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Regional distribution of immigrants in Hungary[1]

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Abstract

The purpose of this study is to analyse the territorial characteristics of foreign nationals those having migrated to Hungary. It is aimed to explore the triggers of choice of usual plan of residence and the differences by citizenship. Interrelationship between the proportion of migrants having resided in a particular area and the access by public road to it will be investigated with the help of path analysis. Firstly comparative studies on the geographical distribution of immigrants and that of former international migrants already settled in the country are to be conducted. Secondly the spatial disparities in the distribution of immigrants at micro-regional level will be identified by the potential method.

Keywords: immigrants, regional distribution, path analysis, potential method

Introduction

Since the regime change (1990) Hungary has had an international migration surplus, i.e. the number of foreigners having migrated to Hungary exceeded that of Hungarian citizens who left the country. Foreigners have become an ever increasing demographic factor in Hungary as natural population change has had a negative trend leading to an approximately 30–40 thousand population loss annually along with a concomitant positive migration balance of 10–20 thousand. On January 1 2008, 174,697 foreign citizens were on an extended stay in the country making up 1.74% of the resident population. It means that out of one hundred people almost two are foreigners. During the seven years following the turn of the millennium the ratio of foreigners increased by 61% on the national level (*Table 1*).

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Table 1. Summary data of Hungarian population

Year (January, 1)	Resident population	Foreign citizens staying in Hungary	
		Number	As a percentage of total population
2001	10,200,298	110,028	1.08
2002	10,174,853	116,429	1.14
2003	10,142,362	115,888	1.14
2004	10,116,742	130,109	1.29
2005	10,097,549	142,153	1.41
2006	10,076,581	154,430	1.53
2007	10,066,158	166,030	1.65
2008	10,045,401	174,697	1.74

Source: HCSO

Over seven years, foreigners increased in number by one-and-a-half times. Out of them, those who arrived from the countries of the Carpathian Basin (Austria, Slovakia, Ukraine, Romania, Serbia, Croatia and Slovenia) account for the majority, surpassing by 5 per cent those, who arrived from the rest of the world. Most of the former came from Romania, Ukraine and Serbia. Beside these groups a significant number of citizens of EU15 countries (mainly Germans and Austrians) live in Hungary. In the following the attention will be focused on the citizens of the neighbouring countries (*Table 2*).

Territorial distribution of foreigners

In 2001, 17% of Hungary's resident population lived in Budapest, 20% in county rank towns, 27% in other towns and 36% in villages. By 2008, in terms of proportion, those living in other towns increased up to 31% while the population of villages dropped down to 32% while there were no changes in the first two categories.

As far as foreign residents were regarded, Budapest was already strongly over-represented (35%) in 2001, which coincides with international trends, as capital cities are primary target destinations for migrants. This impact is showed in a more expressed way by those who arrived from outside the European continent (77% of Asians live in the capital city). Working-age people account for an even larger proportion when taking into consideration all towns, while in the villages the pensioners account for a bulk of migrants.

Over the analysed seven years, on the one hand, the pull force of Budapest strongly increased among foreigners (43%), concomitant with a decrease in the proportion of county rank towns, along with constant rates of smaller towns and villages.

Table 2. Foreign citizens staying in Hungary by citizenship (January 1)

Country	2001	2002	2003	2004	2005	2006	2007	2008
Austria	694	785	750	780	544	1,494	2,225	2,571
France	511	601	711	765	330	1,316	1,506	1,481
Netherlands	324	346	373	415	236	666	1,096	1,201
United Kingdom	624	700	872	963	440	1,451	1,911	2,107
Germany	7,493	7,676	7,100	7,393	6,908	10,504	15,037	14,436
Italy	542	563	545	551	404	777	1,020	1,207
EU–15	11,723	12,181	11,629	12,143	9,714	18,357	25,394	25,490
Croatia	917	931	800	902	837	778	813	852
Poland	2,279	2,227	1,945	2,196	2,178	2,364	2,681	2,645
Russia	1,893	2,048	1,794	2,244	2,642	2,759	2,760	2,787
Romania	41,561	44,977	47,281	55,676	67,529	66,183	66,951	65,836
Serbia	12,664	11,975	11,693	12,367	13,643	12,111	12,638	17,186
Slovakia	1,576	2,213	1,536	2,472	1,225	3,597	4,276	4,944
Slovenia	82	88	65	81	34	79	115	133
Turkey	455	544	469	557	615	756	886	1,120
Ukraine	8,947	9,835	9,853	13,096	13,933	15,337	15,866	17,289
Other European	20,584	21,088	21,552	22,915	24,493	24,307	25,314	26,272
Neighbouring countries	66,359	70,716	71,913	85,293	97,711	99,579	102,769	108,811
Europe	93,197	97,640	98,230	110,915	122,261	130,535	140,827	146,145
Asia	12,603	14,401	13,480	14,715	15,121	18,543	19,733	22,356
America	2,488	2,557	2,434	2,535	2,667	2,989	3,075	3,557
Africa	1,233	1,318	1,281	1,455	1,556	1,800	1,783	1,913
Other and unknown	507	513	463	489	548	563	612	726
Total	*110,028*	*116,429*	*115,888*	*130,109*	*142,153*	*154,430*	*166,030*	*174,697*

Source: HCSO, own edition

Reasons behind the territorial distribution of foreigners

According to the neoclassical theory (Hamilton, B. *et al.* 1984; Venables, A.J. 1998) flows of humans on the macro level are determined by the push and pull factors of capital and labour. On micro level it is the regional differences in incomes that generate a motivation to move (Hatton, T.J. and Williamson, J.G. 2005). The population tends to be increasingly mobile in areas where considerable disparities of incomes can be identified. Other motivating factors are the individual skills and abilities of the migrants as well as intentions to improve life circumstances (Borjas, G.J. 1996; Williamson, J.G. 2006). In the opinion of the authors, in the distribution pattern of foreigners, beside these main economic motivation factors identified by the literature an important role is played by the attraction of the metropolitan area of the capital city (Rédei, M. 2007; Papademetriou, D.G. 2006) as a significant focus of migration and also that of border areas due to the neighbourhood of source countries.

In consequence of a great number of citizens from the neighbour countries geographic location has a great significance in the case of migration affect-

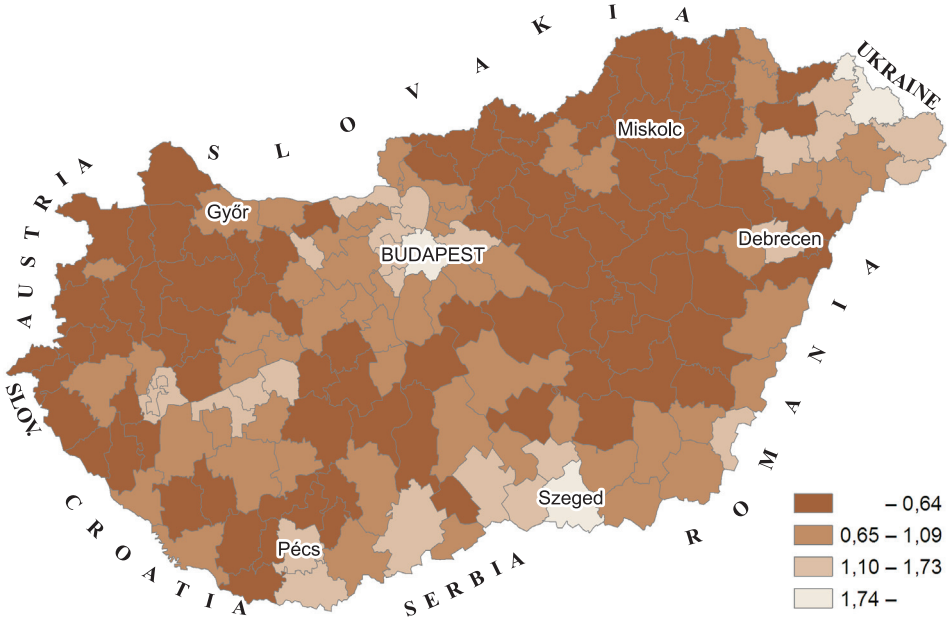
ing Hungary (Rédei, M. 2007). As it is illustrated by *Figure 1* in the surroundings of Lake Balaton, Budapest and Pest County as well as in micro-regions[4] on the Ukrainian, Romanian and Serbian borders, foreigners accounted for a greater proportion than elsewhere in 2001. Similar concentration of foreigners is not typical along the Croatian, Slovenian, Slovakian and Austrian borders. On the one hand this may be explained by the less numerous populations of these groups in Hungary, on the other hand, by smaller "differences in potential" compared with those that are observed along the Serbian and Romanian border sections. The above areas (centre and hinterlands) and their surroundings experienced an increase in the percentage of foreigners within the resident population from 2001 to 2008.

