DISTANCES AND DIRECTIONS OF INTERNAL MIGRATION IN HUNGARY*

SÁNDOR ILLÉS[1]

The gravity centre is a classic regional analytical method which requires masses. This mass can be a multitude of people but also any other absolute quantity. The gravity centres of the migration can be considered as one of the variants of the gravity centres of the population. Adopting ourselves to the nature of the migration flows we can not grasp the migration itself with one but only with two gravity centres: with the gravity centre of out-migration and the gravity centre of in-migration. The gravity centre of migration must characterise the regional distribution of the migrate subpopulation directly before and after the event of migration. Our purpose was to state the average distance and characteristic direction of the internal migration flows in Hungary. Used the centrographic approach we got a detailed picture on the development of the direction and distance of migration.

Data used for the research were the data of internal migration by settlements for the years 1984-2002 and the geographical co-ordinates of the same settlements, both supplied by the Hungarian Central Statistical Office. The methods were simple. The gravity centre is the weighted arithmetic means – weighted with the migrants – of the co-ordinates of latitude and longitude of the settlement centres. After all the gravity centres of migration are nothing else but the mean values of the regional distribution of the out-migrants and in-migrants. Various methods are known for the characterisation of the situation around the gravity centre. One of them, Bachi's 'd' standard distance was calculated to prove two kinds of spatial selectivity of migration in Hungary. In this contribution we chose the whole country as a spatial unit to be studied, but regional and county gravity centres were computed during the research.

The gravity centres of out-migration and in-migration were separated from one another and were very near to the gravity centres of the total population. But they were not exactly in the same place. Conclusion can be made that there are territorial selectivities: on the one hand between the sending and receiving settlements (type 1), on the other hand the spatial distribution of the migrate subpopulation is not simply a representative sample of the spatial distribution of total population (type 2). In the country as a whole the gravity centres of in-migration located to the west from the gravity centres of out-migration, thus in the period studied the dominant direction of the migrations proceed to west. The average length of the way made by the permanent migrants was greater compared to the temporary migrants all of the investigated period. The distances between the national gravity centres of migration gradually shortened until 1997, after which a slight increase could be observed.

KEYWORDS: Internal migration; Gravity cenre method; Regional selestivity.

* Preliminary version of the paper was discussed at the European Population Conference, Warsaw, Poland, 26-30 August, 2003.

[1] Senior research fellow, HCSO Demographic Research Institute.

The significant social structure changes which had taken place from the 1950's onwards entailed increasing territorial mobility (it is enough to think of the effects of industrialisation and the forced emergence of agricultural co-operatives) (*Sárfalvi* [1965]; *Compton* [1971]; *Kovács* [1985]). The end of the 1980's, however, brought along changes in a very different character (*Rédei* [1986]; *Daróczi* [1998]; *Kovács* [2002]). Since after international migration came into the limelight at the end of the 1980's, examinations of internal migration movements necessarily became sidelined. Besides, internal migration took an unexpected turn in the period of transformation in Hungary.

The effect of political, economic and social changes the transformation of the 1980's appeared not in the increasing of levels but precisely in a sharp decline in the volume of migration within Hungarian society. The transformation affected individuals and families in such a way that they came to discard or postpone their possible plans of move. The dominant experience of this period of 'metamorphosis' was a feeling of insecurity which, however, in most Central and Eastern European countries did not reach the level of utter hopelessness required for inducing a mass scale internal and international migration. The unpredictability of the near future kept people place-bound and they did not willingly make risky plans for migration in the early 1990's. They drew a greater sense of local security from having an established home and a network of personal contacts than might have been afforded even by a solid job offer at a distant location. The relatively small number of people who accepted risky migration in return for considerable advantages tried their luck not mainly within their own country but in one of the Western countries (*Illés* [2000]; *Trócsányi–Tóth* [2002]).

When in the mid-1990's the most difficult period of transformation was over, the extent of internal migration showed a radical turning point. After a period of low intensity, growing migration levels indicated the beginning of a new era. This increasing tendency, varying with odd waves, showed that Hungarian society was recovering from its previous paralysed state. It is hard to predict the end-point of this growing tendency but likely it is going to last until the end of the delay period that stops free movement of persons (the period of derogation lasting for 0 plus 2 plus 3 plus 2 years in EU context) (*Lukács–Király* [2001]).

