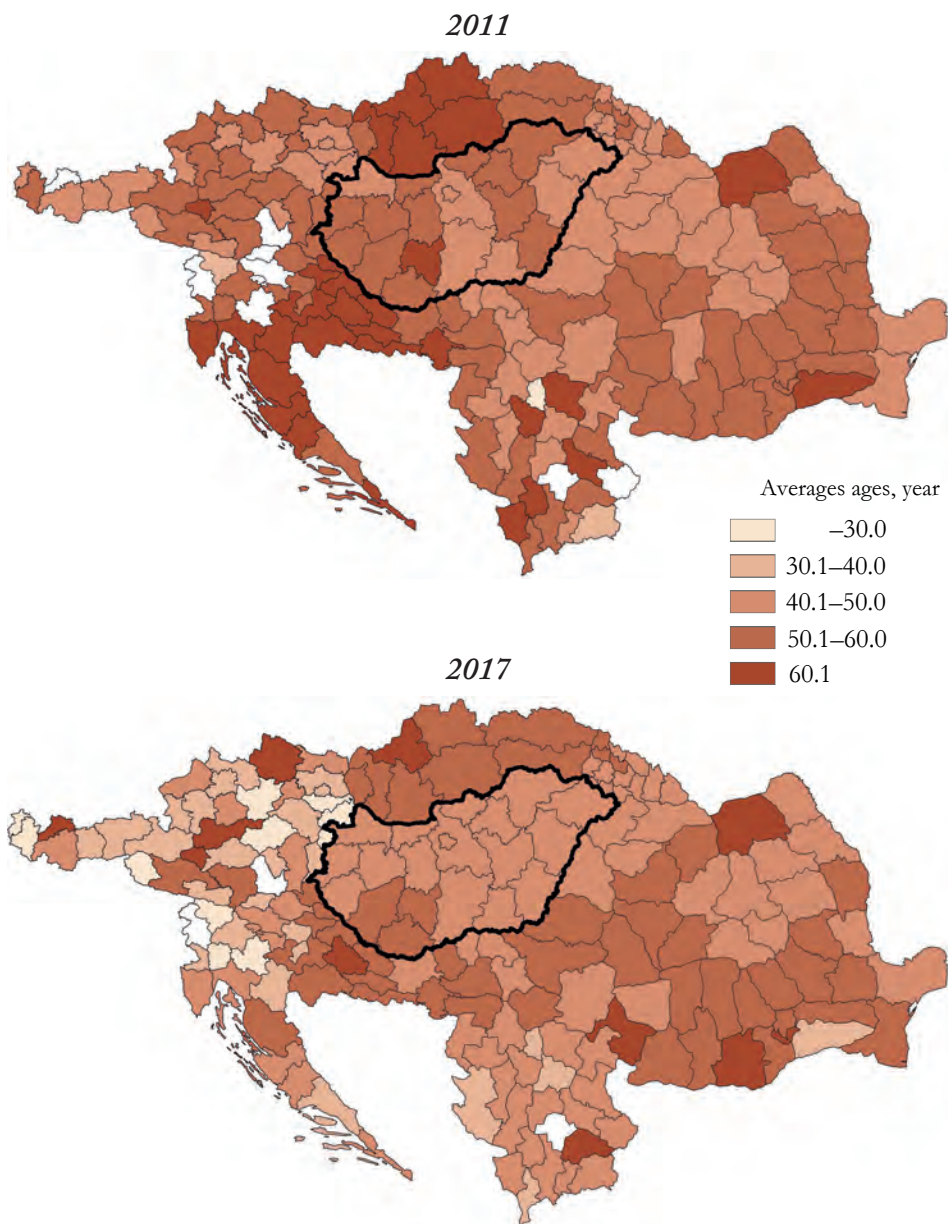
The highest proportion of young people arrive from Austria, Ukraine and Slovenia. This is partially explained by education-oriented migration. In the case of Austria, it is important to mention that the statistics are likely to detect the immigration of Hungarian children born abroad whose families had previously emigrated from Hungary, and later returned with their young children.

The proportion of working age people, from 25 to 64 years old, is highest for those arriving from Transcarpathia, Transylvania and Northern Vojvodina. It is generally true that among the migrants born near the border, more tend to be retired or young, while migrants arriving from larger distances are more typically of working age.

¹⁷ Hungary has territorially-based, valid and functioning bilateral social policy agreements with formerly socialist countries since the 1960s. The conventions are applicable when the natural person concerned is a habitual resident in one of the contracting states. The benefits are calculated based on the length of service in both territories and established by the social security body of the country in which the individual is a habitual resident, in accordance with its internal legislation. These agreements were based on what was then a realistic assumption that international migration between the countries would be low. The states provide nearly the same level of service; therefore, the burden is roughly equal between the contracting states (Gellérné L. É. – Szigeti B., 2005).

Figure 16

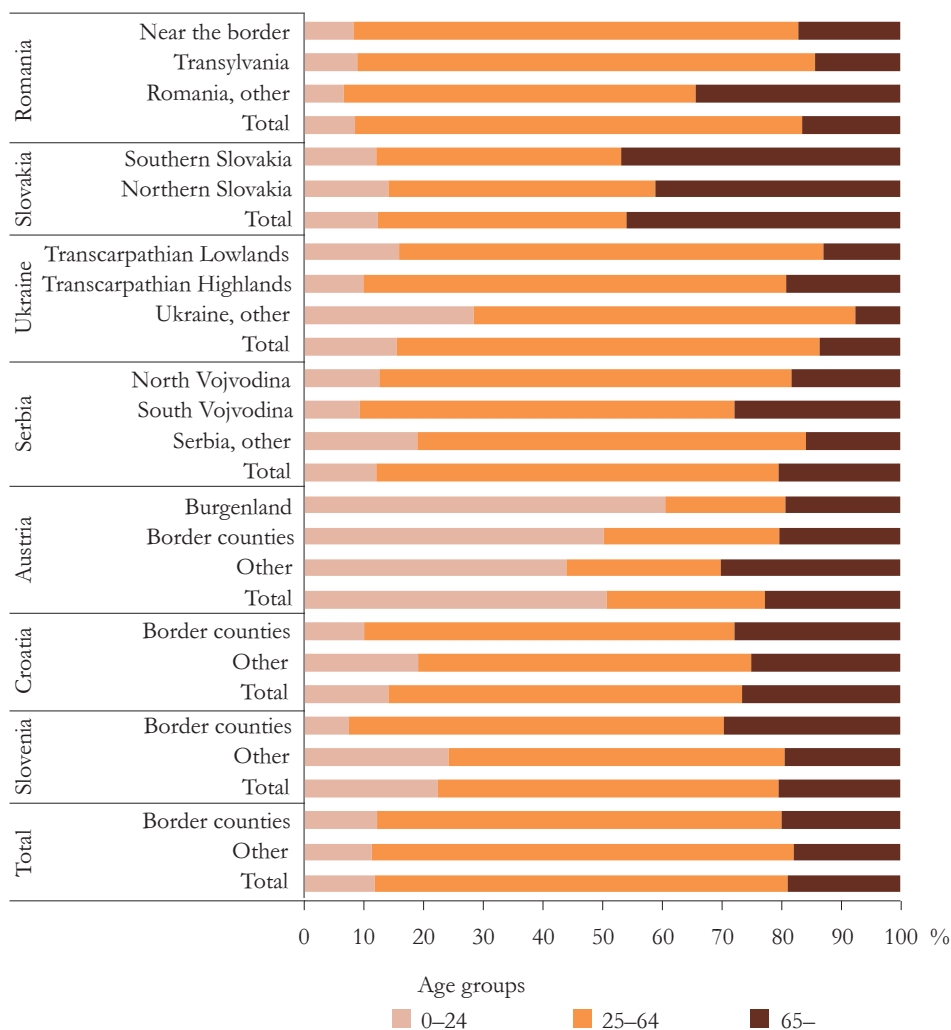
Population of foreign origin from the neighbouring countries living in Hungary by birth regions and average ages



Source: own calculation, based on the database of HCSO.

Figure 17

Distribution of the population of foreign origin from the neighbouring countries living in Hungary by age groups, by region of birth, 2017



Source: own calculation, based on the database of HCSO.

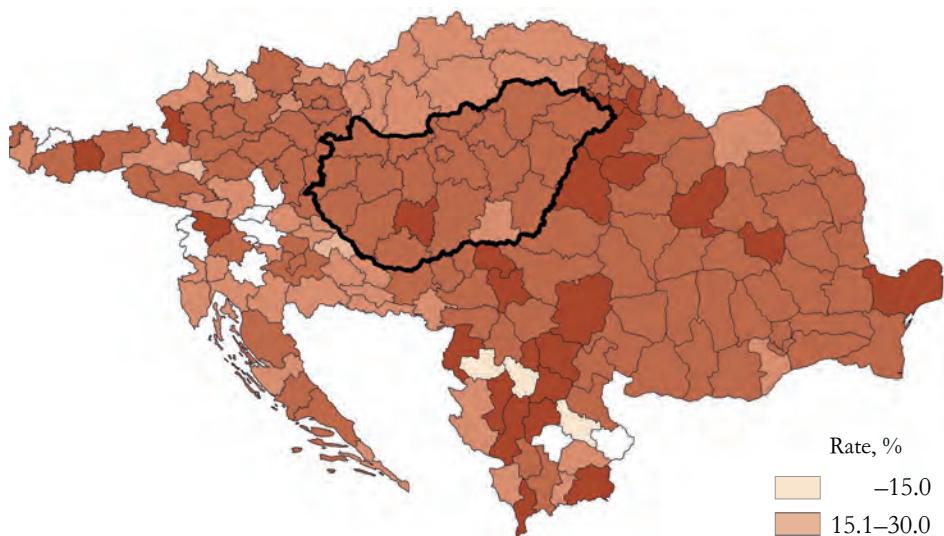
Examining the phenomenon by family type, we can see that the number of households without children is declining as the average age of migrants decreases. By 2017, the proportion of households of foreign origin with children increased to 61%; that is, family reunification and the migration of whole families increased in the examined years. Due to

the higher proportion of elderly people, people arriving from Slovakia usually live in childless households.

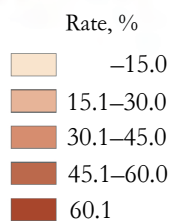
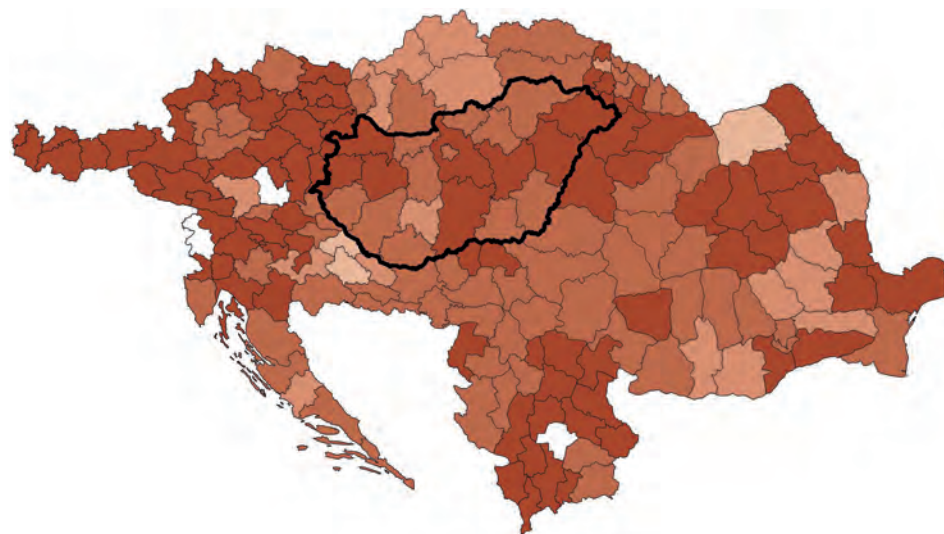
Figure 18

Population of foreign origin living in Hungary by region of birth and the proportion of households raising children

2011



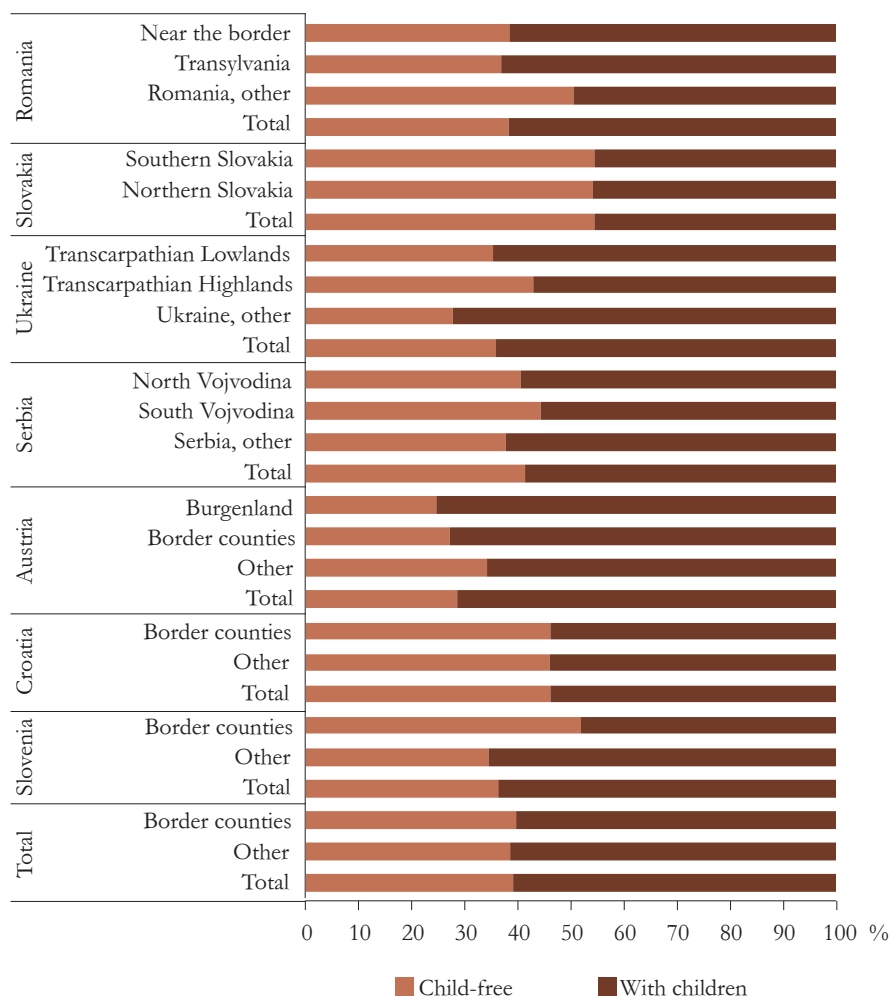
2017



Source: own calculation, based on the database of HCSO.

Figure 19

*Population of foreign origin from the neighbouring countries,
living in Hungary, by family type and region of birth, 2017*



Source: own calculation, based on the database of HCSO.