In Hungary the following general characteristic were found in the territorial distribution of international migrants. The overwhelming part of foreigners live in Budapest and its surroundings, a smaller proportion of them is a resident of micro-regions near the borders as well as in the surroundings of Lake Balaton. Citizens from the EU15, in addition to Budapest and its agglomeration, give preference to settle in the western part of the country (Illés, S. 2004), mainly in Győr-Moson-Sopron and Somogy counties.

Romanian citizens are the most diffused in their geographical distribution; they live in large numbers along the Romanian border, in the capital city and in Western Hungary. The Serbs cluster in a wedge determined by the common border and Budapest. The Slovaks are concentrated in Northern Hungary and in the surroundings of Budapest, while for the Ukrainians, in addition to Budapest, those micro-regions are the most attractive ones which are near to their source country. In short, it might be said that for those foreign nationals who have come to Hungary from the neighbouring countries Budapest and Pest County are unambiguously attractive destinations beside those micro-regions which are nearer to that country which corresponds to their citizenship, i.e. mainly close to the Romanian, Ukrainian and Serbian border sections. It is important to note that the foreigners show an interest to settle down also in places where a human resource injection is needed, like Southern Transdanubia or North East Hungary.

[4] The system of micro-regions (formerly attraction zones of micro-regions) covers the whole country. Micro-regions do not cross county borders. Every settlement belongs to one micro-region, though through their relationship settlements may be attracted by one or more central settlements. The present system of micro-regions has contained 174 micro-regions since 25th September 2007 on the basis of Act CVII of 2007. In most cases the professionals of regional analyses use this level in their work. The system of Hungarian micro-regions fits the first LAU level in the European regional breakdown. At the local level, two levels of Local Administrative Units (LAU) have been defined in the European Union. The upper LAU level (LAU level 1, formerly NUTS level 4) is defined for most, but not all of the countries. The second LAU level (formerly NUTS level 5) consists of about 120 000 municipalities or equivalent units in the 27 EU Member States.

Proportion of foreigners per 100 residents, January 1, 2001



Proportion of foreigners per 100 residents, January 1, 2008

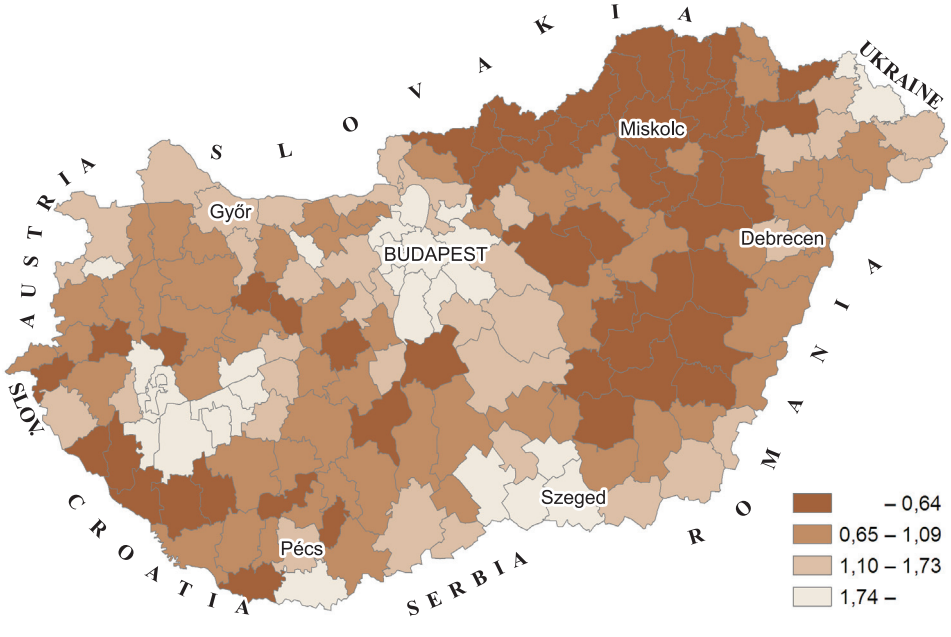


Fig. 1 Regional distribution of the foreigners by LAU1 level, 2001–2008. *Source:* HCSO, own edition

Previously, location theories observed the border regions as traditionally backward areas, first of all because borders hampered international trade flows and because they were threatened by possible military invasions (Anderson, J. and O'down, L. 1999). National borders have a negative effect on a regional economy, because these artificially cut off spatially interrelated regions and increase transaction costs. Different taxes, languages, cultures (though in the case of borders in concern these last two cases are not valid) and business practices hamper the cross border trade – these are a basis for potential political and social instability at border regions – which discourage domestic and foreign producers to settle down in these regions (Hansen, N. 1977).

A change in this unfavourable image, as a result of a greater international integration (Papademetriou, D.G. 2006) – with the help of eliminating trade barriers and international borders (Van Geenhuizen, M. and Ratti, R. 2001) – represents a new perspective of growth in border regions (Contessi, S. 2001; Traistaru, I. *et al.* 2002) in the first place because of geographical accessibility to large potential markets as occurred in 1993 in Europe with the establishment of a single market and after the establishment of NAFTA (Krugman, P. and Venables, A.J. 1996; Krugman, P. 1998).

Applying path analysis to examine the territorial distribution of foreign population groups

In the present analysis of the most populous groups of foreigners that live in Hungary (from Romania, Serbia, Slovakia, EU15 and Ukraine) the causes of their territorial distribution will be analysed. As it was seen, the literature put an emphasis of living standards and differences in payments as pull factors but the location of settlements is prioritised, too, and this geographic factor will be examined in a somewhat more detail.

With the help of path analysis, between 2001 and 2008, the average proportion of foreigners by micro-regions is to be examined by factors. In this analysis, in the first place it was aimed to identify correlation between public road access to micro-regions and the proportion of immigrants.

Zero order linear correlations of independent and dependent variables are broken down into two parts in the path models. One part is the effect that our independent variables directly have on a dependent variable; the other part is the effect that is produced by independent variables through other intermediate variables (Duncan, O.D. 1966; Alwin, D.F. and Hauser R.M. 1975; Székhelyi, M. and Barna, I. 2008).

Path analysis is a series of estimations of ordinary least squares built upon each other. In step 1 it is examined what an impact the primary variables have upon the indicators of a secondary group; there are as many regressions

as secondary variables. In step 2 it is examined how the primary and secondary variables jointly impact the tertiary ones. At last a regression is found, where all variables are put together. The impact of significant indicators is analysed jointly with the explored paths (Németh, N. 2008).

The following indicators were involved in our analysis:

Accessibility

– For micro-regional centres, travel distance on public road from the "corresponding" border crossing in minutes (BORDER).

– For micro-regional centres, travel distance on public road from Budapest in minutes (BUDAPEST).

Economic situation

– Personal cars per thousand residents as an average of 2000–2007 (CAR).

– Shops and stores that sell food per thousand residents as an average of 2000–2007 (SHOPS).