Level of migratory movements

The use of total migration and residential mobility rates affords a better judgement and understanding of the actual levels of spatial mobility than the use of the absolute figures. From a methodological point of view, total rates are able to remove the distortions arising from the changes of population number and age composition. The meaning of these rates is easily understood – they show the amount of migration and residential mobility that would occur in the life of one average person if migratory conditions of a particular period of time were to become fixed as permanent. This indicator shows the same changes as the changes of absolute numbers and intensity rates, in other words the changes of age composition had no significant influence on the variations in the trends (*Illés* [2002]).

We may state that from the second half of the 1980's onwards more people moved homes within their own town or village than to other settlements. Previously, only

migration was taken into account in judging the level of territorial mobility. This made the Hungarian population appear highly immobile. It has been successfully shown that besides the low migration level there is a supplementary movement (almost identical in number) within the given township. Adding the two forms of mobility together, their sum no longer allows us to call the Hungarian population immobile in general within the country's boundaries.

Figure 1. Total migration rate (TMR) and the total residential mobility rate (TRMR) in Hungary, 1990–2002

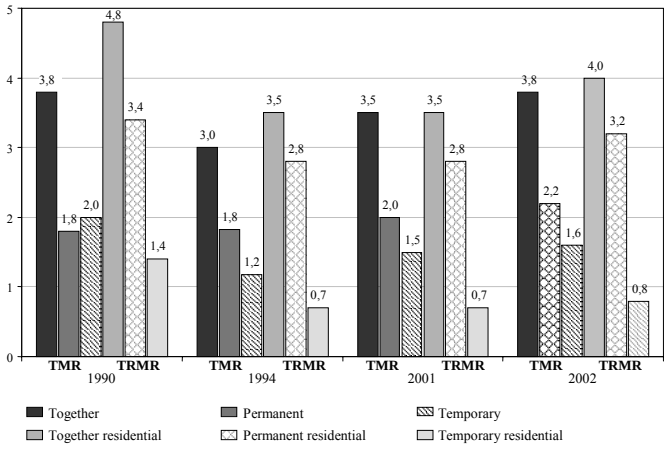
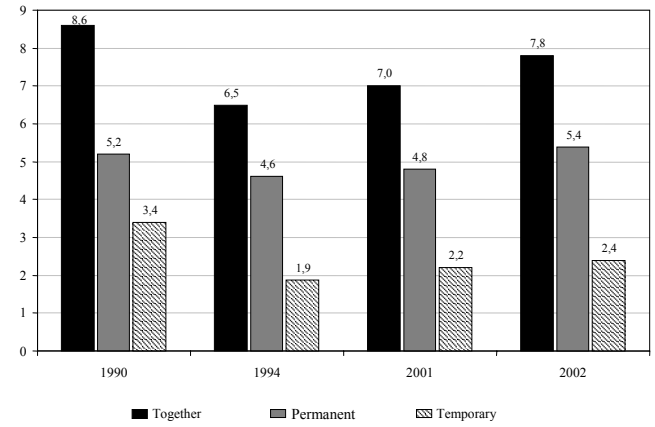


Figure 2. Total spatial mobility rate (TSMR=TMR+TRMR) in Hungary, 1990–2002



Research context

The questions of the gravity centre have an extensive international and Hungarian literature. Here we only mention the calculations regarding Hungary and their subject

matters. The method was used first on the epoch of World War II for practical purposes, namely at the preparatory works of the placement of the big railway stations of Budapest, and at the planning of the distribution places of essential foodstuff (*Bene* [1961] p. 99.). In these cases the purpose was obviously to indicate the nearest points reachable to larger masses of people, thus they tried to minimize the length of the way to these points.