The main feature of international migration to Hungary is that the majority of the immigrating population is either of Hungarian nationality or is a native speaker of Hungarian. The strength of the linguistic and cultural relations extending beyond the borders is primarily the result of the peace treaties that ended World War I and

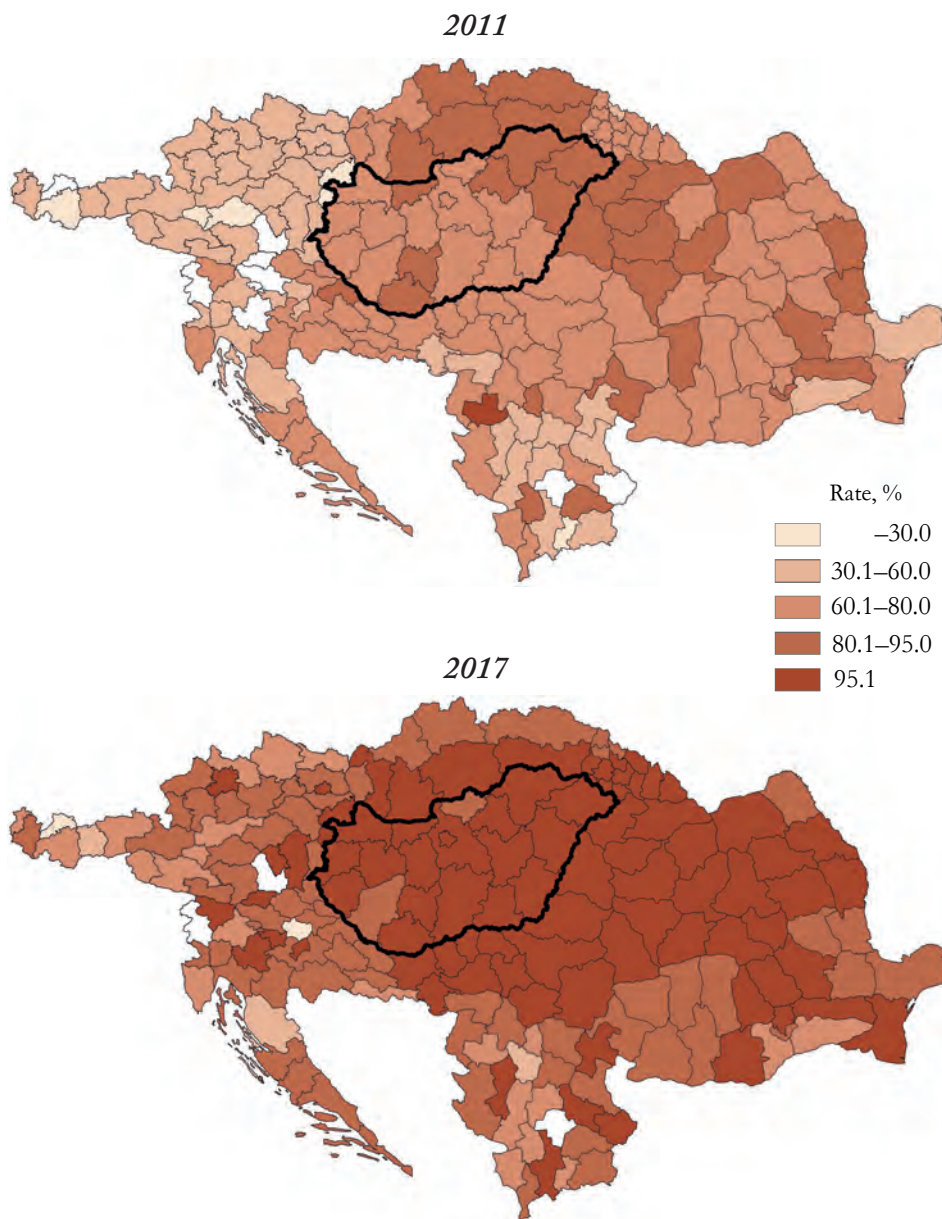
World War II. This determinism is steadily, but slowly, decreasing. The main reason for the decline is that the weight of the neighbouring countries is dropping within the population of foreign origin.

In 2011, the proportion of non-Hungarian native speakers from the countries of the Carpathian Basin was 14%; in 2017, this figure was at around 3%. Behind this change may be the assimilation of non-Hungarian ethnic groups (namely, some of those who were already living in Hungary in 2011 did not declare themselves ethnically Hungarian at that time, but did so in 2017)¹⁸. It is possible to identify the demographic processes behind the phenomenon in the period before 1918. The proportion of non-Hungarian native speakers is higher in those arriving from Ukraine (not including the Transcarpathian regions), Northern Slovakia, Serbia (not including Vojvodina), as well as in Austria, Croatia and Slovenia. In the case of Ukraine, the prominent value can be linked to the Russian-Ukrainian conflict that has been protracted since 2014, the economic and social crisis, and uncertainty (Karácsonyi D. et al., 2014).

18 The most reliable data on Northern Transylvania's diaspora (and generally outside of the borders of Trianon) comes from the period before World War II. In 1941, 779,829 people lived in these settlements, among them 124,748 declared themselves Hungarians, 572,000 Romanian, close to 25,000 Germans, and 58,000 said they were of another nationality (Tóth P, 1999). Currently, in 47 of these 709 settlements live Hungarians as a majority; the largest number of people are residing in Érmihályfalva (7.971). At the same time, there are 14 settlements on the list (30% of these settlements), where the number of departing Hungarians to Hungary has overtaken the 1941 Hungarian population. This also indicates that the plurality of identities and the assimilation to Hungarians are still alive in the Carpathian Basin.

Figure 20

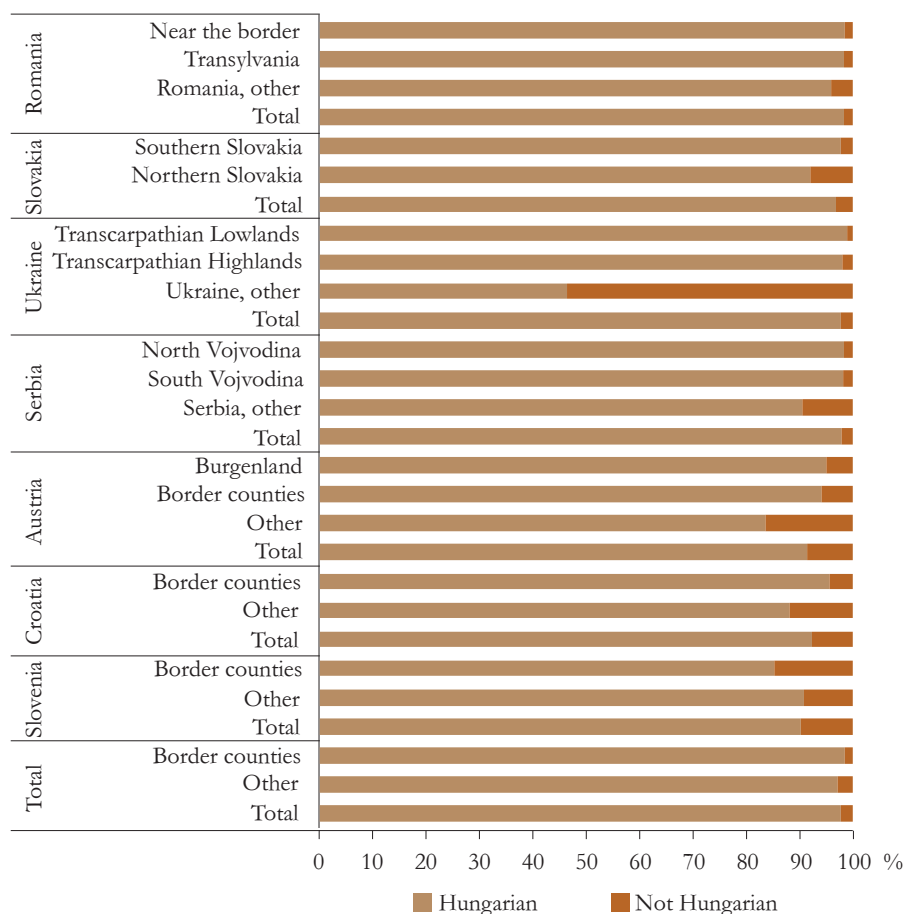
*Population of foreign origin from the neighbouring countries,
living in Hungary, by region of birth and the proportion of
Hungarian native speakers*



Source: own calculation, based on the database of HCSO.

Figure 21

Population of foreign origin from the neighbouring countries, living in Hungary, by native language and region of birth, 2017

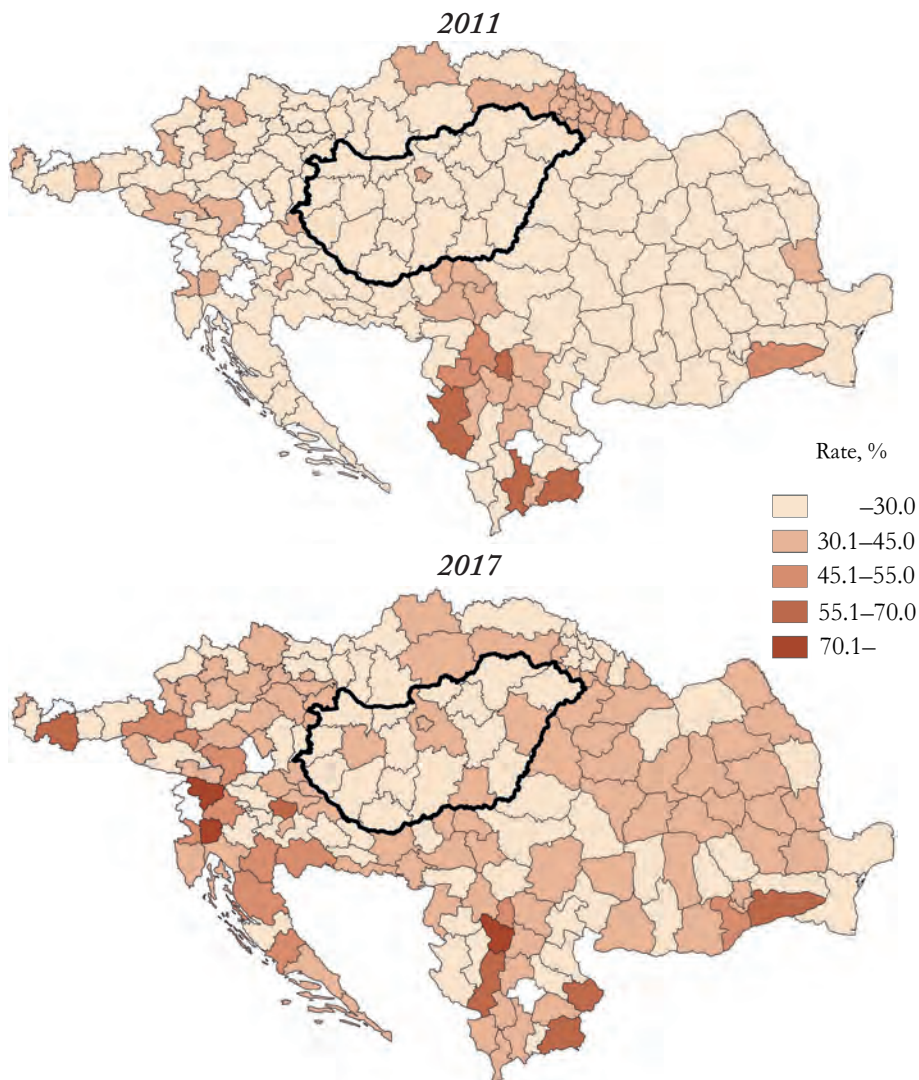


Source: own calculation, based on the database of HCSO.

In Hungary, international migrants have, on average, a higher education level than the resident population (Rédei M., 2007). This is equally true for the citizens of the neighbouring countries. In 2011, more than half of the resident population aged 25 or older in Hungary had at least graduated high school; this proportion was 68% for those arriving from the neighbouring countries. Educational qualifications are on a constant increase; meanwhile, there are no major territorial differences in the regional distribution of degrees.

Figure 22

Population of foreign origin from the neighbouring countries living in Hungary, of age 25 or older, by higher education and region of birth

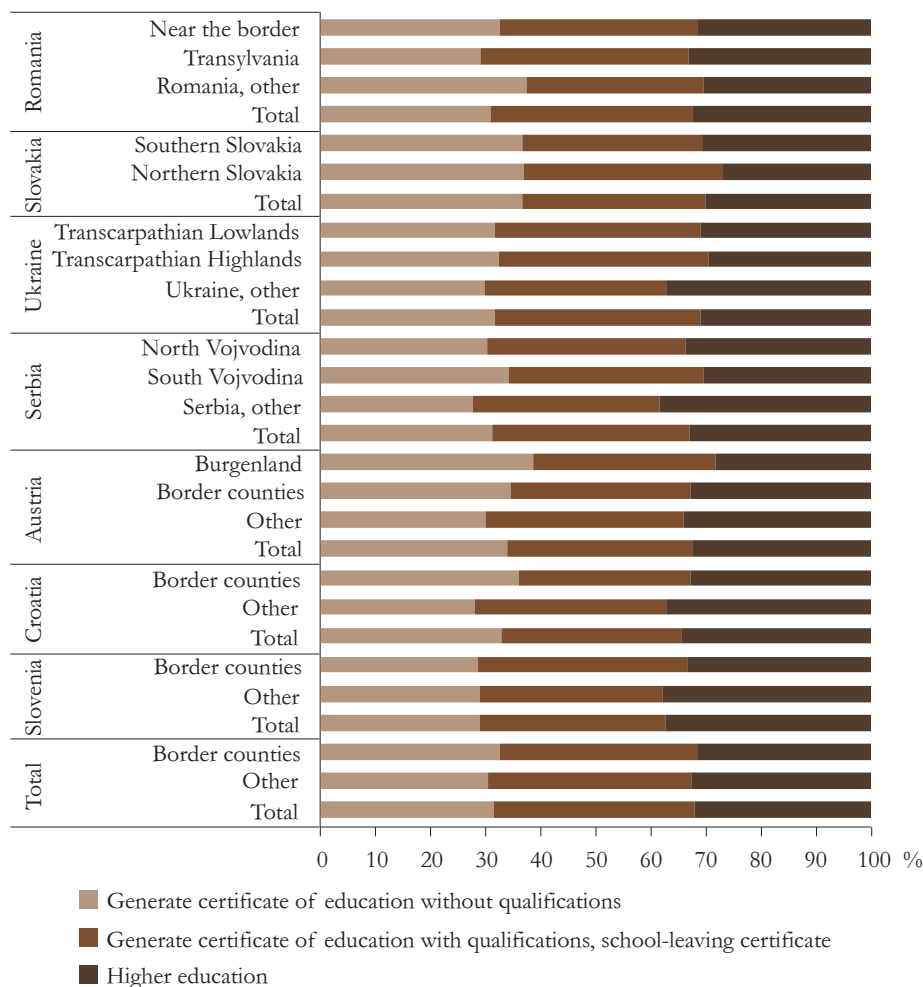


Source: own calculation, based on the database of HCSO.

Today, it seems that the decades-old rule that the potential impact area of migration increases along with education has been partly overthrown (Rédei M., 2007). Nowadays, in the case of longer-distance migration, those with the lowest levels of education participate in a higher proportion compared to their counterparts who migrate from a smaller distance.

Figure 23

Population of foreign origin from the neighbouring countries living in Hungary, of age 25 or older, by education level and region of birth, 2017



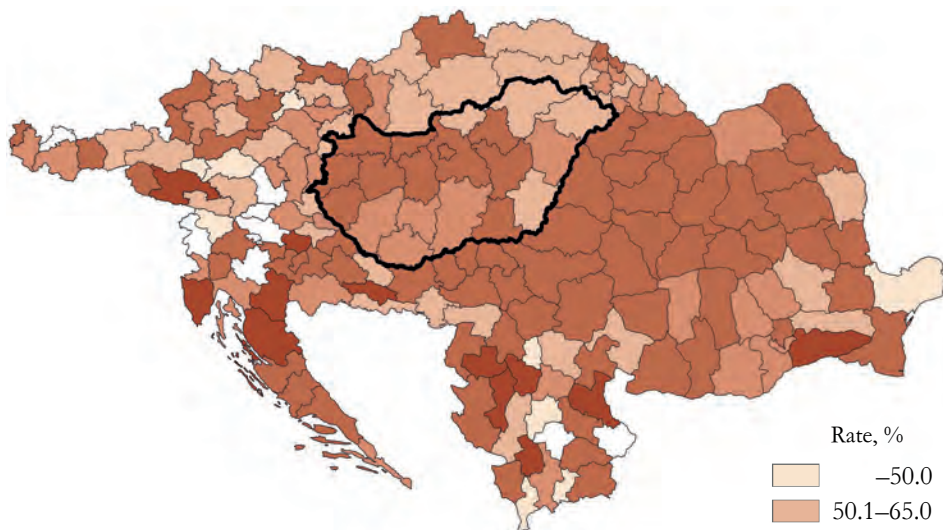
Source: own calculation, based on the database of HCSO.