– Earning per taxpayer as an average of 2000–2007 (EARNING)

– Active enterprises per thousand residents as an average of 2000–2006 (ENTERPRISES).

Social situation

– Natural increase/decrease per thousand residents, 2000–2007 (DECREASE).

– Migration balance per thousand residents, 2000–2007 (MIGRATION)

– Indicted cases per thousand residents as an average of 2001–2007 (CRIME).

– Ratio of those with secondary and higher qualifications to the resident population, %, 2001 (QUALIFICATION).

Territorial distribution of migrants

– Ratio of immigrants from a given country to the resident population, 2000 (RATIO).

These values are regarded as independent variables that explain the proportion of foreigners with a given citizenship, which constitute the dependent variable.

In this way concerning the territorial distribution of migrants four groups of variables were put together as a total. Over our examinations, there were more indicators in the individual groups of variables, which were excluded from our system as a result of preliminary calculations.

In relation to the single indicator groups the following hypotheses were devised.

Accessibility: the nearer is the given micro-region to Budapest as well as to the corresponding border section, the higher is the proportion of foreigners.

Economic situation: the more significant is the economic weight of a micro-region, the higher is the proportion of foreigners.

Social situation: the more favourable is the demographic situation and the higher is the educational attainment of the population as well as the lower is the rate of criminal offences, the higher is the proportion of foreigners in the micro-region.

Territorial distribution of former immigrants: the higher was the proportion of migrants in previous times, the higher it is going to be in the analysed period, too.

According to our presumptions the primary explanatory factors (accessibility) influence differences in secondary factors (economic situation, social situation), which were analysed in detail in an article on this topic (Hardi, T. 2008), which in turn exert an impact on tertiary factors (territorial distribution of migrants in previous times). Another assumption is that the primary and secondary explanatory factors have an influence on the proportion of migrants not only in an indirect but in an independent way. (The arrows in *Figure 2* are to illustrate this relationship in causality).

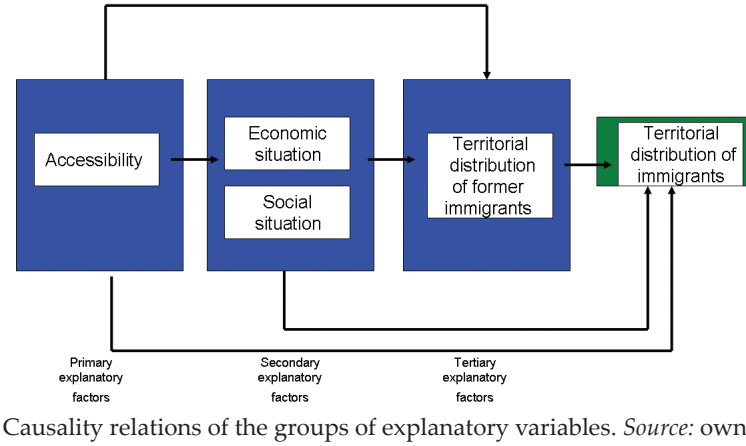


Fig. 2. Causality relations of the groups of explanatory variables. *Source:* own edition

As a starting phase for the path analysis with a simple multivariate regression along with all independent variables based on micro-regional data, an attempt was made to explain the proportion of foreigners by citizenship. Our results are summarised in *Table 3*. Of them, on the one hand it may be pointed out that the variables involved in the analysis jointly explain with an R^2 value of between 0.83 and 0.99 the proportion of the population with a proper citizenship in the resident population, on the other hand, significant differences by citizenship may be found in the weight of the explanatory factors. Further it should be stated that the proportion of earlier migrants by micro-region has the most significant explanatory meaning in all cases, i.e. the newly arrived foreigners are distributed in line with the existing pattern.

Table 3. Regression results

Dependent variable	Denomination	EU15	Serbia	Romania	Slovakia	Ukraine
β1	Border	-0.212	-0.014	0.006	-0.123	-0.022
β2	Budapest	0.034	0.008	-0.065	0.016	0.016
β3	Car	-0.058	0.039	0.170	0.100	0.023
β4	Shops	0.077	-0.017	-0.023	0.044	0.027
β5	Earning	-0.413	0.006	0.051	0.032	0.053
β6	Enterprises	-0.096	-0.016	-0.138	-0.182	0.025
β7	Decrease	0.006	0.001	0.038	-0.014	-0.001
β8	Migration	0.150	0.007	0.044	-0.031	0.004
β9	Crime	-0.016	-0.003	-0.015	0.086	-0.018
β10	Kpfe	0.215	-0.022	-0.059	0.095	-0.016
β11	Ratio	0.838	0.983	0.863	0.817	0.971
R^2	–	0.830	0.990	0.920	0.820	0.960

With the help of the path analysis, however, only with the geographic location of micro-regions (distance from the corresponding border and from Budapest) it was attempted to explain the proportion of foreigners and to show the importance of the geographic proximity. The location may have a direct and, through other variables, an indirect influence, which will also be quantified. As we have two independent primary variables so the betas of binary linear regressions are broken down into indirect and direct parts by this procedure in an additive way. The schematic system of our path analysis is illustrated by *Figure 2*.

As a next step the relations will be analysed among accessibility and the ratios of migrant groups to a resident population at micro-regional level, in the beginning irrespective of their indirect or direct role.

Table 4 is to illustrate steepness at a "simple" binary regression; R is to measure closeness at this stochastic relationship. R^2 is to show in percentages how the geographic location explains the dispersion of micro-regional

distribution for foreigners with a given citizenship. So we can conclude that the geographic location explains in itself in 22–30% of the micro-regional variances for foreigners with a given citizenship; that is why the geographic location plays a significant role when the foreigners choose a place of residence in Hungary. To be fair, it has to be noted, based on *Table 3*, that for the foreigners plays an even greater role in an informed decision to choose a domicile. They will settle down with a high probability in those micro- regions where their compatriots already live in greater numbers, who will help them in the process of management of migration, in the adaptation, in solving administrative problems, in looking for a job, in the issue of housing in general the process of integration.

In the terminology of *Table 4*, the nearest corresponding border when analysing the countries of EU15 is the Austrian border, while in other cases the borders corresponding to citizenships. In a regression the steepness at these variables being negative means that when moving away from the border, the analysed group with a foreign citizenship as a rule accounts for a decreasing proportion, whereas positive regression indicates an increasing proportion. In a similar way, if those betas, which belong to the access time of Budapest are negative, then when moving away from the capital city the foreigners, on average, will account for a decreasing proportion of the resident population, however, in case of a positive steepness for an increasing proportion. As it can

Table 4. Binary regression results between accessibility and migrants' proportions

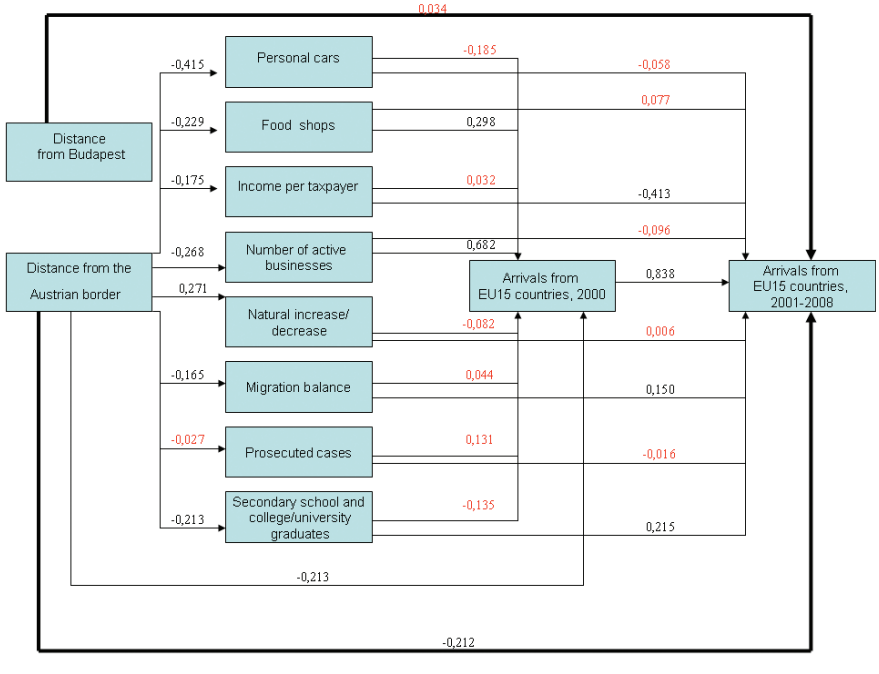
Coefficients	Time to access the nearest border crossing point, 2008	Time to access Budapest, 2008
EU15		
β	-0.509	0.141
R^2	0.221	
Romania		
β	-0.193	-0.488
R^2	0.259	
Serbia		
β	-0.575	0.203
R^2	0.284	
Slovakia		
β	-0.516	0.076
R^2	0.236	
Ukraine		
β	-0.489	0.228
R^2	0.303	