Later the calculations concerning the gravity centre were connected with the total population and were made already considering the whole country, or a part of the country as a regional unit (*Bene* [1961]; *Bene–Tekse* [1966]; *Nultsch* [1968]; *Mészáros* [1995]), mainly for scientific purposes. It can be stated that with the increase in the size of the examined area the calculations relating to the gravity centre have a decreasing practical and a growing theoretical significance. For calculations of the gravity centre not only the multitude of people was used as a mass. Using this method, *József Nemes Nagy* [1987] proved the translocation of the industrial gravity centres of the former Soviet satellite states to the east, so finally he could determine the dominant geographical direction of the long-term moving of the industrial production. One of the last users was *Zoltán Sümeghy* [1998a]; [1998b] who presented the shift of the gravity centres of persons of Hungarian and Slovakian nationalities on the area of recent Western Slovakia. It is already of the near past that *Tamás Ábrahám* [2000], *József Nemes Nagy* [2002] and *Zsolt Bottlik* [2002] also used this method at their research.

From the outline of the history of this topic in Hungary it can be assumed that the calculation of the gravity centre is a regional analytical method, which requires masses (absolute numbers). This mass can be a multitude of people but also any other absolute quantity. The gravity centre of the migration can be considered as one of the variants of the gravity centre of the population. Adopting ourselves to the nature of the migration flows (bipolar phenomenon) we cannot grasp the migration itself with one but only with two gravity centres: with that of out-migration and in-migration, respectively (*Compton* [1971]; *Wunsch-Thermote* [1978]; *Sárfalvi* [1991]; *Mészáros* [1994]; *Valkovics* [1998]; *Dusek* [2003]). The gravity centre of migration must characterize the regional distribution of the migrate subpopulation directly before and after the event of migration. After all the gravity centre of migration is nothing else but the mean value of the regional distribution of the out-migration and in-migration. Compared to the gravity centre of the population, in case of that of migration calculations result the dense indicators of the spatial distribution of migrate subpopulation.

Within a regional unit from the location compared to one another of the gravity centre of out-migration and in-migration, respectively, and from the distance we can make a direct conclusion regarding the similarities and differences, respectively, of the sending and receiving areas compared to one another. If we choose the whole country as a regional unit to be studied, then computing the gravity centre of out-migration and also of in-migration we can quantify a certain ‘average’ length of the migration flows. Forming time series from these values we can confirm or deny the hypothesis whether the distances of migrations shortened in the last decades and if proved so we can also quantify to what extent. Thus our purpose is to state the average distance and characteristic direction of the internal migration flows in Hungary. Using the method we get a detailed picture on the development of the direction and distance of migration flows for the years of

transition, too. It is probable that while there is a significant decrease in the quantity of regional mobility and a moderate increase in the flow from urban to rural areas during the transformation period, there are also significant modifications in the development of the directions and distances of internal migration.

The method and the data

The method is simple. The gravity centres are the weighted arithmetic means – weighted with the migrants – of the co-ordinates (latitudes and longitudes) of the settlements. The gravity centres of migration are determined with the known methodological apparatus of the calculation of the gravity centres of the population (*Bene–Tekse* [1966] p. 65.). For instance, for the year (period) k the co-ordinates of the national (regional, county) gravity centres of the permanent out-migrants can be calculated with the following equations:

$$\bar{x} = \frac{\sum_{i=1}^{n} m_i \cdot x_i}{\sum_{i=1}^{n} m_i} \qquad \bar{y} = \frac{\sum_{i=1}^{n} m_i \cdot y_i}{\sum_{i=1}^{n} m_i}$$

Where $\bar{x}$ is the geographical line of longitude of the gravity centre of the permanent out-migrants, $\bar{y}$ is the geographical line of latitude of the gravity centre of the permanent out-migrants, m_i is the number of persons out-migrated from settlement i, x_i is geographical longitude of the settlement i, and y_i is the geographical latitude of the settlement i. The figures ($i = 1, 2, \ldots n$) mean the settlements of the country. Also the national (regional, county) gravity centres of the permanent in-migrants and of the temporary migration can be calculated with the same method.