In the cases of Romania, Transcarpathia, Austria, and Slovakia there is no significant correlation between the distance from the place of birth to the border and the level of education; while in the rest of the neighbouring countries the proportion of high level degrees increases with the distance from the border. Those coming from the furthest away are coming, on average, from places with higher levels of high education.

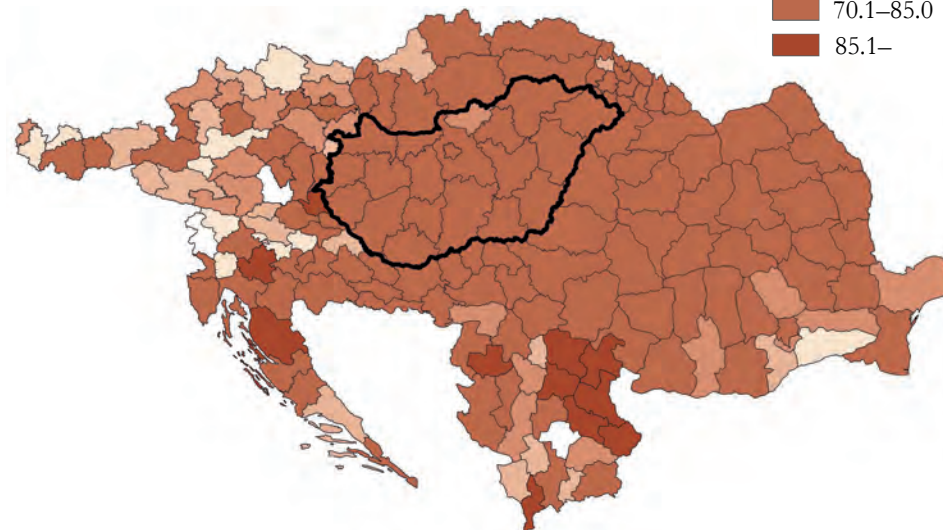
Figure 24

Population of foreign origin from the neighbouring countries living in Hungary, aged 25–64 years old, by employment rate and region of birth

2011



2017



Source: own calculation, based on the database of HCSO.

Educational qualifications also have a decisive impact on labour market characteristics. The employment rate for 25 to 64 year old residents in Hungary born in the neighbouring countries was 79% in

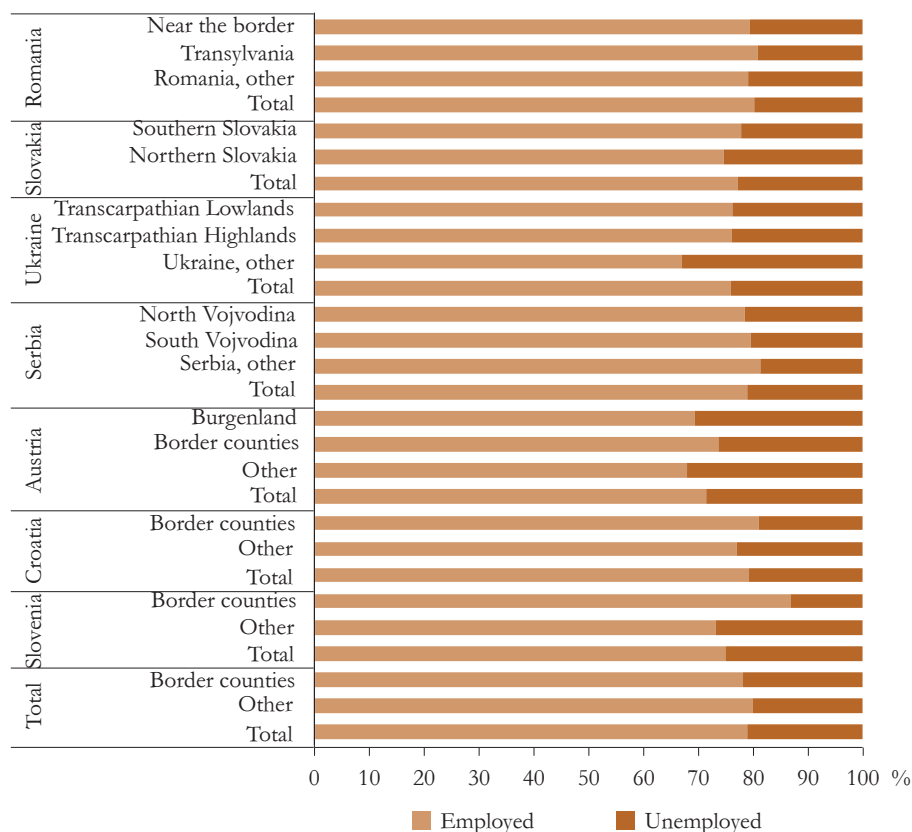
2017. That is to say, the citizens of the neighbouring countries work at a higher proportion than the resident population (75.1%).

According to birth regions, the regions with highest employment rates are Serbia and Romania, which are furthest from the border, and the border regions of Croatia and Slovenia. This can be partly attributed to their higher education levels.

The highest inactivity rates are seen in people originating from Austria and Ukraine (not including Transcarpathia). Many from the former group are still students, or they live off their own assets, while in the case of the latter country, many not have been able to enter the labour market force, or perhaps are not legally employed.

Figure 25

Population of foreign origin from the neighbouring countries living in Hungary, aged 25-64 years old, by employment and region of birth, 2017

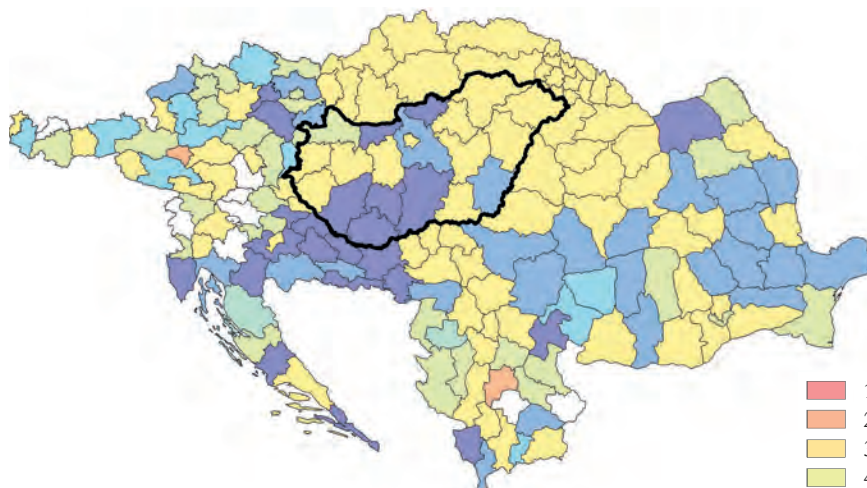


Source: own calculation, based on the database of HCSO.

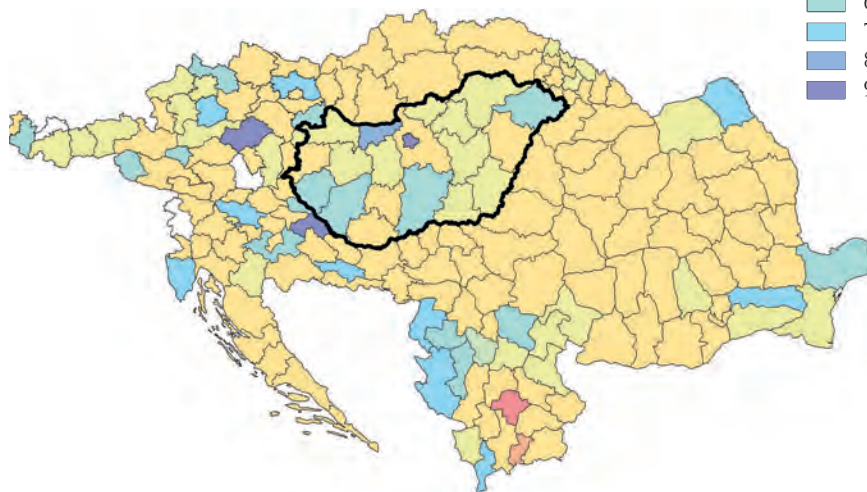
Figure 26

Population of foreign origin from the neighbouring countries living in Hungary, aged 25-64 years old by major occupational groups and region of birth*

2011



2017



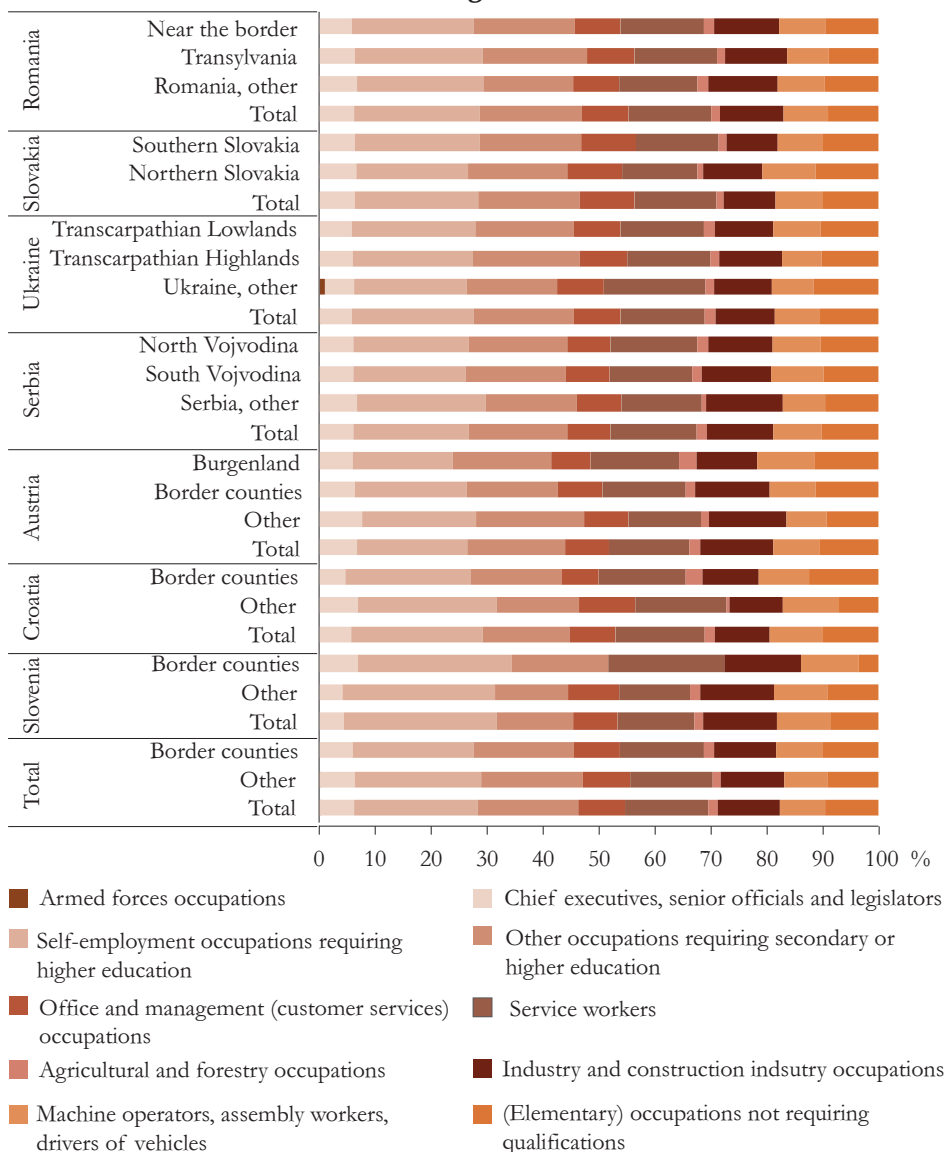
* Main group 0: Armed Forces occupations; Main group 1: chief executives, senior officials and legislators; Main group 2: self-employment occupations requiring higher education; Main group 3: other occupations requiring secondary or higher education; Main group 4: office and management (customer service) occupations; Main group 5: commercial and services occupations; Main group 6: agricultural and forestry occupations; Main group 7: industry and construction industry occupations; Main group 8: machine operators, assembly workers, drivers of vehicles; Main group 9: (elementary) occupations not requiring qualifications.

Source: own calculation, based on the database of HCSO

Occupational distributions do not point to significant differences in territories; it generally holds true that unskilled occupations are replaced by occupations in self-employment requiring higher education.

Figure 27

Population of foreign origin from the neighbouring countries living in Hungary, aged 25–64 years old by main occupational groups and birth region, 2017



Source: own calculation, based on the database of HCSO.

5.3 The impact of migrations to Hungary on the population numbers of Hungarians in the source areas

After becoming acquainted with the source territories from where the population of foreign origin flows, it is now possible to examine the effects of migration from the Carpathian Basin into Hungary. The aim was to explore how migration into Hungary has and continues to shape the Hungarian ethnic spatial structure, the territorial composition of the Hungarian ethnic population, and its proportions in the Carpathian Basin. On the basis of the 2011 population census, an estimate was made at a regional level for those ethnic proportions, without which, the migrants to Hungary would have been in the neighbouring countries in 2011. On the other hand, a calculation was made on how the migration trends between 2011 and 2017 shaped the ethnic structure of Hungarians abroad. An estimate for the changes in the 2017 regional ethnic percentages is also added (assuming the other ethnicities remain unchanged in numbers), which took place solely due to migrations to Hungary.

The analysis does not cover the migration of Hungarians to neighbouring countries; it focuses solely on the migration of the population of those with foreign origins. The 2011 census data of the surrounding countries was the starting point for the estimate. No census has been carried out in Ukraine since 2001; therefore, only information from 2001 was available. Instead of all of Ukraine, only Transcarpathia was included in the analysis. The set of questions on ethnicity is not mandatory in the censuses of any of these countries (in Austria and Slovenia no such questions are even asked at all), which makes it difficult to draw an accurate picture of the situation. The territorial distribution of the ethnic Hungarian population of the Carpathian Basin in 2011 – the starting point of my estimates – has been calculated according to the calculations of the literature (Molnár J. et al., 2005, Kiss T. et al., 2012, Kapitány B., 2015, Tóth P, 2018). I relied on the method by Balázs Kapitány (Kapitány B., 2015) for the 2011 rates of ethnic minorities. The essence of this method is to adjust the number of people who declare their nationality by classifying non-respondents proportionately in the given area according to the

proportion of those declaring their ethnicity¹⁹. This process refines the underestimation of proportions of Hungarians in the censuses of the neighbouring countries, but even then, the results are still lagging behind the real values of Hungarians abroad.

The usability of the results of the process is also limited by several factors. On the one hand, methodological differences can be observed in the practice of census taking in individual states. On the other, Hungarian censuses may overestimate the proportion of Hungarian ethnic population within the numbers of the population of foreign origins (in Hungary it is perhaps easier for them to declare themselves Hungarian). Thus, in the areas of emigration, it is possible to detect a higher number of Hungarian ethnic emigration than what is actually real. There is no precise picture of the assimilation process in Hungary (for example, if someone belonging to the Romanian ethnic group came to Hungary and later became Hungarian); as such, the estimation procedure cannot cover these effects. At the same time, people who become Hungarian in Hungary do not represent a real demographic deficit in the number of Hungarians abroad (only if this process also occurred in the source area). During the examination of the period 2011 to 2017, it was assumed (due to the lack of data) that the balance of migrants from the neighbouring countries to Hungary is the same as the difference between the stock data of the same two dates. All in all, the hypothesis behind the calculations is that in the period of 2011–2017, the relevant natural demographic events (migration, death) of the Hungarian population of foreign origins and the process of assimilation (namely, the assimilation of ethnically non-Hungarians in Hungary) cancelled out each other's opposite effects with a result of zero.

¹⁹ The assumption cannot be verified, as there is no specific research that could lead to a more reliable estimate of the ethnic proportions among non-respondents.