Source: HCSO, own calculation

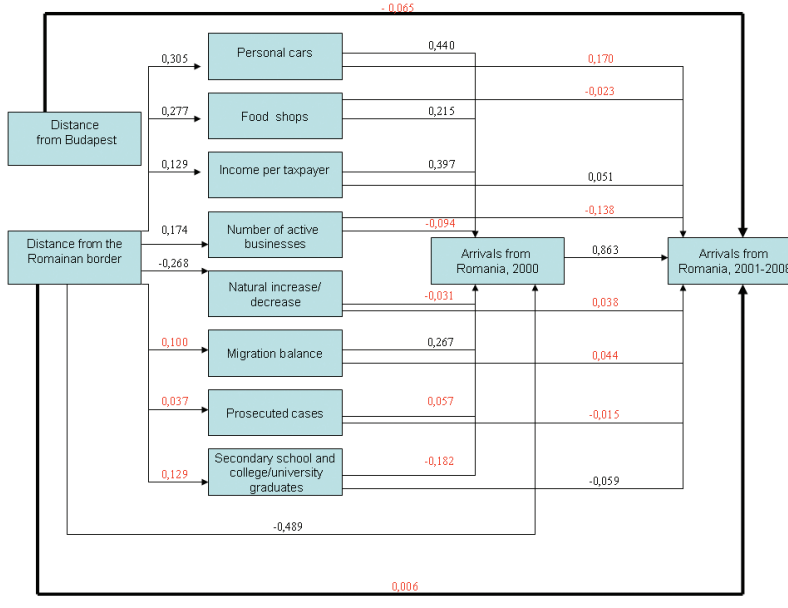
be seen at data on *Table 4* – with the exception of those who migrated from Romania – in all cases the distance measured from border crossings is longer than the distance measured from Budapest, which is shown by the difference between standardized betas. That is in addition to the central character of the capital city, borders play a significant role in the geography of migration.

In the further part of the path analysis the beta value was broken down into direct and indirect paths. To this effect, in the first place it was analysed that out of primary characters (accessibility) which and how influence the secondary ones (economic situation, social situation). This operation began with the distances measured from the border:

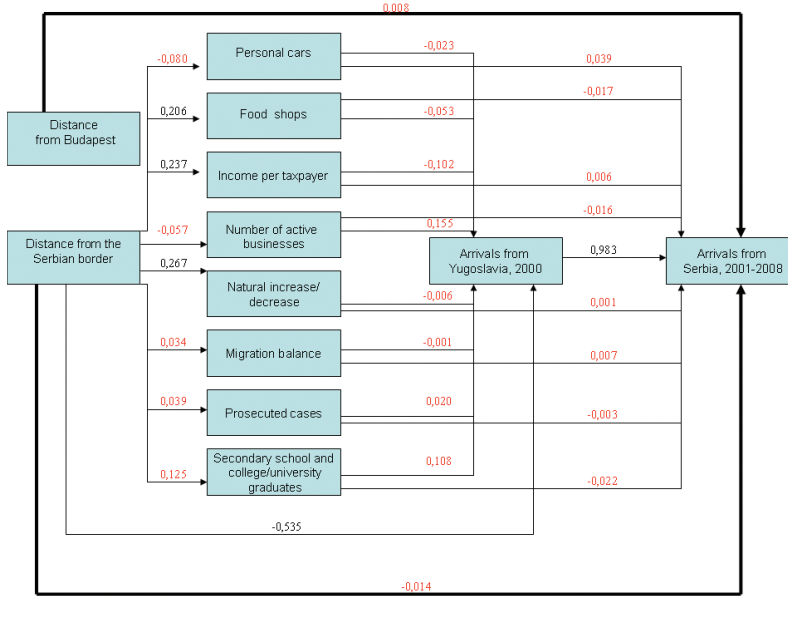
The distance measured from the Austrian border – except indicted cases – produces a significant effect on all analysed secondary factors (in case of *Annex 1–5* non-significant values are marked with grey). Signs in most cases are negative that is why there is higher development, better provision and school attainment, etc. nearer to the border. There is only one positive sign for natural change (increase/decrease), which is in conjunction with the present demographic processes in Hungary. The closest correlation may be seen between car ownership and the distance from the Austrian border (*Annex 1*).



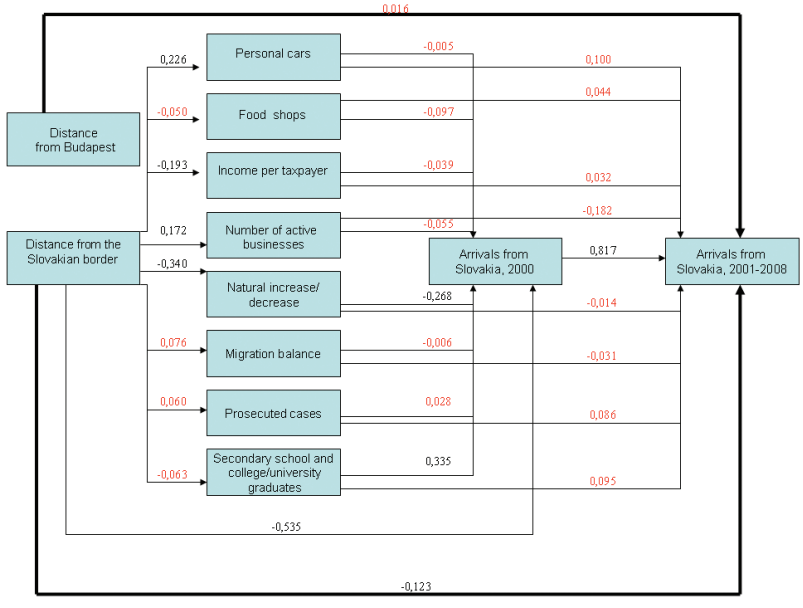
Annex 1. The role of distance from the Austrian border in explaining the tatio of immigrants from EU15 countries within total population in 2001–2008. *Source:* HCSO, own edition



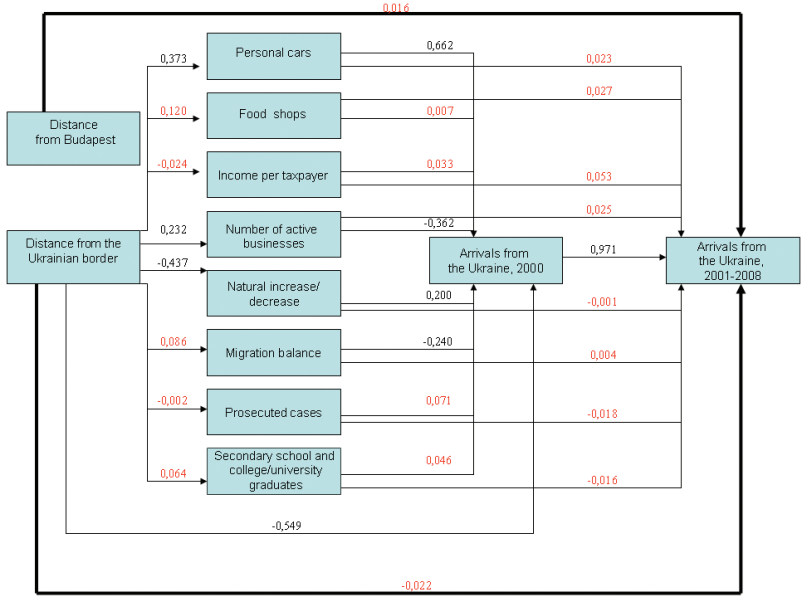
Annex 2. The role of distance from the Romanian border in explaining the ratio of immigrants from Romania within total population in 2001–2008. *Source:* HCSO, own edition