Data used for the research were the data of internal migration by settlements for the years 1984–2002 and the geographical co-ordinates of the settlements, both supplied by the Hungarian Central Statistical Office.[2]

The method of calculation being well known and elaborated, its creators considered it as suitable for the analysis of all the vital events – migration included. Migration was yet not analysed in Hungary with this method this far. *Lajos Bene* (1961) calculated the gravity centres of net migration for the 1921–1941 period, but this cannot yet be considered as a pure analysis of the migrations because he did not distinguish the gravity centres of out-migrations and in-migrations. Therefore the calculation of the gravity centres of the net migration does not show the whole migration movement but 'only' the centres

[2] During the period examined there were significant changes in the settlement stock (in the beginning of 1984 3066 settlements, at the end of 2002 3145 settlements). There were unifications and disaggregations (*Szigeti* [1997], [1998]) and their effect cannot be let out of consideration. The geometric gravity centres of the settlements of Hungary were in the same place in the 1984–1988 and in the 1989–1993 periods. In the 1994–1997 period it moved by 234 metres to the east and by 175 metres to the south. Thus we can see that the impact resulting from the modifications in the borders of the settlements was practically insignificant. The method itself as well as the theoretical consideration did not request homogenization of the settlement series for the beginning or the end of the period investigated. Because of the above arguments for each year we worked with the actual topical settlement series of the absolute number of migrants and later we sum them up for the appropriate periods.

of the changes in the population number resulting from the migration of the area examined.[3]

Following these long introductory chapters we can put the question: for what purpose can we use the gravity centres of migration? Responses are as follows:

1. They are very compact mean values, which characterize the regional distribution of the migrate subpopulation.

2. The direction determined by the two gravity centres can be considered as the most characteristic among the many directions of migration.

3. The distance between the two gravity centres as the crow flies (air kilometres, meters) also means a certain average distance of the migration streams in the time interval studied.

National gravity centres of migration

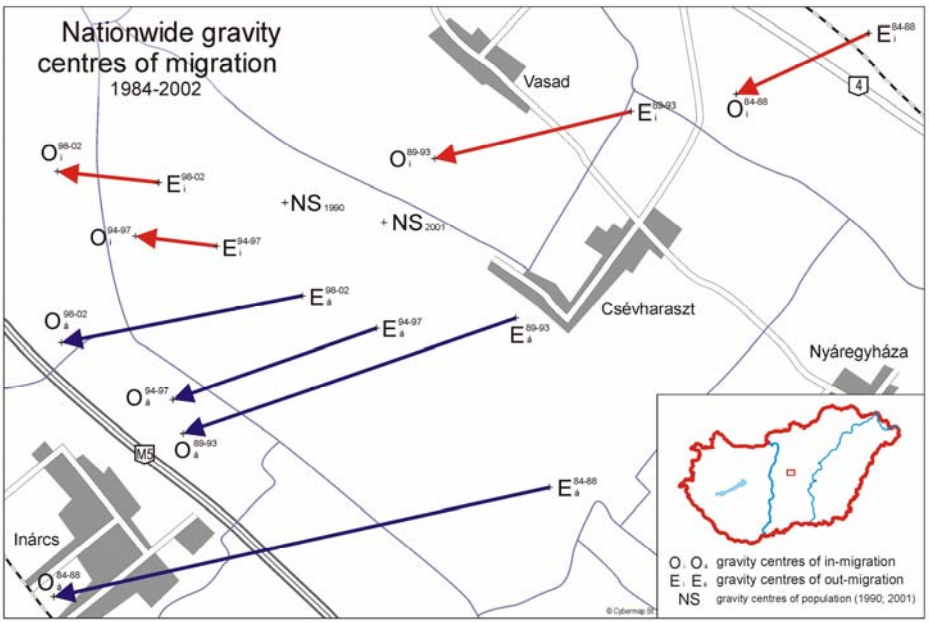
On Figure 3 the gravity centres of permanent and temporary migration, respectively, are indicated for Hungary as a whole, for four periods of time between 1984 and 2002. Moreover, the gravity centres of the total population at the dates of the 1990 and 2001 population censuses are shown. The gravity centres of the permanent and of the temporary migration are separated from one another. It means that flows and counterflows are not equal, so there are main streams of internal migration in Hungary. The gravity centres are very near to the 1990 and 2001 population gravity centre which can be found on the area of the settlement Csévharaszt in Pest county. Yet they are not exactly in the same place, and from these differences the conclusion can be made that there are territorial selectivities: on the one hand in relation to the sending and receiving settlements (type 1), on the other hand the spatial distribution of the migrating subpopulation is not simply a representative sample of the regional distribution of the total population (type 2). The above-mentioned two kinds of selectivity, however, are very small. Their extent decreased uniformly until 1997 because the gravity centres of migration were getting closer and closer to one another and at the same time to the gravity centres of total Hungarian population. In all of the investigated periods the selectivity of first type was bigger for the permanent migration than the temporary one. It means that the separation of the sending and receiving settlements were greater for permanent migrants than the temporary migrants. In the first ten years of the period examined it seemed that a greater regional selectivity of second type could be stated for the temporary migrations compared to the permanent ones. After 1994 this characteristic feature changed and permanent migrations showed a greater regional selectivity of second type because these gravity centres were farther from the gravity centre of the population.