Table 11

Territorial ethnic proportions and changes in the Carpathian Basin, 2011, 2017

Country, county in Hungarian	Country (district, kraj, rayon, okrug, županij ^{b)} internationally	Population, 2011	Number of Hungarian nationals, 2011	Proportion of Hungarian nationals, 2011	People living in Hungary who were born in the given area, 2011	People living in Hungary who were born in the given area, 2017	Theoretical proportion of Hungarian nationals, 2011 ^{a)}	Territorial differences, 2011 (percentage points) ^{b)}	Proportion of Hungarian nationals, 2017 (changes due to emigration between 2011 and 2017)	Territorial differences, 2017 (percentage points) ^{b)}
Romania										
Arad	Arad	430 629	39 298	9.1	4 680	6 028	10.1	1.0	8.8	0.3
Beszterce-Naszód	Bistrita Nasaud	286 225	15 091	5.3	815	1 119	5.5	0.2	5.2	0.1
Bihar	Bihar	575 398	147 607	25.7	21 936	31 160	28.4	2.7	24.4	1.3
Brassó	Brasov	549 217	42 880	7.8	2 847	4 177	8.3	0.5	7.6	0.2
Fehér	Alba	342 376	15 969	4.7	1 601	2 123	5.1	0.4	4.5	0.2
Harghita	Harghita	310 867	268 555	86.4	21 055	35 102	87.3	0.9	85.7	0.7
Hunyad	Hunedoara	418 565	16 976	4.1	3 283	4 411	4.8	0.7	3.8	0.3
Kolozs	Cluj	691 106	111 420	16.1	17 362	19 218	18.2	2.1	15.9	0.2
Kovácsna	Covasna	210 177	157 062	74.7	8 488	16 740	75.7	1.0	73.7	1.0
Krassó-Szörény	Caras Severin	295 579	3 297	1.1	275	440	1.2	0.1	1.1	0.0
Máramaros	Maramures	478 659	34 945	7.3	4 199	5 276	8.1	0.8	7.1	0.2
Maros	Mures	550 846	212 801	38.6	22 458	31 875	41.0	2.4	37.6	1.0
Szatmár	Satu Mare	344 360	121 161	35.2	13 922	19 790	37.7	2.5	34.1	1.1
Szeben	Sibiu	397 322	11 683	2.9	1 374	1 643	3.3	0.4	2.9	0.0
Szilágy	Salaj	224 384	53 011	23.6	5 219	8 337	25.4	1.8	22.5	1.1
Temes	Timis	683 540	38 812	5.7	3 387	3 806	6.1	0.4	5.6	0.1
Transylvania. Hungarian/Romanian borderland		6 789 250	1 290 568	19.0	132 901	191 245	20.6	1.6	18.3	0.7
Romania, other		19 897 257	17 339	0.1	8 182	10 814	0.1	0.0	0.1	0.0
Romania, total		20 121 641	1 307 907	6.5	141 083	202 059	7.2	0.7	6.2	0.3

(Table continued on next page.)

(Continued.)

Country, county in Hungarian	Country (district, kraj, rayon, okrug, županiji ^{a)} internationally	Population, 2011	Number of Hungarian nationals, 2011	Proportion of Hungarian nationals, 2011	People living in Hungary who were born in the given area, 2011	People living in Hungary who were born in the given area, 2017	Theoretical proportion of Hungarian nationals, 2011 ^{a)}	Territorial differences, 2011 (percentage points) ^{b)}	Proportion of Hungarian nationals, 2017 (changes due to emigration between 2011 and 2017)	Territorial differences, 2017 (percentage points) ^{c)}
Slovakia										
Besztercebánya	Banskobystrický	660 563	72 752	11.0	3 192	3 181	11.4	0.4	11	0.0
Eperjes	Prešovský	814 527	695	0.1	259	318	0.1	0.0	0.1	0.0
Kassa	Košický	791 723	80 444	10.2	3 927	3 980	10.6	0.4	10.2	0.0
Nagyszombat	Třnavský	554 741	129 997	23.4	4 694	4 302	24.1	0.7	23.5	-0.1
Nitra	Nitriansky	689 867	182 386	26.4	11 369	10 056	27.6	1.2	26.6	-0.2
Pozsony	Bratislavský	602 436	25 710	4.3	2 860	2 861	4.7	0.4	4.3	0.0
Trencsén	Trenčiansky	594 328	858	0.1	344	310	0.2	0.1	0.2	-0.1
Zsolna	Žilinský	688 851	595	0.1	83	191	0.1	0.0	0.1	0.0
Slovakia, total		5 397 036	493 437	9.1	26 728	25 199	9.6	0.5	9.2	-0.1
Serbia										
Észak-Bácska	Severnobački	186 906	80 242	42.9	6 247	12 530	44.8	1.9	40.9	2.0
Észak-Bánát	Severnobanatski	147 770	72 511	49.1	5 330	11 510	50.8	1.7	46.8	2.3
Dél-Bácska	Južnobački	615 371	50 347	8.2	4 086	6 222	8.8	0.6	7.9	0.3
Közép-Bánát	Srednjobanatski	187 667	24 779	13.2	1 144	2 027	13.7	0.5	12.8	0.4
Nyugat-Bácska	Zapadnobački	188 087	18 493	9.8	2 076	3 313	10.8	1.0	9.2	0.6
Dél-Bánát	Južnobanatski	293 730	13 882	4.7	494	843	4.9	0.2	4.6	0.1
Szerémség	Sremski	312 278	3 987	1.3	43	99	1.3	0	1.3	0.0
Vajdaság	Vojvodina	1 931 809	264 241	13.7	19 420	36 544	14.5	0.8	12.9	0.8
Serbia, other		5 255 053	12 763	0.2	495	1 513	0.2	0.0	0.3	0.1
Serbia, total		7 186 862	277 004	3.9	19 915	38 057	4.1	0.2	3.6	0.3

(Table continued on next page.)

(Continued.)

Country, county in Hungarian	Country (district, kraj, rayon, okrug, županij ^{a)} internationally	Population, 2011	Number of Hungarian nationals, 2011	Proportion of Hungarian nationals, 2011	People living in Hungary who were born in the given area, 2011	People living in Hungary who were born in the given area, 2017	Theoretical proportion of Hungarian nationals, 2011 ^{a)}	Territorial differences, 2011 (percentage points) ^{b)}	Proportion of Hungarian nationals, 2017 (changes due to emigration between 2011 and 2017)	Territorial differences, 2017 (percentage points) ^{c)}
Slovakia										
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Nagyszombat	Trnavský	554 741	129 997	23.4	4 694	4 302	24.1	0.7	23.5	-0.1
Nyitra	Nitriansky	689 867	182 386	26.4	11 369	10 056	27.6	1.2	26.6	-0.2
Pozsony	Bratislavský	602 436	25 710	4.3	2 860	2 861	4.7	0.4	4.3	0.0
Trencsén	Trenčiansky	594 328	858	0.1	344	310	0.2	0.1	0.2	-0.1
Zsolna	Žilinský	688 851	595	0.1	83	191	0.1	0.0	0.1	0.0
Slovakia, total		5 397 036	493 437	9.1	26 728	25 199	9.6	0.5	9.2	-0.1
Serbia										
Észak-Bácska	Severnobački	186 906	80 242	42.9	6 247	12 530	44.8	1.9	40.9	2.0
Észak-Bánát	Severnobanatski	147 770	72 511	49.1	5 330	11 510	50.8	1.7	46.8	2.3
Dél-Bácska	Južnobački	615 371	50 347	8.2	4 086	6 222	8.8	0.6	7.9	0.3
Közép-Bánát	Srednjebanatski	187 667	24 779	13.2	1 144	2 027	13.7	0.5	12.8	0.4
Nyugat-Bácska	Zapadnobački	188 087	18 493	9.8	2 076	3 313	10.8	1.0	9.2	0.6
Dél-Bánát	Južnobanatski	293 730	13 882	4.7	494	843	4.9	0.2	4.6	0.1
Szerémség	Sremski	312 278	3 987	1.3	43	99	1.3	0	1.3	0.0
Vajdaság	Vojvodina	1 931 809	264 241	13.7	19 420	36 544	14.5	0.8	12.9	0.8
Serbia, other		5 255 053	12 763	0.2	495	1 513	0.2	0.0	0.3	0.1
Serbia, total		7 186 862	277 004	3.9	19 915	38 057	4.1	0.2	3.6	0.3

(Table continued on next page.)

(Continued.)

Country, county in Hungarian	Country (district, kraj, rayon, okrug, županij ^{a)}) internationally	Population, 2011	Number of Hungarian nationals, 2011	Proportion of Hungarian nationals, 2011	People living in Hungary who were born in the given area, 2011	People living in Hungary who were born in the given area, 2017	Theoretical proportion of Hungarian nationals, 2011 ^{a)}	Territorial differences, 2011 (percentage points) ^{b)}	Proportion of Hungarian nationals, 2017 (changes due to emigration between 2011 and 2017)	Territorial differences, 2017 (percentage points) ^{c)}
Transcarpathia										
Beregszász	Berehove	80 616	53 948	66.9	6 440	19 200	69.4	2.5	60.7	6.2
Huszt	Khust	128 824	5 511	4.3	1 019	2 446	5.0	0.7	3.2	1.1
Ilosva	Irshava	100 905	114	0.1	216	650	0.3	0.2	-0.3	0.4
Munkács	Mukachevo	183 080	19 846	10.8	2 630	7 199	12.1	1.3	8.6	2.2
Nagyberezna	Velykyi Bereznyi	28 211	15	0.1	74	126	0.3	0.2	-0.1	0.2
Nagyszőlős	Vynohradiv	117 957	30 874	26.2	3 035	11 503	28.0	1.8	20.5	5.7
Ökörmező	Mizhhiria	49 890	8	0.0	161	223	0.3	0.3	-0.1	0.1
Perecseny	Perechyn	32 026	78	0.2	90	175	0.5	0.3	0.0	0.2
Rahó	Rakhiv	90 945	2 929	3.2	298	653	3.5	0.3	2.8	0.4
Szolyva	Svaliava	54 869	383	0.7	167	327	1.0	0.3	0.4	0.3
Técső	Tiachiv	171 850	4 991	2.9	1 161	2 252	3.6	0.7	2.3	0.6
Ungvár	Uzhhorod	189 967	32 794	17.3	5 396	12 257	19.5	2.2	14.2	3.1
Volóc	Volovets	25 474	25	0.1	88	162	0.4	0.3	-0.2	0.3
Transcarpathia, total		1 254 614	151 516	12.1	20 775	57 173	13.5	1.4	9.4	2.7
Austria										
Őrvidék ^{d)}	Burgenland ^{d)}	286 215	10 000	3.5	336	2 188	3.6	0.1	2.9	0.6
Austria, other		8 349 150	7 270	0.1	1 945	7 581	0.1	0.0	0.0	0.1
Austria, total		8 635 365	17 270	0.2	2 281	9 769	0.2	0.0	0.1	0.1

(Table continued on next page.)

In 2011, 26 million people lived in the Carpathian Basin (in the territory of the historic Hungarian Kingdom, not including the former Croatian Kingdom); among them, 12 million – 46% of the people living here – declared themselves Hungarian. In 2011, 201,000 and in 2017, 313,000 (13% of Hungarians living abroad) individuals of Hungarian ethnicity lived in Hungary, who were born in the other countries of the Carpathian Basin.

If we look at the entirety of the international migration movements in Hungary in what was the country's territory prior to the Treaty of Trianon, we find that about half of the movements would count as internal migration. The consequences of the peace agreements that ended World War I and World War II, and the cross-border linguistic and cultural relations are still dominant in the migration processes of the Carpathian Basin (Tóth 2005). The data confirms that the migration trend taking place before World War I was continued, whereby movements from the periphery to the center of the country were characteristic.

It is important to emphasize that migrations from abroad to Hungary do not change the total number of Hungarians in the Carpathian Basin in the short term. However, they are reduced over the long term due to their significant influence on the ethnic spatial structure: locally, in the areas of emigration, schooling, labor market, cultural and social opportunities decrease together in proportion with the numbers of Hungarians; ethnic relationships may narrow, and with scattering, assimilation may appear in parallel or become accelerated (Kocsis 2002, 2003, 2006, 2015; Kocsis et al., 2015; Tóth 2018).

According to 2011 data, the proportion of Hungarian ethnicity in Transcarpathia decreased mostly due to migration to Hungary (the 12.1% ethnicity proportion would have been 13.5%, had 21,000 people not chosen to leave the region). In Transcarpathia, the rajons of Berehove and Uzhhorod were the most affected (the proportion of Hungarian ethnicity was reduced by 2.5 and 1.8 percentage points, respectively).

According to the previous census, without migrations to Hungary, 21% of Transylvania's population would be Hungarian; taking into account migration activities, this rate is 19%. The most affected

counties are Bihor (a 2.7 percentage point difference), Satu Mare (2.5), Mures (2.4), Cluj (2.1). 50% of Transylvania's Hungarians live in these territories.

In Slovakia in 2011, the proportion of Hungarians in the previous census was 9.1%; without emigration, we would have seen a half-percentage point increase bringing the percentage to 9.6%. Here the biggest drop was in the Nitriansky kraj (by 1.2 percentage points). In 2011, already 11,000 people born there were living in Hungary.

In the cases of Austria, Slovenia and Croatia, there has been no significant change in the ethnic spatial structure linked to the migration of the born-abroad Hungarian population. At the same time, nearly 100,000 Hungarians work for our neighbor in the West, according to Austrian social security data²⁰. A minority of this group emigrated from Hungary, while a larger portion were daily commuters. Thus, the overall presence of Hungarian nationals in Austria increased in the period under review.

Examining the period since 2011, it can be concluded that the decline of Transcarpathian Hungarians in the Carpathian Basin as a result of emigration has become the fastest in proportion. In 2017, the proportion of Hungarians is estimated at 9.4%, 2.7 percentage points lower than the previous figure. The proportion of Hungarians in the Berehove rajon stayed barely above 60%, in comparison to 66.9% in 2011, if we assume the numbers of other ethnicities remained unchanged. At the same time, the relatively favorable demographic situation of Hungarians living in Transcarpathia and emigration in general tend to dampen the ethnic structural shift (Karácsonyi et al., 2014).

In Romania, according to estimates for 2017, the proportion of Hungarians decreased to 6.2% from 6.5% in 2011. This process mostly affected Bihor County, where the proportion of Hungarians became 24.4%, while according to the 2011 census, their proportion went over 25.7%.

Due to the steady emigration flow from Severnobački and Severnobanatski, the proportion of ethnic Hungarians in Vojvodina may have decreased from 13.7% in 2011 to 12.9% in 2017.

20 <http://www.hauptverband.at/cdscontent/?contentid=10007.754024&viewmode=content>

At the same time, the movements of Hungarians from Slovakia into Hungary stopped; instead, return migrants were characteristic of this period. As such, the ethnic structure remained unchanged for 2017. The same holds true to the other analyzed countries that have not been mentioned so far.

6 International migration networks in the Carpathian Basin, 2011, 2017

6.1 Relations of source and destination areas

The previous chapters show that in the international migration affecting Hungary, the global migration effect and the existing processes between the surrounding countries and Hungary exist simultaneously. These processes date back to a long time. International migration to Hungary is characterised by the fact that the majority of the immigrant population has Hungarian nationality or is native speaker of Hungarian. The strength of cross-border linguistic and cultural relations is primarily the consequence of the peace treaties that concluded World War I and World War II. In 2017, 3.6% of Hungary's resident population was born in other countries of the Carpathian Basin. This chapter focuses on the territorial analysis of this target group.

The chapter aims to go beyond the classical study of international migration by not only examining the phenomenon according to Hungarian destination areas, but also linking sending and receiving areas by identifying the areas of origin. Furthermore it considers the phenomenon as a network and attempts to present its topology. Understanding settlement relations is also important because their dynamics involve regional changes in the volume of future migrations.