Annex 3. The role of distance from the Serbian border in explaining the ratio of immigrants from Serbia within total population in 2001–2008. *Source:* HCSO, own edition



Annex 4. The role of distance from the Slovak border in explaining the ratio of immigrants from Slovakia within total population in 2001–2008. *Source:* HCSO, own edition



Annex 5. The role of distance from the Ukrainian border in explaining the ratio of immigrants from Ukraine within total population in 2001–2008. *Source:* HCSO, own edition

The distance measured from the Romanian border (*Annex 2*) is insignificant in connection with the migration balance, criminal offences and educational attainment; concerning other secondary indicators it exerts a different influence as we may have seen before. Against the distance measured from the Austrian border, here the signs are mainly positive that is the socio-economic situation is improving when moving away from the border; so the border zone may be characterized unambiguously as a periphery. In this respect the distance measured from the border is in the closest correlation with the car density. However, natural change shows a decrease when moving away from the border.

The distance measured from the Serbian border produces a significant effect on only three secondary indicators (*Annex 3*). When moving away from the border there is an improvement in provision with food shops, in income per taxpayer and in natural increase.

The distance measured from the Slovakian border exerts a significant influence on car ownership, income per taxpayer, density of enterprises and natural increase (*Annex 4*). When moving away from this border there is an increase in car ownership as well as in enterprise density and a decrease in productivity and natural increase.

At last the distance measured from the Ukrainian border exerts a significant influence on three secondary variables too (*Annex 5*). When moving away from the border there is an increase in car and enterprise density as well as a drop in natural change. The distance measured from the border is the closest for this last indicator. Distances measured from the Serbian, Slovakian and Ukrainian borders were in the closest correlation with the natural increase.

Closeness among primary and secondary indicators may be analysed with the help of a determination coefficient, which shows how accessibility indicators explain difference from the average of socio-economic indicators. It may be pointed out that the inequality indicators first of all explain dispersion at the migration balance, car ownership and productivity (accessibility interprets more than one third of dispersion in case of all the three). In spite of this, the weighed determination coefficient for criminal offences is only 5%, the lowest for the analysed indicators.

After analysing how the primary and secondary explanatory factors relate each other we should focus our attention on how these variables impact the tertiary ones.

In 2000, the ratio of arrivals from EU15 countries to the resident population was directly and significantly influenced by the distance measured from the Austrian border as well as the effect of this may be felt through specific data of food shops and the business density (*Annex 1*). Of these three paths the direct one is the strongest. In this case the sign is negative, i.e. considering 2000 there was also a decrease in arrivals from EU15 countries when moving away from the border.

In one respect, in 2000, the distance measured from the Romanian border produced a direct and significant effect on the ratio of those who came from Romania as well as its effect could be felt through the provision with cars and food shops and the productivity (*Annex 2*). Of the analyzed paths the direct impact of the distance measured from the border is the strongest and has a negative sign, i.e. there was also a decrease in the ratio of arrivals from Romania in 2000 along with an increase in distance.

In 2000, there was a significant correlation between arrivals from Romania and the distance measured from the Romanian border, an impact was also felt through car and food shop provision as well as productivity (*Annex 2*). At the analyzed paths the distance from the border has the strongest direct effect with a negative sign, i.e. there was a decrease in the ratio of arrivals from Romania along with an increase in distance already in 2000.

In 2000 only the distance measured from the Serbian border has a significant effect on the ratio of arrivals from Yugoslavia; there is no significant correlation through the secondary factors. There is a decrease in the share of migrants along with an increase in the distance measured from the border (*Annex 3*).

In 2000, on the one hand, the distance measured from the border had a direct effect on the ratio of those who came from Slovakia; on the other hand, it also had an indirect effect through the natural increase/decrease. Of the two indicated paths the direct one is the stronger and it has a negative sign, i.e. there is a decrease in the share of immigrants along with an increase in distance (*Annex 4*).

At last, in 2000, there was a direct, significant correlation between the distance measured from the Ukrainian border and the ratio of migrants from Ukraine to the resident population (of all border sections here is the strongest direct impact), as well as an indirect effect expressed through car and business density as well as natural increase/decrease (*Annex 5*).

When observing how tertiary variables impact dependent ones it can be pointed out that this is significant in all cases and shows the strongest standardized beta-coefficient. It means that based on our model, the share of migrants is mostly influenced by the territorial distribution of earlier migrants. The highest standardised beta-coefficient can be observed with the immigrants from Serbia.

Considering the model as a whole, in 2001 and 2008, there was a significant correlation between the distance from the border and the average share of immigrants from the EU15 and Serbia. It is not true at the distance measured from Budapest, which is not significant in any case when considering its direct impacts. Of course it does not mean that there is no correlation between the distance measured from Budapest and the ratio of immigrants within the resident population. That has effects not in a direct way but rather through different socio-economic factors. So this part of the path analysis is not detailed

separately in the present article, but due to the later results these calculations are also shown in *Annex 1–5.*

After identifying the "path strengths" in our model identification started as to the accessibility impact upon the territorial distribution of migrants. The question is how accessibility indicators (directly or, through other factors, indirectly) impact the ratio of immigrants by citizenship.

When look at the variable for the distance measured from the Austrian border, as it can be seen in *Annex 1* this primary factor has a direct impact of -0.2123. On the one hand indirect paths may go over the primary, secondary and tertiary variables, at this time all ways have to be added together from the onset to the dependent variable, while the proper path sections have to be multiplied together, i.e. (irrespective of significances): (-0,4148*-0,1847*0,838)+(-0,2291*0,2976*0,838)+(-0,1749*0,0324*0,838)+(-0,268*0,6817*0,838)+(0,2714*-0,0822*0,838)+(-0,1653*0,0435*0,838)+(-0,027*0,1306*0,838)+(-0,2125*-0,1349*0,838)=-0,15463.

Furthermore through the primary and secondary variables: (-0,4148*-0,058)+(-0,2291*0,07725)+(-0,1749*-0,413)+(-0,2682*-0,0958)+(0,2714*0,00642)+(-0,1653*0,1496)+(-0,027*-0,0163)+(-0,2125*0,21524)=0,03599.

Or through the primary and tertiary variables: -0,2126*0,838=-0,1782.

So the indirect effects as a total: -0,15463+0,03599+-0,1782=-0,2968.

Together with the direct effects: -0,2968+-0,2123=-0,5092. I.e. a partial steepness appearing in *Table 4* is obtained.

Total paths were calculated for the analyzed citizenships and for both accessibility indicators. The results are contained by *Table 5*.

In general it can be pointed out that in all cases accessibility indicators has no direct impact but first of all an indirect one described by socio-economic indicators.

An analysis of the foreigners' places of residence in Hungary by an indicator on location potential

As it was seen, the attractive target area in Hungary for a foreigner migrant is one where his/her compatriots with the same citizenship live (Sik, E. 1999). So with the help of a location potential indicator it could be visualised how the foreigners with a different citizenship see the area of the country as a potential destination to settle down. The used accessibility potential was calculated from the Hansen type gravitational model (Hansen, N. 1977).