The gravity centres of the permanent out-migrants are on the administrative area of the settlement Csévharaszt, to south-southeast from the gravity centre of the total population. The gravity centres of in-migrations can be found near to the village Inárcs. It can be stated that the permanent out-migrants are more to the east from the gravity centre of the population, the in-migrants however are more to the west, so the dominant flow directed from east to west in the internal migration. The direction observed in the earlier

[3] The study of the change in the population number with the method of the gravity centres would be complete if we calculated also the gravity centres of the natural and total increase and decrease, respectively, and if we also compared them.

period still exists, in fact this is the most characteristic. From Table 1 it can be affirmed uniformly that the gravity centres of permanent migrations get nearer and nearer to the gravity centre of the population until 1997 which shows the decrease in the extent of the territorial selectivity of the second type of the permanent migrations.

Figure 3. Nationwide gravity centres of migration, 1984–2002



Note: O_i, E_i – temporary migration; $O_á$, $E_á$ – permanent migration.

Table 1

Distance and direction between the national gravity centre of population 1990 and the national gravity centres of migration
(meter)

Year	Out-migration		In-migration	
	gravity centres			
	Permanent			
1984–1988	5700	SE	6700	S–SW
1989–1993	4500	E–SE	3600	S–SW
1994–1997	2200	SE	3300	S–SW
1998–2002	2300	S	3900	S–W
	Temporary			
1984–1988	9000	E–NE	6900	E–NE
1989–1993	5400	E–NE	2300	E–NE
1994–1997	1200	SW	2300	W–SW
1998–2002	1900	W–NW	3400	W–NW

Between 1984 and 1993 the gravity centres of the temporary out-migrants and in-migrants can be found mostly farther to the east, on the administrative area of Csévharaszt, Vasad and Monor. After 1994 their location changed and they were farther to the west from the gravity centre of the population. It is not difficult to realise the tendency that also the characteristic sending and receiving areas of the temporary migration are shifted farther and farther to the west. Similarly to the permanent migration the distances of the gravity centres of the temporary migration measured to the gravity centre of the total population show a monotonous decrease until 1997 which also refers to the decline in the extent of the spatial selectivity of second type.

The gravity centres of the permanent and temporary migration moved characteristically in a different direction compared to one another (see Figure 3). The gravity centres of the permanent out- and in-migrations 'advanced' to the north and then to the west, while the temporary gravity centres of the same type moved characteristically to south-west. Despite the moving to the north and south, moving to the west can be considered as a common feature, especially in the second half of the period studied.

The gravity centres of the out-migration and in-migration regarding the same period moved in similar directions and to similar extents, so it can be foreseen that the distances between them could not change radically either.

Distances

With indirect estimation it was proved in the literature already that parallel with the decrease in volume also the average distance of the spatial movements shortens. The process of the regional levelling was one of the most important cause of the decline in distance before the transition period *(Erdősi* [1985]; *Kovács* [1985]; *Rédei* [1991]; *Daróczi* [1998]; *Nemes Nagy* [1998]; *Horváth-Rechnitzer* [2000]; *Dobosi* [2003]). Calculation of the gravity centres of migration of a various degree of spatial aggregation gives direct evidence to prove the decrease in the distance of migration and the extent of the decrease. It seems that – given that regularities are valid with the transition period still holding on – the regional differences becoming more and more marked because of the different pace of development will increase the average distances of movement (*Cséfalvay* [1993]; *Enyedi* [1994], [1996]; *Rees-Kupiszewski* [1999]; *Nagy* [2002]; *Szászi-Hajnal-Reszler* [2003]). Let us examine whether this hypothesis can be verified.