The analysis explores in detail the peculiarities of the spatial network of international migrants with regard to Hungary and its neighbouring countries and links them to the characteristics of the migrants. When analysing the relationship between the sources and destination areas of migration in the Carpathian Basin, the objective is not only to identify the regional peculiarities of flows between a particular emigration country and Hungary, but also to identify the regional characteristics of the migration flows in an integrated manner, taking into account all neighbouring countries simultaneously, as well as to draw a general network of contacts and conclusions.

Hereinafter, the relations of the place of birth and current place of residence of the foreign born population arriving to Hungary are reviewed at NUTS3 level, based on data of 2011 and of 2017. In case

of Ukraine, due to the large size of the country only Transcarpathia was considered in the study, since nearly 90% of Ukrainian migrants arrive from this region. (As the NUTS classification does not exist in Ukraine (Menezcev K., 2010), for Transcarpathia (Zakarpatska Oblast) the analyses were carried out at "raion" level, a less aggregated level than "oblast". From the 161 regions created, significant concentrations can be detected in the migration matrix to the 19 Hungarian counties and Budapest. Omitting the pairs of regions, which account for more than 0.5% of total migration, a much narrower group is available than before. Thus, 41.6% of migrations were concentrated in 1% of all matrix cells in 2011, which increased by 4.7 percentage points until 2017.

In 2011, Central Hungary was the most attractive destination to those arriving from Transylvanian counties. 3.24% of migration from neighbouring countries to Hungary took place between Mures and Budapest, 3.19% from Harghita County and 3% between Cluj-Napoca and the Hungarian capital. Active contact spaces and intense flows (Anderson et al., 1999; Baranyi B. et al., 2004; Hansen N., 1977; Van Geenhuizen, M. et al., 2001) developed between the interconnected counties, which can be explained partly by the phenomenon of circular migration (Fercsik R., 2008; Illés S. et al., 2009) and partly by the easier interaction with family members who remained home (Rédei M., 2007). The most significant of these were the movements between Bihor and Hajdú-Bihar (1.58%), Satu Mare and Szabolcs-Szatmár-Bereg county (1.05%), North Bačka, North Banat and Csongrád county (1%, 1.2%), as well as from Beregovo and Uzsgorod raion to Szabolcs-Szatmár-Bereg County (0.99%, 0.68%).

By 2017, the number of pairs of region affected by more than 0.5% by migrations from neighbouring countries to Hungary increased. Hungary's migration relations widened, the more distant areas of neighbouring countries also became resource areas by smaller volumes, while the regional role of the districts of Trnava, Bratislava, Košice and Nitra somewhat weakened. The importance of Budapest and Pest County further strengthened, as well as the migration weight of Szabolcs-Szatmár-Bereg County, mainly because of those arriving from Ukraine. By 2017, the proportions of migrations from Harghita,

Mures to Central Hungary increased slightly, however the rates of border connections strengthened to a greater extent.

Table 12

The proportion of major migration flows from neighbouring countries to Hungary, 2011*

(%)

Foreign / Hungarian counties	Buda- pest	Pest	Komá- rom- Eszter- gom	Győr- Mo- son- Sopron	Tolna	Hajdú- Bihar	Sza- bolcs- Szat- már- Bereg	Bács- Kiskun	Békés	Csong- rád- Csanád
Suceava	0.09	0.07	0.00	0.01	0.57	0.00	0.01	0.21	0.03	0.02
Arad	0.59	0.28	0.03	0.06	0.02	0.06	0.02	0.08	0.33	0.33
Bihor	2.55	1.75	0.21	0.37	0.10	1.58	0.18	0.30	0.59	0.30
Cluj	3.01	1.90	0.20	0.25	0.07	0.28	0.11	0.24	0.15	0.15
Satu Mare	1.43	1.10	0.14	0.21	0.05	0.67	1.05	0.17	0.13	0.10
Sălaj	0.64	0.60	0.06	0.08	0.02	0.13	0.08	0.09	0.08	0.07
Covasna	1.27	0.92	0.18	0.14	0.08	0.08	0.04	0.14	0.09	0.10
Harghita	3.19	2.34	0.21	0.33	0.18	0.22	0.15	0.39	0.27	0.34
Mures	3.24	2.35	0.30	0.44	0.16	0.26	0.14	0.42	0.27	0.32
Trnava District	0.37	0.17	0.08	0.55	0.10	0.02	0.03	0.12	0.07	0.05
Nitra Region	1.04	0.64	0.85	0.40	0.24	0.04	0.04	0.15	0.22	0.12
North Bačka District	0.73	0.24	0.03	0.07	0.12	0.02	0.01	0.50	0.05	1.00
North Banat District	0.48	0.21	0.04	0.06	0.06	0.03	0.01	0.22	0.06	1.20
South Banat District	0.56	0.17	0.03	0.05	0.13	0.02	0.02	0.26	0.05	0.37
Uzhhorod Raion	0.72	0.40	0.05	0.05	0.02	0.23	0.68	0.06	0.04	0.03
Berehove Raion	0.79	0.45	0.06	0.06	0.03	0.18	0.99	0.08	0.04	0.05

* The total foreign-linked population born in the neighbouring countries and residing in Hungary =100%.

Table 13

The proportion of major migration flows from neighbouring countries to Hungary, 2017

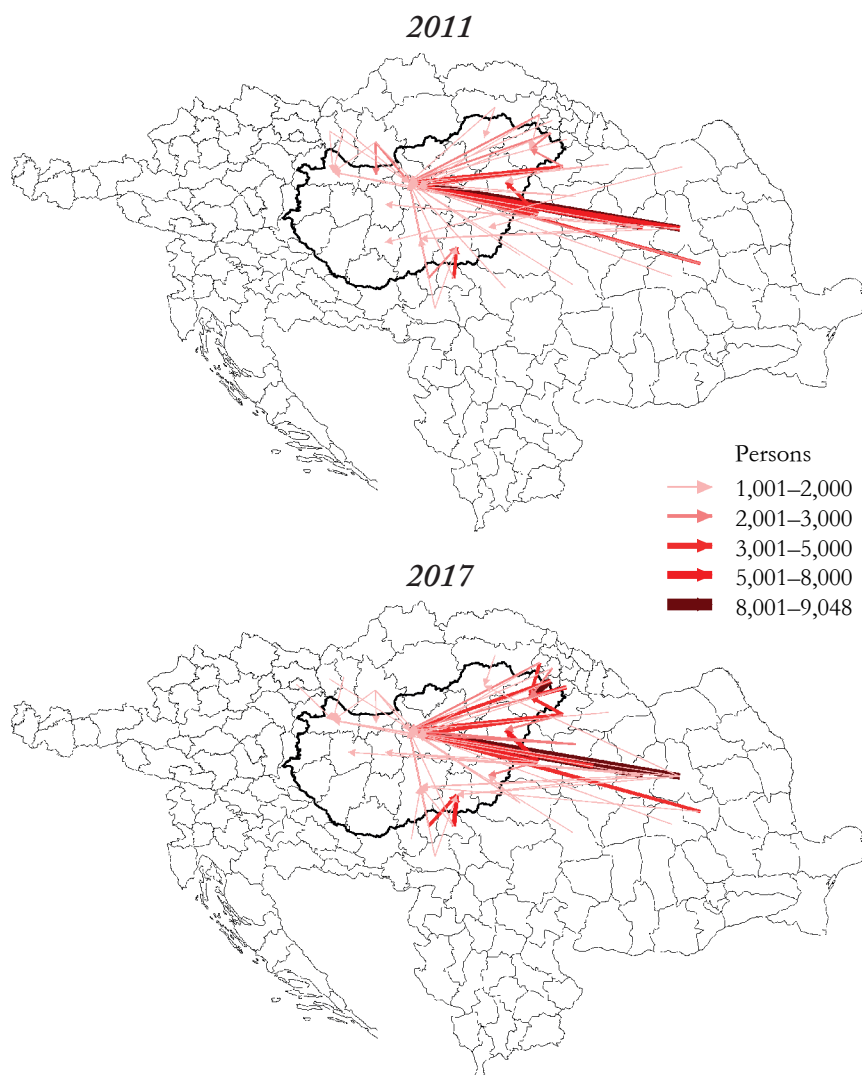
(%)

Foreign/ Hungarian countries	Buda- pest	Pest	Komá- rom- Eszter- gom	Veszp- rém	Haj- dú-Bi- har	Sza- bolcs- Szat- már- Bereg	Bács- Kiskun	Békés	Csong- rád- Csanád
Arad	0.31	0.32	0.02	0.03	0.05	0.01	0.04	0.52	0.22
Bihor	1.94	1.52	0.19	0.28	2.05	0.17	0.22	0.70	0.25
Cluj	2.08	1.40	0.15	0.26	0.21	0.09	0.16	0.10	0.09
Satu Mare	1.20	1.14	0.12	0.16	0.66	1.32	0.12	0.09	0.08
Sălaj	0.71	0.63	0.05	0.05	0.21	0.09	0.07	0.07	0.06
Covasna	1.39	1.23	0.19	0.27	0.09	0.04	0.51	0.10	0.09
Harghita	3.15	2.59	0.23	0.55	0.26	0.16	0.57	0.19	0.35
Mures	2.86	2.66	0.27	0.21	0.22	0.10	0.47	0.18	0.42
Nitra Region	0.51	0.29	0.58	0.24	0.02	0.04	0.07	0.09	0.05
North Bačka District	0.69	0.25	0.03	0.04	0.03	0.01	0.75	0.06	1.30
North Banat District	0.44	0.24	0.04	0.05	0.03	0.02	0.41	0.08	1.58
Uzhhorod Raion	0.80	0.39	0.06	0.04	0.24	1.32	0.13	0.03	0.03
Berehove Raion	1.00	0.52	0.07	0.05	0.24	2.88	0.10	0.04	0.04
Mukachevo Raion	0.44	0.23	0.03	0.03	0.16	0.77	0.05	0.03	0.02
Vynohradiv Raion	0.61	0.31	0.06	0.04	0.16	1.64	0.07	0.02	0.02

The growing appreciation of the capital city area is evident not only in the larger sending regions, but also in almost the entire Carpathian Basin (Rédei M., 2009). This is the Hungarian region, which is a clear destination for international migrants, even from greater geographical distances (Soltész B. et al., 2014). This is particularly true for those of working-age, with higher educational attainment, working in managerial position, as well as for those living in households without children. Border areas are rather considered as local destinations. In case of shorter geographical distances and movements close to the border area, the proportion of those moving with their children is much higher, the educational attainments and occupations of migrants are more diversified, but there are no significant differences in their economic activity compared to that of migrants of longer distance.

Figure 28

*The relations of the region of birth and region of the current place of residence in Hungary among the foreign-linked population**



* The illustrative maps were prepared by QGIS software. I am grateful for the contribution of my colleagues, Prof. Géza Tóth (Hungarian Central Statistical Office) and Dr. Lajos Bálint (Hungarian Demographic Research Institute).

Figure 29

The relations of the region of birth and region of the current place of residence in Hungary among the foreign-linked population aged 24 years and over by educational attainment level, 2017

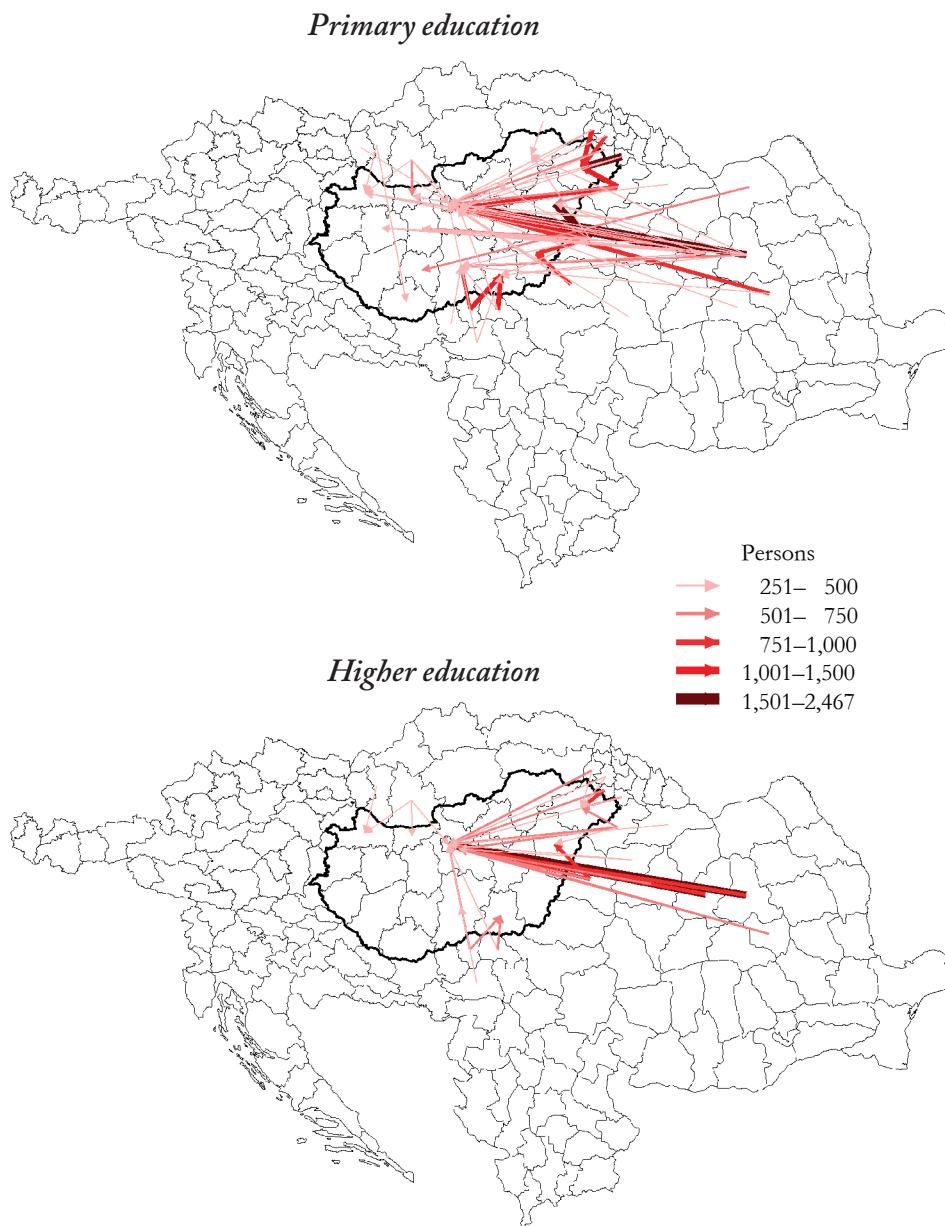
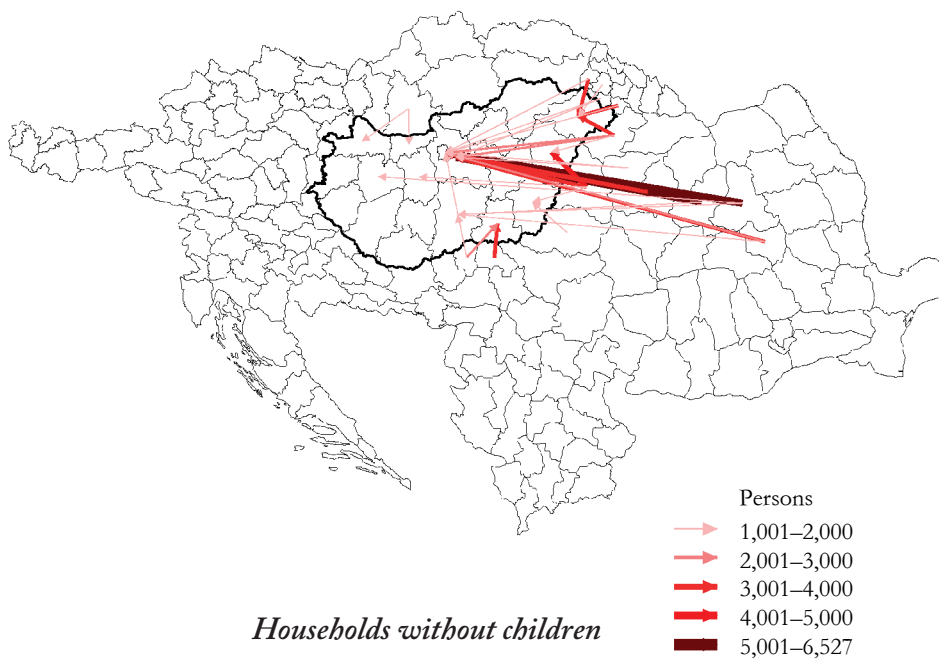