During the research, in the way that was described previously a gravitation analogy based model was calculated with a linear resistance factor (Tóth, G. and Kincses, Á. 2007). For accessible destinations, volumes were

Table 5. The role of direct and indirect paths in explaining the share of immigrants within total population (standardised B coefficients)

Coefficients	Access time for the nearest corresponding border crossing, 2008	Access time for Budapest, 2008
	EU15	
indirect	-0.297	0.106
direct	-0.212	0.034
total	*-0.509*	*0.141*
R^2	0.221	
	Romania	
indirect	-0.199	-0.424
direct	0.006	-0.065
total	*-0.193*	*-0.488*
R^2	0.259	
	Serbia	
indirect	-0.562	0.195
direct	-0.014	0.008
total	*-0.575*	*0.203*
R^2	0.284	
	Slovakia	
indirect	-0.393	0.060
direct	-0.123	0.016
total	*-0.516*	*0.076*
R^2	0.236	
	Ukraine	
indirect	-0.467	0.212
direct	-0.022	0.016
total	*-0.489*	*0.228*
R^2	0.303	

Source: HSCO, own edition

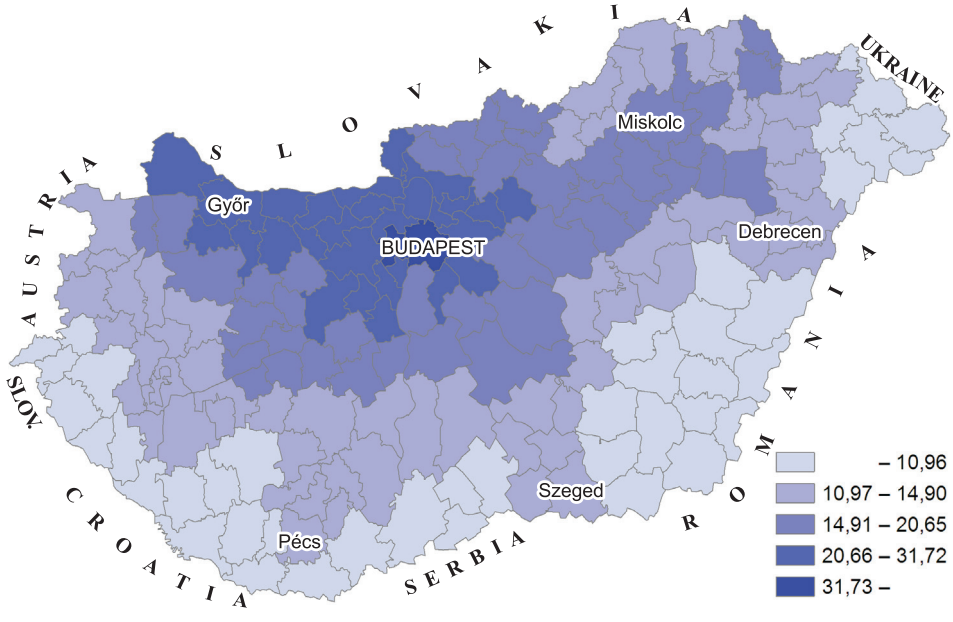
determined based on the population with a corresponding nationality in single micro-regions. This present analysis takes into account what accessibility conditions are in a given area, i.e. accessible destinations in the area. Based on our model, the potential in point I of the space:

$$P_i = \sum_{j \neq i} \frac{B_j}{d_{ij}} + \frac{B_i}{d_i}$$

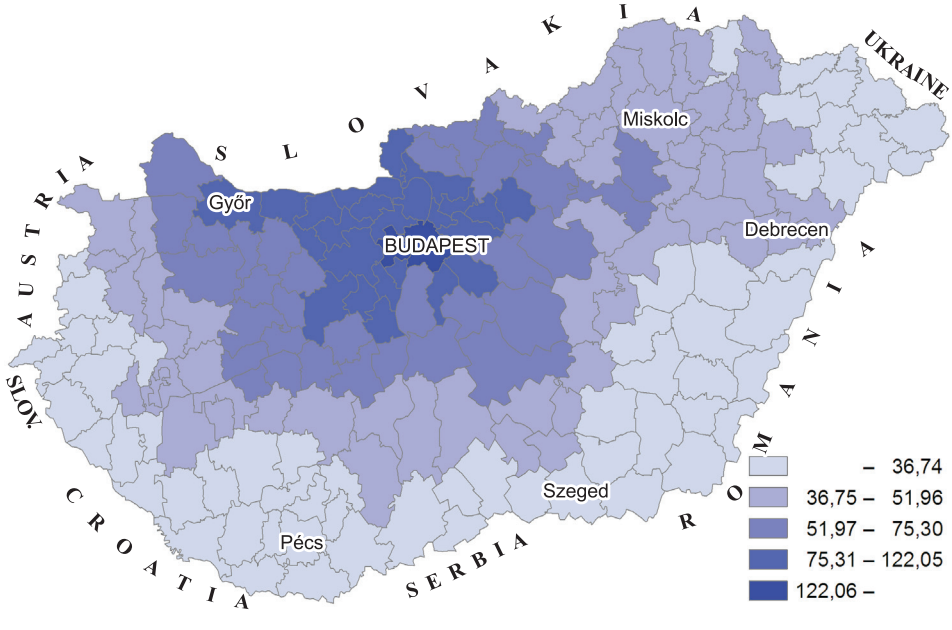
where B_i, B_j volumes for accessible destinations d_{ij} distances between I and j micro-region centres in minutes, while d_i is the own distance (in minutes), which can be calculated in a way that for the area of a given micro-region regarded as a circle, a radius is determined, which is considered as proportional with intra-micro-regional public road distances and the time required to cover this radius is regarded as an own distance.

In case of EU15, Serbian, Romanian, Slovakian and Ukrainian citizens micro-regional potential values are mapped in 2001 and 2008 (*Figure 3*).