Figure 30

The relations of the region of birth and region of the current place of residence in Hungary among the foreign-linked population by type of household, 2017

Households with one or more children



Households without children

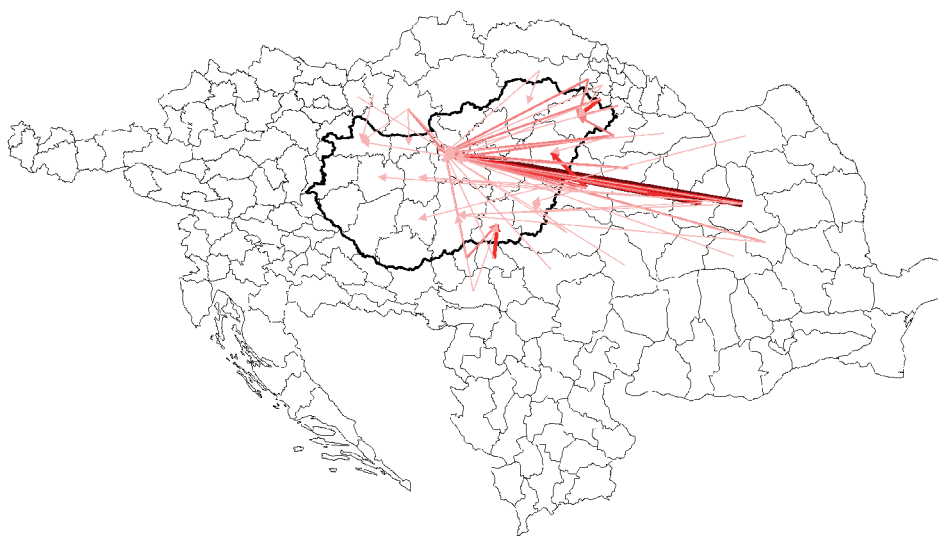


Figure 31

The relations of the region of birth and region of the current place of residence in Hungary among the foreign-linked population aged between 25–64 years by economic activity, 2017

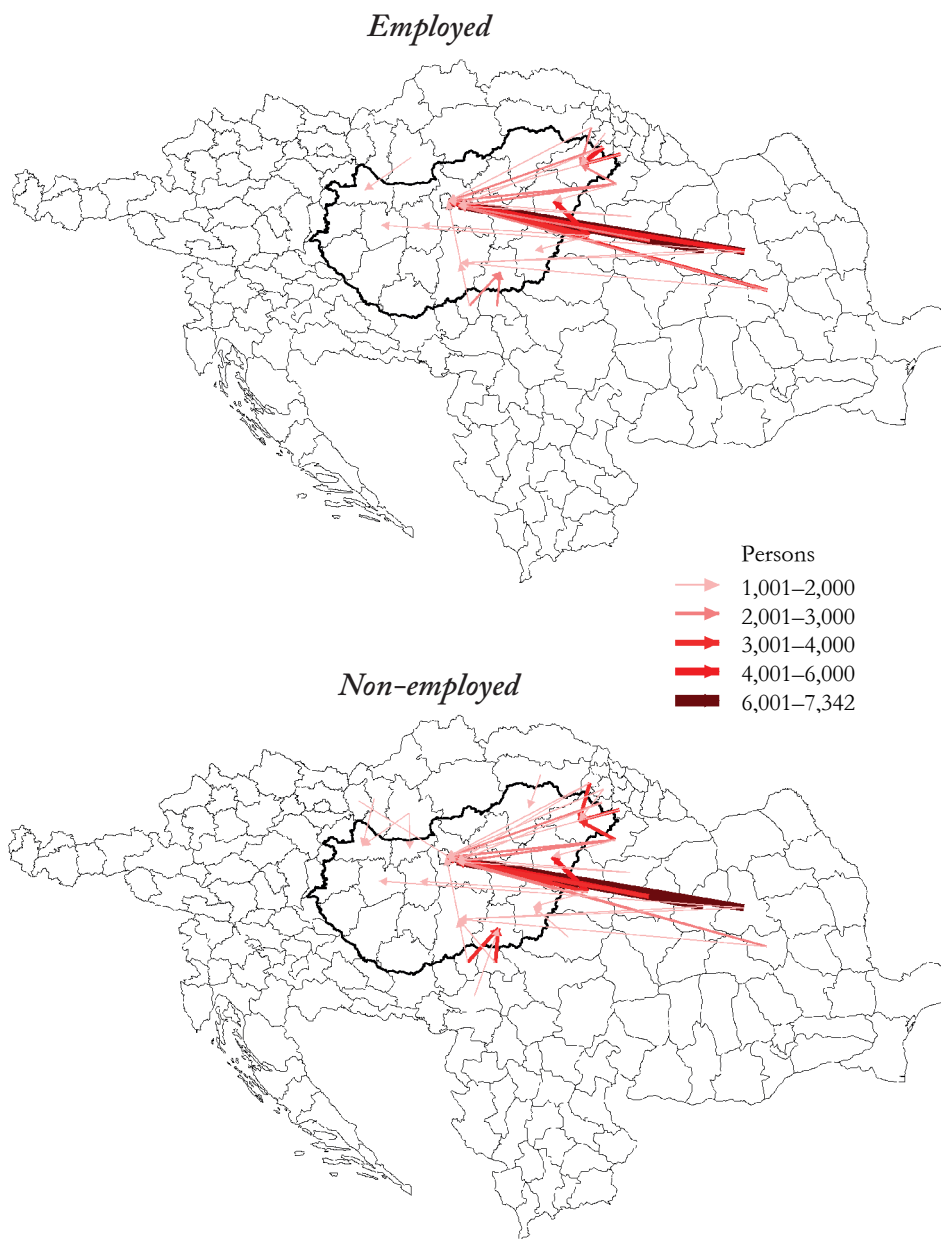
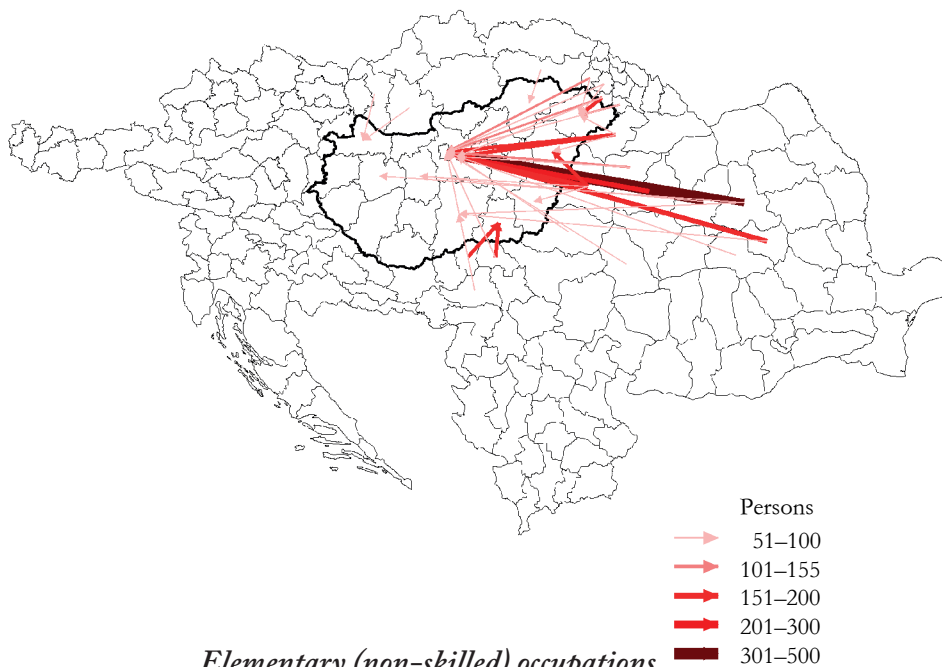


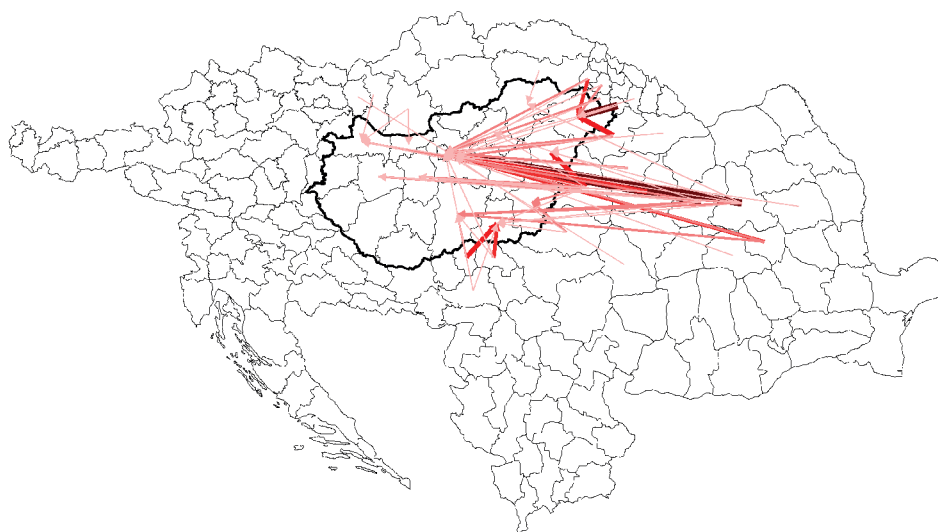
Figure 32

The relations of the region of birth and region of the current place of residence in Hungary among the foreign-linked population aged between 25–64 years by occupation, 2017

Managing directors and administrative managers, advocacy leaders



Elementary (non-skilled) occupations



6.2 Networks of migration settlements

From the point of view of the chapter, network theory (applying what has been described in chapter 3) is important through the relations between the settlements which are connected by international migration affecting Hungary. Namely, settlements represent the nodes of the network. Two settlements are connected if international migration occurs between the two settlements of the Carpathian Basin, i.e. a person immigrated from one (foreign) settlement to the other (Hungarian) regardless of the number of migrants²¹. The analysis of the relations of the Hungarian receiving settlements in the Carpathian Basin shows how diverse migration is, how “embedded” the process is in the settlement.

In 2011, Budapest had the most connections with Romanian migration settlements. Migrants arrived from 613 different Romanian settlements in the capital city, Debrecen had the second most connections (314), followed by Érd (289), Szeged (272), Pécs (271), Miskolc (246) and Kecskemét (242). By 2017, Budapest broadened the number of its contacts (685), as well as Debrecen (336), Érd (295), Szeged (281), Győr (245), while the settlement relations of Pécs (225), Kecskemét (224) and Miskolc (221) somewhat reduced. The attractiveness of Budapest and larger cities with county rights (Debrecen, Miskolc, Nyíregyháza, Győr, Szeged, Kecskemét) grew. The degree of nodes in case of Békéscsaba and Gyula, Debrecen and Nyíregyháza is declining and is being succeeded by the surrounding settlements of Szeged and Kecskemét. The centre of gravity of the network shifted westward during the period considered.

In case of Serbia it is also true that the capital city had the most settlement relations (109 in 2011; 147 in 2017). Szeged had the second largest connectivity (85 in 2001; 100 in 2011), there lived however more Serbian born citizens (8177 persons) than in the capital city (6379 persons). In other words, more people arrived in Szeged from fewer

²¹ In the analysis, I did not take into account all the movements among the settlements; domestic migrations, emigrants from Hungary, flows between neighbouring countries are not part of the examination. In this way, the analysis can be considered as part of a larger network.

Serbian settlements along the border (on average more people also by settlement), while many people arrived in the capital city from many places, but on average in smaller number. Between 2011 and 2017 a slight increase could be witnessed in the regional relations of Pécs (from 71 to 77), Baja (from 57 to 62), Zalaegerszeg (from 17 to 67), Hódmezővásárhely (from 44 to 50), Tompa (from 35 to 47) and Kiskunhalas (from 43 to 49), while in Kecskemét (56 to 53) a decrease could be detected.

Regarding the migration from Ukraine, the number of contacts of the major cities along the Hungarian border increased significantly, while there was a modest growth in Budapest and several settlements of Pest County. The ranking among the most connected settlements remained mostly unchanged, thus it shows as follows: Budapest (from 197 to 214), Debrecen (from 115 to 148), Nyíregyháza (from 129 to 171) and Kisvárda (from 81 to 112).

The other neighbouring countries are much less interconnected (and have fewer migrants) in Hungary. With these countries, too, the growing dominance of the capital city is apparent. Even regarding Slovakia, the relationship with Budapest developed the most dynamically (from 162 to 214). In most cities, in addition to volume, a decrease in relationships can be realised of which Győr (from 108 to 90), Miskolc (from 95 to 85), Mosonmagyaróvár (from 92 to 75), Esztergom (from 73 to 52) and Komárom (from 85 to 58) are notable. Likewise Austrian settlements, those have the most considerable relationship with Budapest (from 128 to 174). Among them, the dynamics of Sopron (from 37 to 64), Győr (from 43 to 58), Pécs (from 40 to 58), Veszprém (from 18 to 33) are worth mentioning, while in Kaposvár (from 39 to 31) and Mosonmagyaróvár (from 48 to 44) the number of connections decreased. Croatia's migration settlement relations with Budapest (from 35 to 56), Győr (from 1 to 17) and Harkány (from 16 to 31) strengthened, while Pécs (from 51 to 44), Baja (from 12 to 2) and Siklós (from 28 to 14), i.e. the nearby settlements lost their network strength. The number of Slovenian citizens in Hungary is minimal, Slovenian citizens living in Budapest came from a total of 13 different Slovenian settlements.

Looking at the Hungarian migration relations covering the settlements of all neighbouring countries, the central position of Budapest and Pest County was even clearer (Dövényi Z, 2011). In 2011, a dynamically evolving migration settlement relationship characterized the axes between Budapest and Dunakeszi, Fót, Göd, Vác, Szentendre, Pomáz, Budakalász, Solymár, as well as Pécel, Maglód, Kerepes and Gödöllő. Line-like developments can thus be observed vis-à-vis the larger sending countries, while there is a more block-like structure in settlements situated westward from the capital city: Üllő, Vecsés, Gyál, Monor, Pilis, Cegléd, and Érd, Tárnok, Biatorbágy, Budaörs, Törökbálint, Budakeszi, Szigetszentmiklós respectively.

Figure 33

The number of connections of Hungarian settlements with migration settlements in the Carpathian Basin, 2017

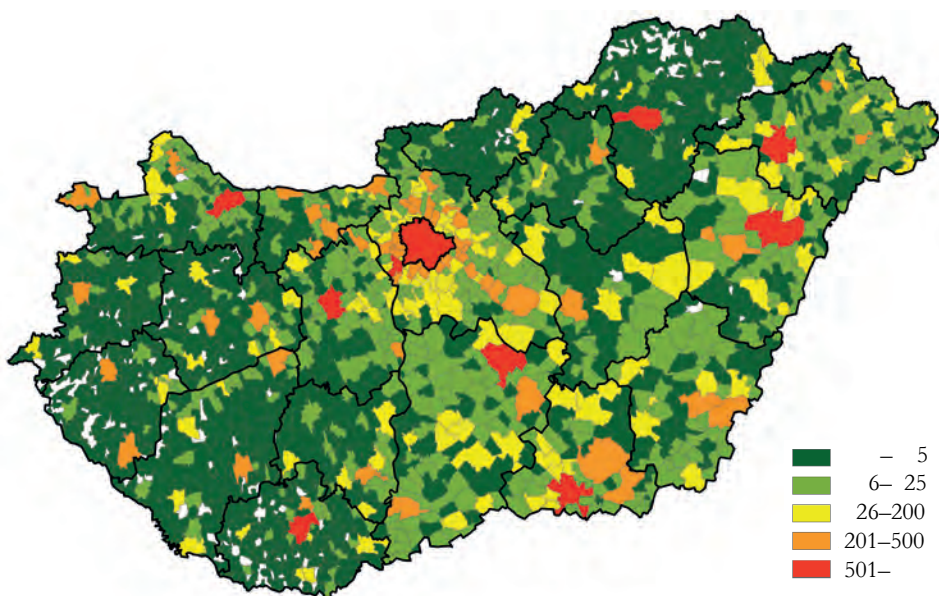
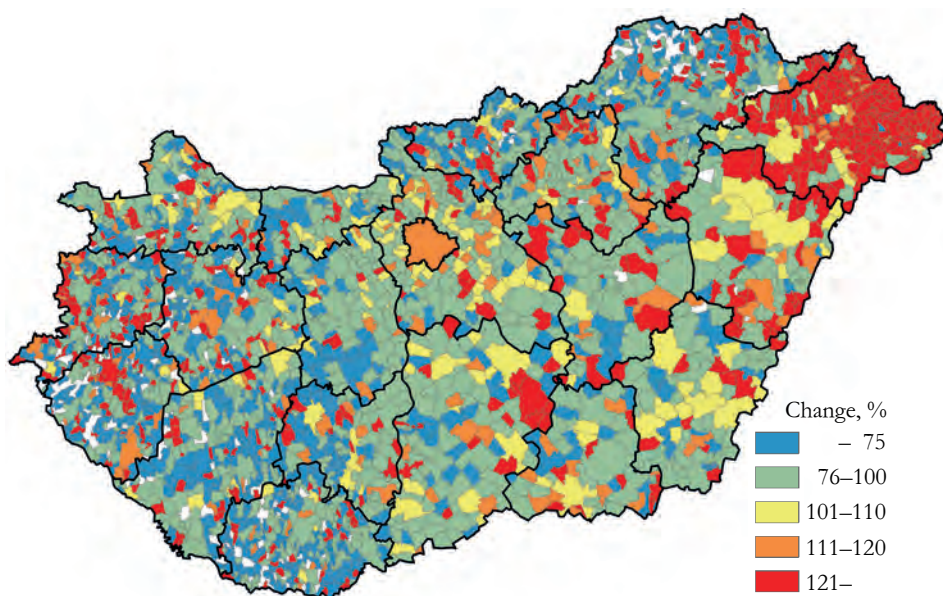


Figure 34

Changes in the relations of migration settlements of Hungarian settlements in the Carpathian Basin, 2017/2011



By 2017, the Central Hungarian region maintained its central position. In 2011, migrants arrived to Budapest from 1,361 different settlements in neighbouring countries, which increased to 1,502 by 2017 (Due to migration, Hungary had connection with a total of 1895 settlements in the neighbouring countries in 2017, and 1544 in 2011.). The connections of border counties (Vas, Zala and Szabolcs-Szatmár-Bereg) were strengthened parallel with the increase in the number of Austrian and Ukrainian migrants.

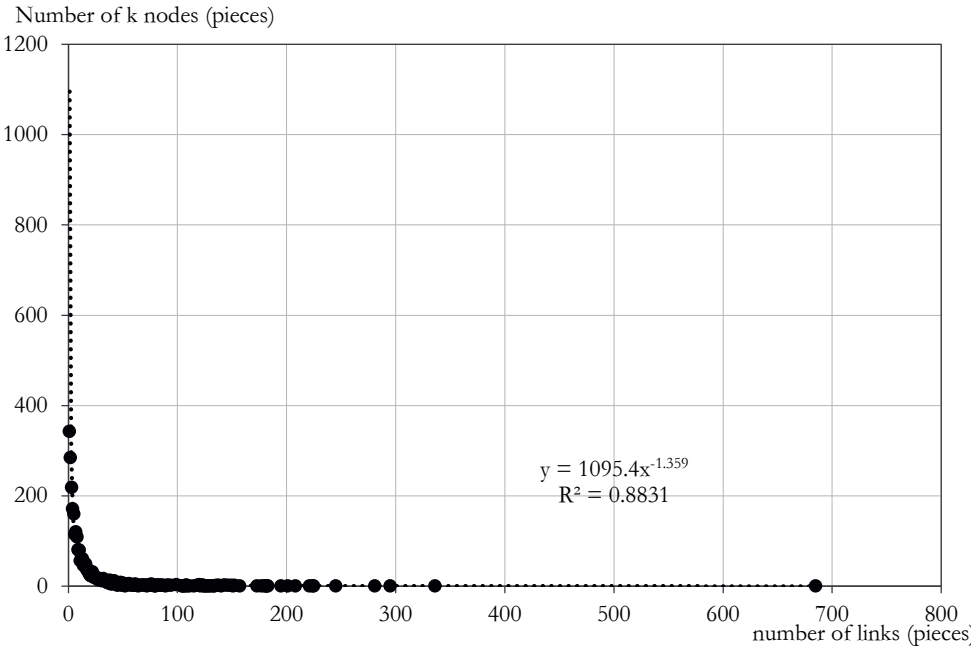
Studying the degrees (connections) of migration settlement networks, in addition to Budapest, the connectedness of Debrecen (602), Szeged (560), Pécs (534), Győr (503), Érd (481), Miskolc (462), Nyíregyháza (461), Kecskemét (445), Székesfehérvár (428), Tatabánya (353), Sopron (336) Szigetszentmiklós (328), Budaörs (325), Békéscsaba (319), Dunakeszi (306), Mosonmagyaróvár (303), Zalaegerszeg (295), Szombathely (294), i.e. the major cities and the larger settlements closer to Budapest.

Settlement relations and their dynamics imply the regional changes in the volume of future migrations. In case the degree declines (if a Hungarian settlement will have fewer links to foreign ones due to migration), it is likely that the respective sending areas are depleted or the receiving ones are saturated, the previous migration waves might have declined or other areas became more attractive to new migrants. Provided that degrees increase, the number of links expands, which could project further increase in the number of migrants due to the growth of the potentially accessible population.

After determining the number of degrees for the Hungarian settlements (the number of migration connections of Hungarian settlements with different settlements of neighbouring countries due to international migration.), it was possible to study the number of Hungarian settlements with a given degree (settlement link). The question is whether a random or a scale-free topology is constructed, or another kind. Results for Romania reflect the status in 2017:

Figure 35

*Degree distribution of settlements affected
by the Romanian-Hungarian migration, 2017*



Through migration most Hungarian settlements have a few connections with Romanian ones (there are many small-degree nodes), while there are a few settlements that have several connections. The number of Hungarian settlements with a given connection declines by the number of connections according to a power law ($R^2 \approx 0.88$). It can be concluded that the Hungarian migration settlement connections with Romania show scale-free topology. It is not only met in the case of Romania, but also for all the neighbouring countries, separately and collectively as well (Kincses Á., 2012).

Figure 36

*Degree distribution of settlements affected
by the Ukrainian-Hungarian migration, 2017*

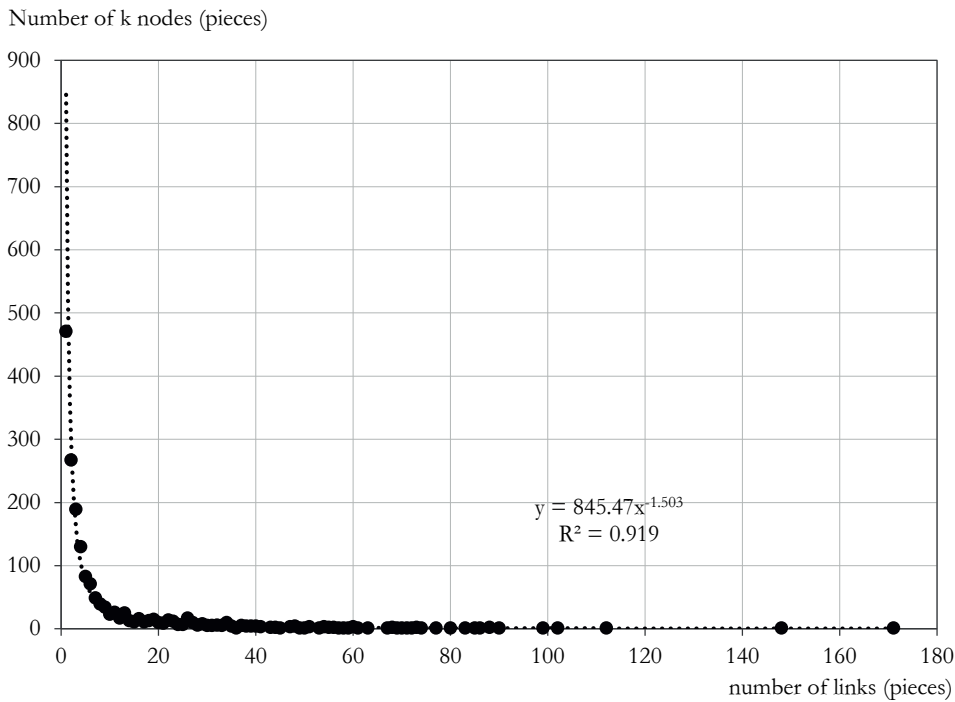


Figure 37

*Degree distribution of settlements affected
by the Serbian-Hungarian migration, 2017*

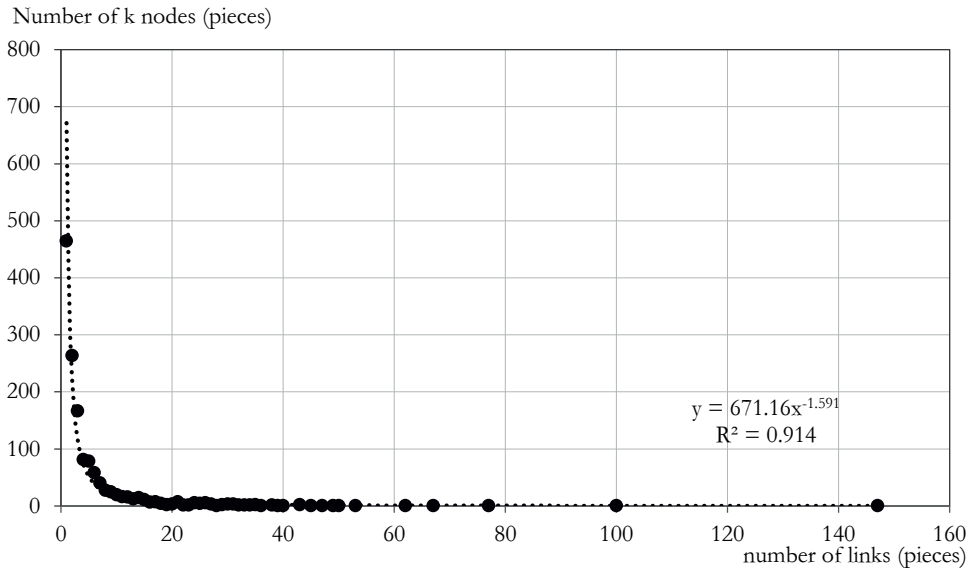


Figure 38

*Degree distribution of settlements affected
by the Slovakian-Hungarian migration, 2017*

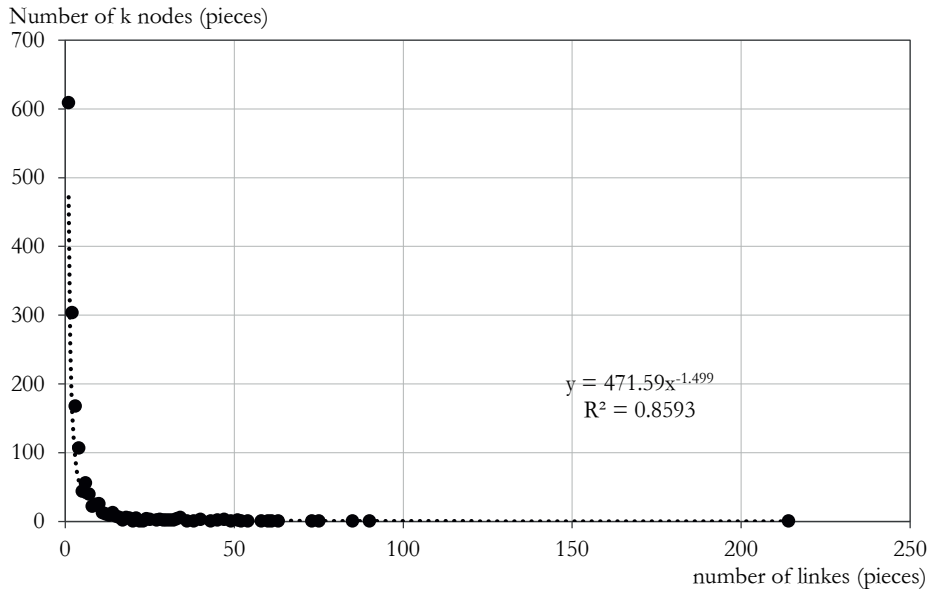


Figure 39

*Degree distribution of settlements affected
by the Austrian-Hungarian migration, 2017*

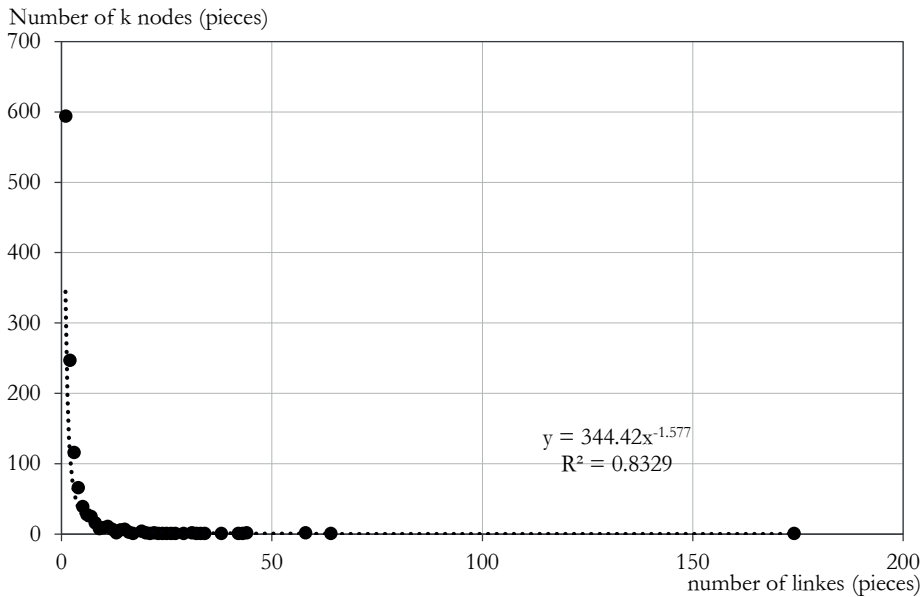


Figure 40

*Degree distribution of settlements affected
by the Croatian-Hungarian migration, 2017*

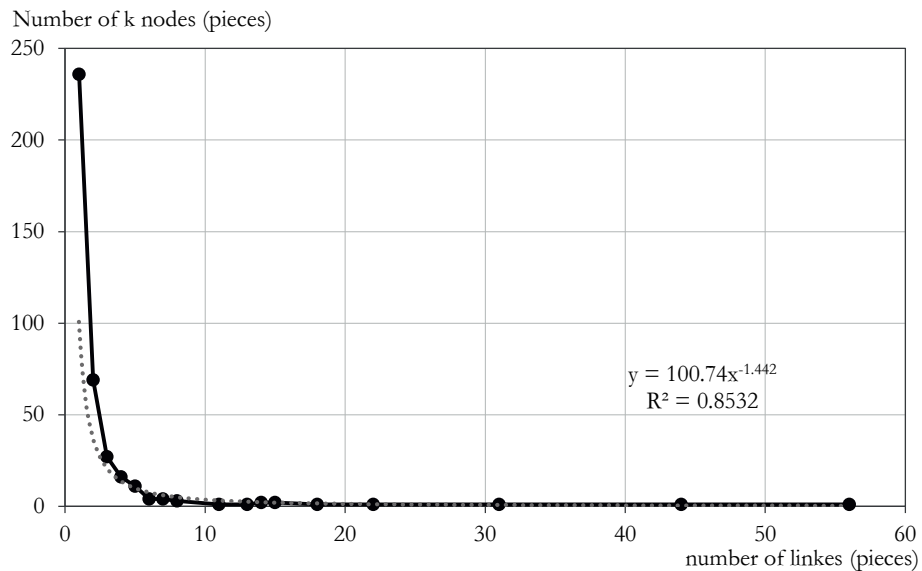


Figure 41

*Degree distribution of settlements affected
by the Slovenian-Hungarian migration, 2017*