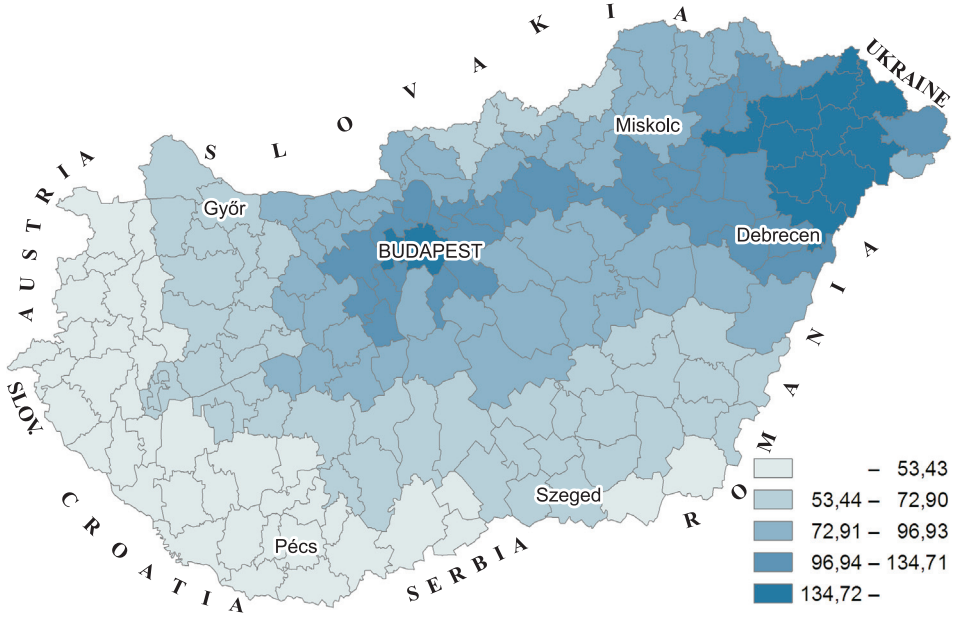
Slovakian citizens, 2001



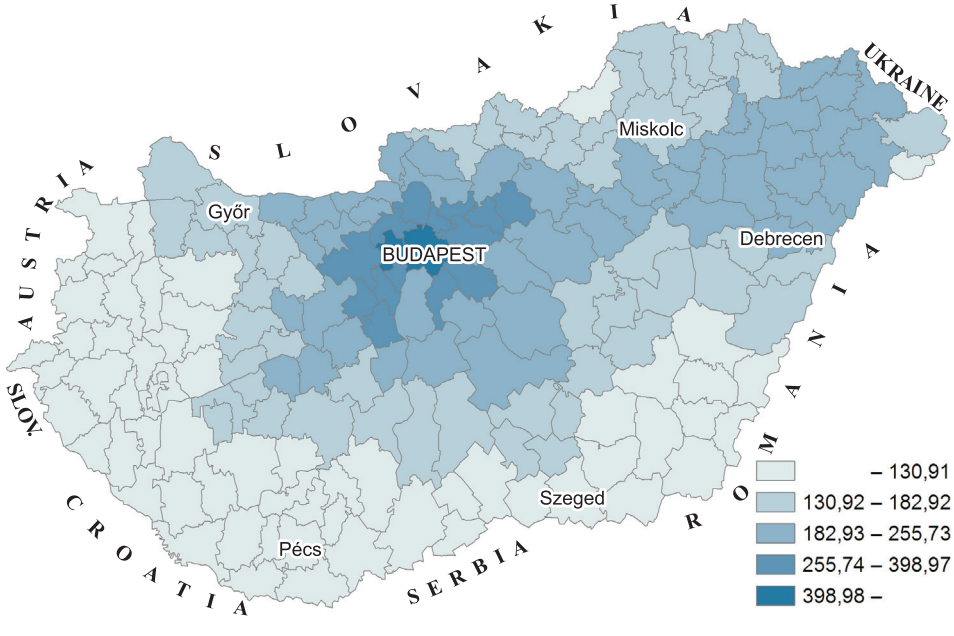
Slovakian citizens, 2008



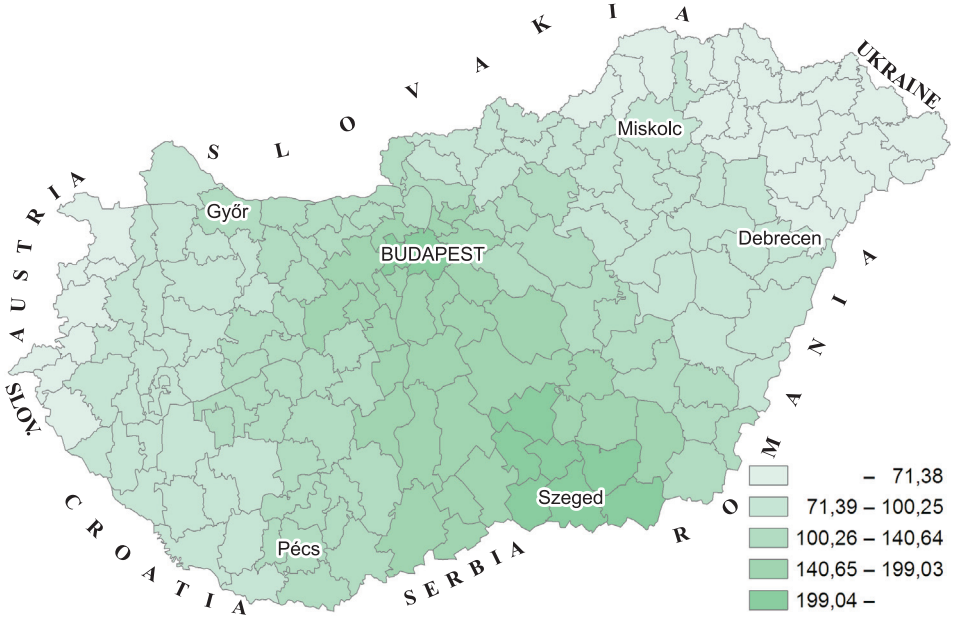
Ukrainian citizens, 2001



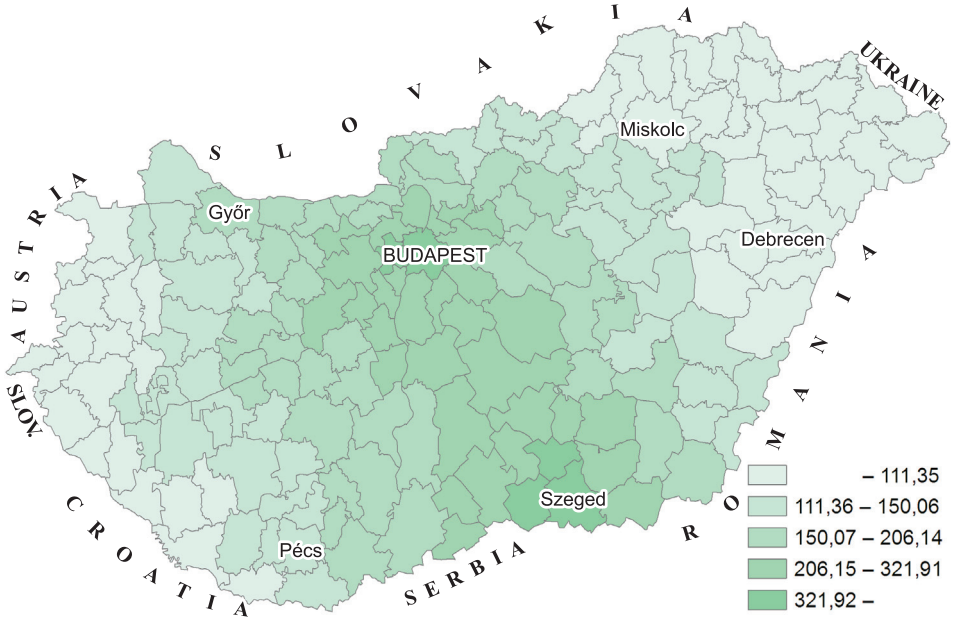
Ukrainian citizens, 2008



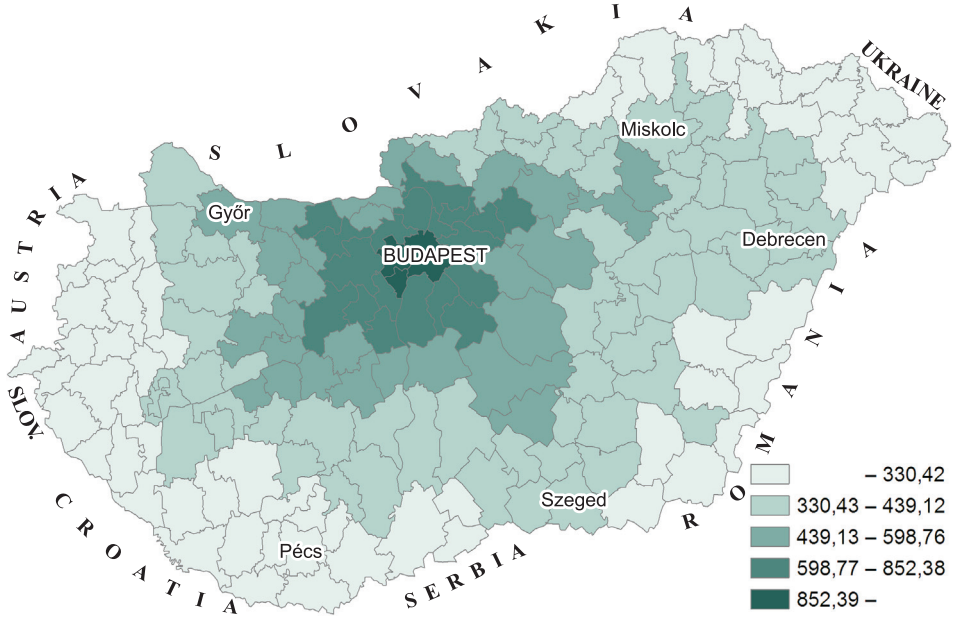
Serbian citizens, 2001



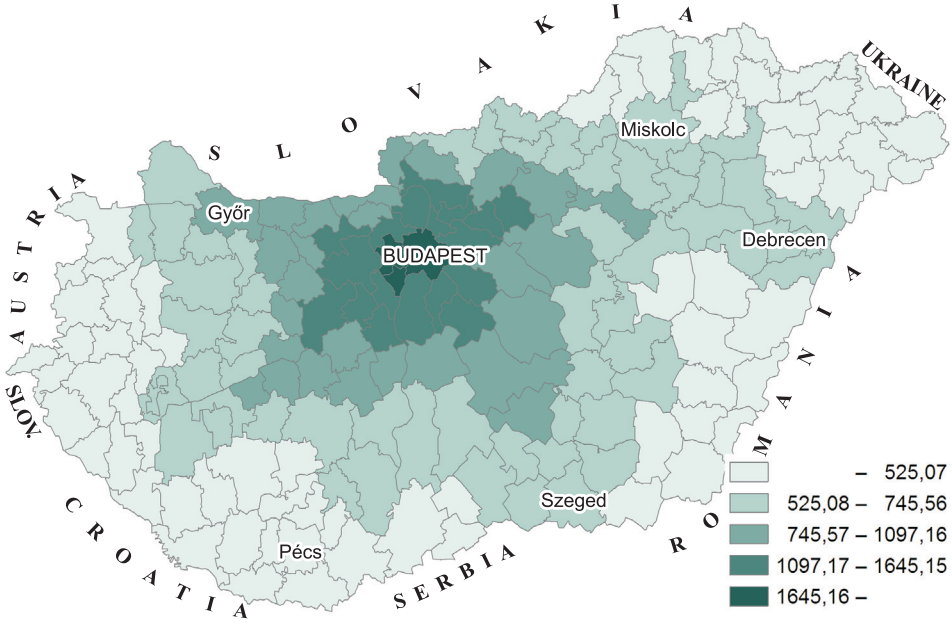
Serbian citizens, 2008



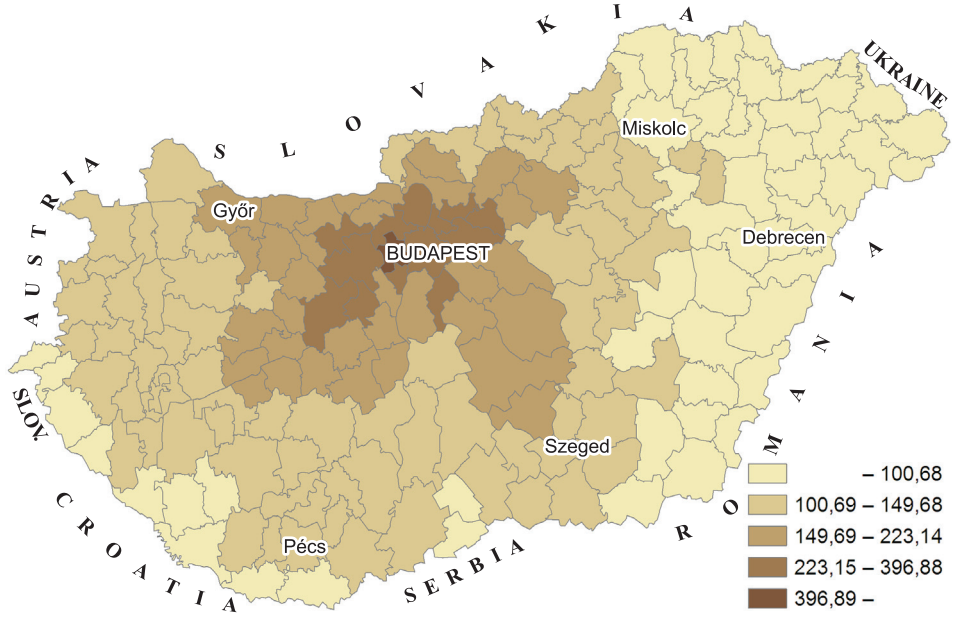
Romanian citizens, 2001



Romanian citizens, 2008



EU15 citizens, 2001



EU15 citizens, 2008

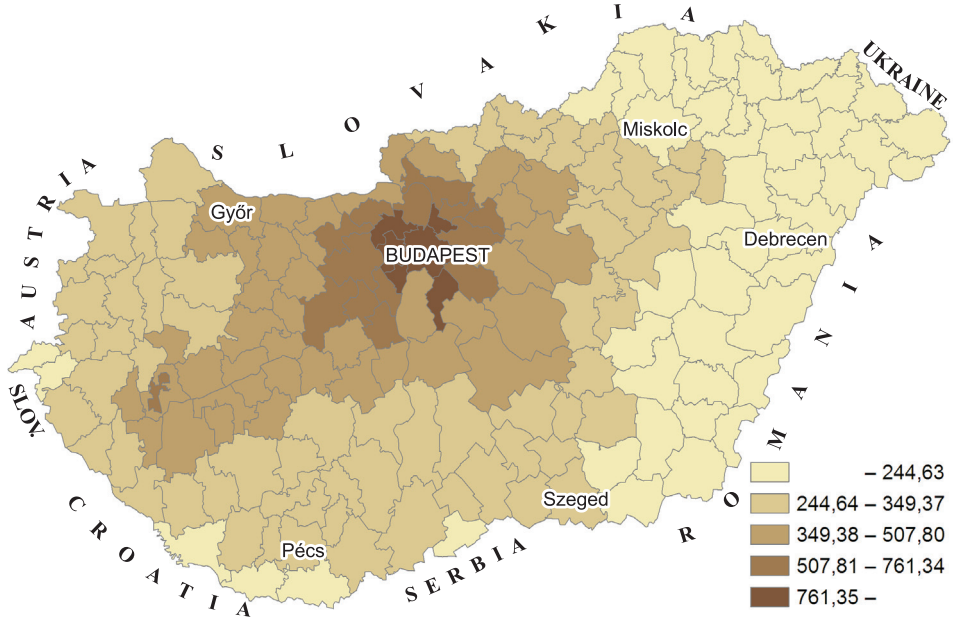


Fig. 3. Results of potential models. *Source:* HCSO, own edition

As it can be seen from these *figures* there are differences in the distribution of location potential by micro-region in case of foreign citizens staying in Hungary.

Channels can be identified between Budapest and the source countries with the exception of those who arrived from Romania, for whom Budapest and its surroundings represent an attraction, but they can be found on the whole territory of the country. Strong potential corridors can be identified for the Ukrainians trending in an east–west direction, for the Austrians in west–east, whereas for both the Serbs and the Slovaks in north–south.

Summary

Budapest and its gravity zone accounts for the residence of a predominant part of the foreign migrants, while a smaller proportion of them live in micro-regions along the border as well as in the surroundings of Lake Balaton. Budapest and Pest County are unambiguously attractive destinations for those foreigners who arrived in Hungary from the neighbouring countries, but they also prefer micro-regions located nearer to the country relating to their citizenship, mainly in the vicinity of the Romanian, Ukrainian and the Serbian border.

During the path analysis the variables involved in the analysis jointly explain in a decisive way the ratio of the population with a proper citizenship to the resident population, thus our hypotheses has fulfilled. On the other hand, however, significant differences by nationality can be pointed out in the weight of the explanatory variables. One of the most important findings of our analysis is that for the average proportion of foreigners between 2001 and 2008, the strongest explanatory force was in all cases the ratio of those compatriot immigrants who came earlier. I.e. the new immigrants follow the existing spatial pattern in their distribution. In case of all citizenship groups, accessibility indicators have no direct effect but an indirect one, which is first of all described by socio-economic indicators.

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