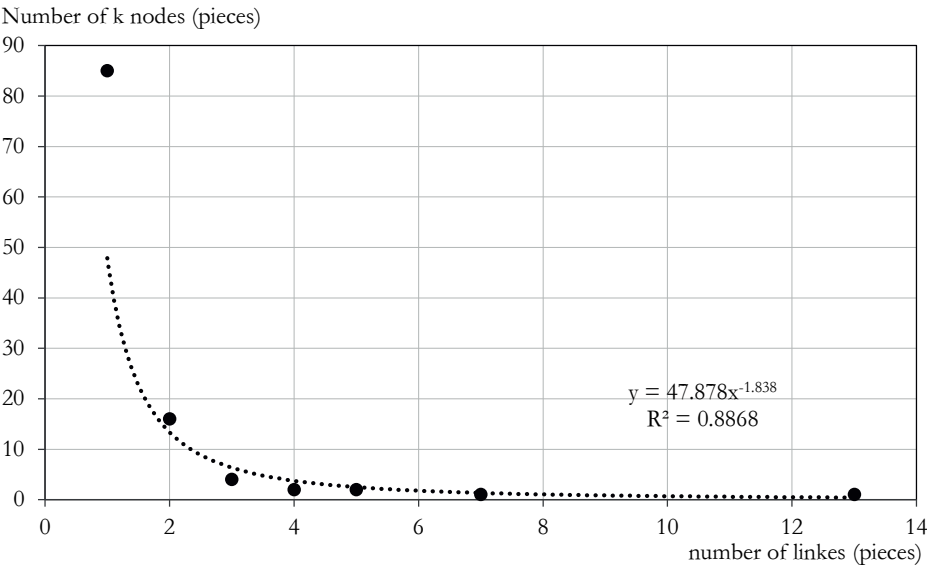
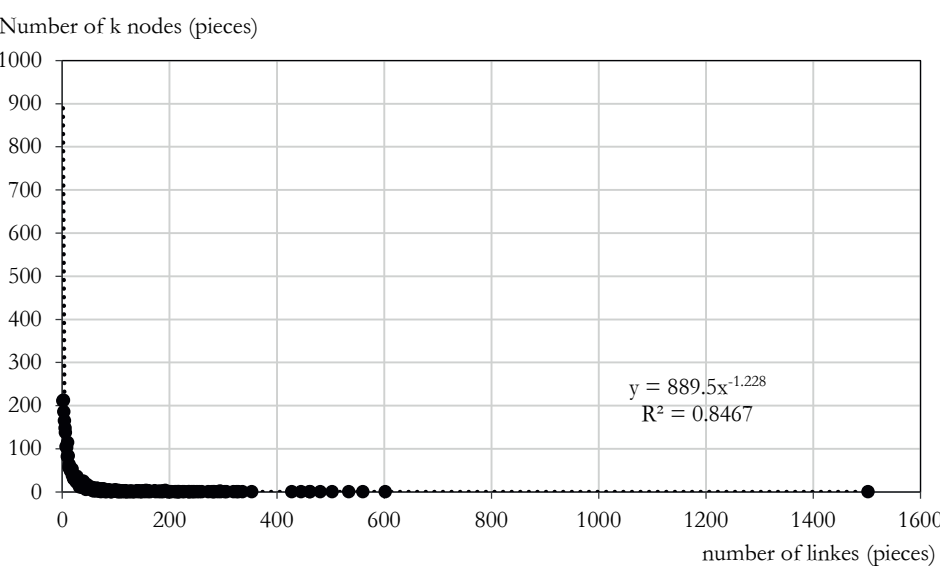


Figure 42

*Degree distribution of settlements affected
by the Neighbouring Courtiers-Hungarian migration, 2017*



The R^2 values that measure the matching accuracy are listed in the following table.

Table 14

*The fit of migration settlement degree distributions
to the scale-free topology by sending countries (R^2)*

Sending countries	2011	2017
Romania	0.87	0.88
Serbia	0.94	0.91
Ukraine	0.89	0.92
Slovakia	0.91	0.86
Austria	0.86	0.83
Croatia	0.87	0.85
Slovenia	0.99	0.89
Altogether	0.85	0.85

The question is what reasons lead to this pattern of settlement networks develop. Scale-free topology is the direct consequence of the sprawling nature of real networks (Barabási A. L., 2008). The scale-free topology identified in the migration settlement networks is justified by the settlements with more connections being much more attractive to migrants than those with fewer degrees. According to the theory of migration networks (Sandu D., 2000; Kiss T., 2007), integration into the new environment is successfully achieved where it is facilitated by previous relationships with the family and friends, as presented in Chapter 3 for global networks. With more links to the settlement, migration is therefore much more “embedded”, a larger potential migrant population and information can be obtained through family, friends, relatives and acquaintances. A migrant is more likely to choose a more popular settlement with many links, about which more information is available than one that he or she knows little about.

Thus, the emergence of migration networks can be the main influence on the direction and volume of migrations, in addition to income disparities and migration distances.

In the case of geographical migration networks, a similar topology prevails in the global (between countries) and local, Carpathian Basin relations (at the settlement level). The scale-free networks are there at the level of countries, and can also be found in the study of smaller distances at settlements levels, it fractally accompanies the migration.

It can be established universally that there are hubs of international migration. Migration connectivity between nodes (countries, settlements) are constantly increasing. At the same time, most nodes have few connections with others through migration, while few have many connections. These type of networks are interconnected by hubs with multiple connectivity capabilities. There is no average receiving area or average sending area independent of exanimated level.

The network is, however not fully centralised and none of its members has an unlimited growing relationship collecting monopoly. This type of network is much more resilient to external influences (due to its multiple centres), so as long as migration has a demographic and economic driving force, in the current global or local regulatory environment the international migration will expand, its directions can only be influenced locally (country or settlements level).

We should move forward from traditional thinking and traditional distributions. The meaning of 'average' has lost its importance gradually, there aren't average companies, migration countries, or settlements (just tiny or arbitrarily large ones).

We should focus on hubs and networks behind the numbers, if we wish to understand the globalized issues. The complex systems and their collective behaviour cannot be recognized soundly just from the knowledge of the system's components. The global perspective is crucial in gaining understanding of the full picture.

7 Summary

The current migratory trends in the world differ from those of previous centuries in the overwhelming number of migrants (in 2017, 258 million people in the world did not live in the country in which they had been born) and migrants arrive from regions from which the countries they are heading are at a huge geographical and economic distance.

In 2017, most foreign-born citizens lived in the USA, however Chile as a destination country has the largest interconnectedness in the world. In 2017, 210 people from different countries chose Chile as their new country of residence.

Migration shows strong territorial concentration, in 2017 half of the migrant population lived in nine countries. There are centres (large receiver countries) in international migration, global migration destinations that attract migrants from a greater distance.

Chile, most countries of the European Union, Australia, Brazil, South Africa are the countries where people arrive from many places, however from there people migrate just to few other countries. People emigrate from countries with large population and countries close to crisis zones to many other countries, while immigration takes place from relatively few countries. Large receiving countries, where the composition of immigrants by country of birth is diverse and countries have many inward links, are often widespread sending ones themselves. This phenomenon can partly be explained by old-age migration and partly by the return migration of descendants whose ascendants emigrated here. This data however, also highlights that, in the age of globalisation, migration is not a one-way action.

The global migration network has a scale-free topology. Countries with multiple links will be much more attractive to migrants than those with fewer degrees. The "trampled path" of emigration is to liaise with those already displaced. A migrant is more likely to choose a popular country or settlement with many links, about which more information is available than one that he or she knows little about. Thus, the emergence of migration networks can be the main

influence on the direction and volume of migrations, in addition to income disparities and migration distances.

The interconnection between countries is constantly growing, migration is expanding relations between countries and people's movement between countries is escalating. Migration also takes place between areas where there was no previously connection. As a result, the average migration distance between countries was reduced to 4 in 2017. More than one fifth of all possible country pairs are related directly or through another country.

The moderately strong degree of centralisation of the world's migration network shows that most countries have few links with other countries through migration (numerous small degree nodes), while few have many links. The network is, however not fully centralised and none of its members has an unlimited growing relationship collecting potential or monopoly. There are several central elements of the network, and there is room for "link-enhancing competition" between the elements. After all, the connection within the network varies, some countries are more connected to others, while others may lose their attractive abilities. This, nevertheless does not mean that this is also associated with a reduction in the number of migrants every time, as more people can arrive through fewer connections. This type of network is much more resilient to external influences (due to multiple centres), so as long as migration has a driving force, international migration will strengthen in the current global regulatory environment, and its directions can slightly and locally be influenced.

International migration into Hungary is markedly differentiated into two levels: the global migration effect, and the processes flowing between Hungary and its neighboring countries, which date back a long time. The main characteristic of international migration in Hungary is that the largest part of the immigrant population is of Hungarian nationality or speaks Hungarian as a native language. The strength of the linguistic and cultural relations extending beyond the border are the outcome of the peace treaties that ended World War I and World War II.

The reproduction of minorities living in the neighboring countries is not just a matter of natural demographic processes. Migration also plays a significant role. Those arriving to Hungary reduce the numbers of the Hungarian population in the place of emigration, where in most cases, regardless of this, population loss takes place due to natural demographic causes. In turn, where the number of Hungarians could grow, migration in those cases removes them, in part. On the other hand, migration, as an age-specific process, influences the socio-economic progresses of the source territories through indirect effects (through dependency rates, mean age, economically active rates, etc.). Migration to Hungary from abroad does not change the total number of Hungarians in the Carpathian Basin in the short term. However, in the long term this number declines, since they have a significant influence on the ethnic spatial structure, and locally, in the regions of emigration, with the number of Hungarians, schooling, labor market, cultural and social opportunities decrease; ethnic relations may narrow, and together with the scattering, assimilation may appear to or even accelerate.

Population movements in the late 1980s and early 1990s made it clear that the demographic processes taking place in the Hungarian linguistic community – despite the fragmentation occurring in 1918, and the nearly 100 year old ‘distributed development’ – can only fully understood if we examine them together, as a single process. It is important to recognize that demographic processes within and outside of the current border are similar in nature. Therefore, what we see happening in demographic processes in Hungary is only a part of the wider demographic processes of the Hungarian language community, but not the same. The target might not only be stopping the downsizing of the Hungarian population in Hungary, but also in the Carpathian Basin too. The realization of this is not an easy task, as it may not be in line with the national interest of the neighboring countries.

The migration processes described in this study would have a significant impact on the ethnic spatial structure and numbers of Hungarians of the Carpathian Basin, if the numbers of other ethnic

groups did not decrease in a similar fashion to the Hungarians. Strengthening the numbers of people staying in their home country, increasing the number of return migrations, and increasing the fertility rates of local Hungarians could all be part a solution to the problem. Thus, it would be a reachable goal to increase the proportion of Hungarians in the Carpathian Basin to over 50% again. Currently, the biggest barrier to this process is the loss of population, which affects the Hungarian population of the Carpathian Basin due to low fertility and high mortality rates.

Based on the results of the analysis, Central Hungary is the most attractive region to people arriving from Transylvanian counties, however Budapest is a significant hub globally for the migration network: in 2011, migrants arrived to Budapest from 1,361 different settlements in neighbouring countries, which increased to 1,502 by 2017. The growing appreciation of the capital city area is notable not only in the larger sending regions, but also in almost the entire Carpathian Basin. This finding is in particular definite for those of working-age, with higher educational attainment, working in managerial position, as well as for those living in households without children. Border areas, notably cities with county rights are considered to be important and local destinations. Active contact spaces and intense flows developed between the interconnected counties. In these cases, the proportion of migrants who move with their children is much higher, their educational attainments and occupations are more diversified, however, the differences between the economic activity of short-distance and long-distance migrants are not significant.

Through migration most Hungarian settlements have little connection to foreign territories (there are many small-degree nodes), while few settlements have many links. The amount of Hungarian settlements with a given connection declines by the number of connections according to a power law. It implies, that the settlement relations of migration from neighbouring countries to Hungary have a scale-free topology.

As a result centres, “hubs” were grown in the migration network (almost half of the foreign-linked population lives in five Hungarian settlements), which should be considered in particular when developing the migration strategy and managing the migration process.

Settlements with multiple links will be much more attractive to migrants than those with fewer degrees, it explains the scale-free topology. With more links to the settlement, migration is much more “embedded”, a larger potential migrant population and information can be obtained through family, friends, relatives and acquaintances. A migrant is more likely to choose a more popular settlement with many links, about which more information is available than one that he or she knows little about. Thus, the emergence of migration networks can be the main influence on the direction and volume of migrations, in addition to income disparities and migration distances.

This finding suggests that in the future, immigration from neighbouring countries will increase in Central Hungary (Budapest and Pest County), in some counties (Szabolcs-Szatmár-Bereg, Vas and Zala), in cities with county rights, as well as in settlements of the border area.

In the case of geographical migration networks, a similar topology prevails in the global (between countries) and local, Carpathian Basin relations (at the settlement level). The scale-free networks are there at the level of countries, and can also be found in the study of smaller distances at settlements levels, it factually accompanies the migration.

The challenges faced by official statistics in the 21st century are manifold. We are surrounded by systems that are becoming substantially more and more complex. The emergence of new phenomena, namely, globalisation, digitalisation, global demographic trends and sustainable development, added to the complex realities that need to be meaningfully and timely captured by official statistics, have resulted in the development of new patterns, routes and types of data, offering us with the opportunity to further improve the relevance of statistics. In response to these trends we

need to find new, usable tools and methods for the measurement of such changing phenomena. Network theory is an innovative tool and approach in our changing world that can help us handle the complexity of the 21st century. However, so far it has not featured in mainstream official statistics.

Official statistics offer a new field to harvest the results of network theory. Through the migration settlement's networks (from where and to where migrants move) some of the most important tangible outcomes of network analysis in official statistics are presented (including usability, degree distribution and consequence). The scale-free nature of networks has played an important role in the development of networks as a whole, as can be seen in many scientific networks and practical interest networks. This scale-free property an unavoidable issue in many disciplines. Once the hubs are present, they fundamentally change a system's behaviour. The statistics of the 21st century have had scale-free features. This means that in the globalised world different phenomena fall into networks with scale-free topology, and through these skeletons we can observe with official statistics the different phenomena that take place.

In these cases, it may be useful to bear in mind the universal peculiarity of these networks and their consequences because complex systems and their collective behaviour cannot be fully recognized purely from the outputs of the components of the system.

Thus it is essential to recognise that in case of the power-law distribution, observation units are not of the same importance, and that more attention should be paid to global networks, nodes, key units to learn the phenomenon more precisely.

We should move forward from the traditional thinking and traditional distributions. The meaning of average has gradually lost its importance, there are no averagely-sized companies (just tiny or arbitrarily large). If we want to increase the quality and relevance of statistics, we should focus on the hubs and networks behind the numbers.

Hence it is essential to recognise that

- under a power-law distribution (the observed phenomenon does not have an internal scale, thus the definition of average is very limited, it gives little information about the phenomenon itself) observation units are not equally relevant,
- Special focus should be paid to global and local networks, hubs, key units (businesses, multinational companies, settlements of key importance, global supply chains etc.) and the interaction between them.

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