The gravity centre of out-migration can be considered as a mean value of the regional distribution of the out-migrating subpopulation and the gravity centre of in-migration as a mean value of the regional distribution of the in-migrants. If these two points do not coincide or are not very near to one another (i.e. more than 100 metres apart) then the distance between the two points also means a certain average physical distance of the migrations in the regional unit studied (country, region, county) not in absolute but in a relative sense. If these two points are near to one another then we have to conclude that the sending and receiving areas are neighbours of one another and presumably there are mutual flows and couterflows to a similar extent. With the increase in the average distance the migratory relations of the neighbours weaken, the relations of the farther areas strengthen and flows by pairs begin to occur in one direction, therefore separation of the sending and receiving areas increases.

The distances of the nationwide gravity centres of the permanent migrants were 7500 m, 5200 m, 3200 m and 3600 m in 1984–1988, 1989–1993, 1994–1997 and 1988–2002, resp., which are not really great distances. Even so, however, the average length of the way made by the permanent migrants is the multiple, two and three times of that of the temporary migrants (2100 m, 3000 m, 1200 m and 1500 m). Consequently, we can say that the permanent migrants make a longer way in the physical space. The shorter distance characteristic of the temporary migrations can be explained by the fact that the number of the temporary migrants, whose purpose is often to take a job and who are registered temporarily, decreased radically as well. The distance of the temporary migrations for study and housing purposes was presumably shorter earlier, too (Table 2), with the expansion of third level education strengthening this process.

Table 2

Distance between the nationwide gravity centres of out-migration and in-migration
(meter)

Type	Permanent migration					Temporary migration				
		1984–88	1989–93	1994–97	1998–02		1984–88	1989–93	1994–97	1998–02
All migration	$E_á^O - O_á^O$	7 500	5 200	3 200	3 600	$E_i^O - O_i^O$	2 100	3 000	1 200	1 500
Interregional migration	$E_á^{ORK} - O_á^{ORK}$	23 200	18 500	11 300	13 900	$E_i^{ORK} - O_i^{ORK}$	3 500	5 800	3 200	3 700
Intercounty migration within regions	$\overline{E}_á^{RBMK} - \overline{O}_á^{RBMK}$	4 800	3 000	3 000	1 600	$\overline{E}_i^{RBMK} - \overline{O}_i^{RBMK}$	1 500	2 600	1 400	–

For the country as a whole we distinguished three types of moves and we also stated the geographical distances between their gravity centres (Table 2). In the first group all the migrations were taken into consideration. On basis of Table 2 we can see that the distances of the migrations crossing the borders of the regions (second type of move) are the longest. Here even multiple lengths can be measured compared to the average distance of the movements within the regions. The migrants leaving their county but remaining in their own regions covered the shortest way.

Our opening hypothesis regarding the permanent migrations until 1997 cannot be confirmed for the country as a whole. The distances of the migrations do not grow in parallel with the increasing regional disparities, we measure characteristic diminution instead. The permanent migrants covered shorter and shorter distances until 1997. In case of the temporary migration between 1988 and 1993 increase in the distance can be confirmed for the country as a whole, but already as far as between 1994 and 1997 the distances are shorter than between 1984 and 1988. The opening hypothesis can be confirmed for both the permanent and temporary migration after 1998, i.e. the distances of migration grow up again. After 1998 slight increases were measured for all the migratory types.

Directions

Following the distance, the other spatial parameter of order, the study of the direction is very important when migration to be examined. The gravity centres of the in-migrants

in Hungary are to the west from the gravity centres of out-migrations, thus in the period studied the prevailing direction of the permanent and temporary migrations proceed to the west. We may add that beside the characteristic western direction also a slight southern component can be verified. In case of the permanent migrations we could observe a very stable direction to the west and south-west which is 'worthy of its character' and did not change in the years of the transition (Figure 3 and Table 3). In the period 1994-1997 the most characteristic direction of the temporary migrations proceeded clearly to the west.

Table 3

Direction of migration

Type	1984–1988		1989–1993		1994–1997		1998–2002	
	Permanent migration							
All migration	W-SW		W-SW		W-SW		W-SW	
Interregional migration	W-SW		W-SW		W-SW		W	
	Temporary migration							
All migration	W-SW		W-SW		W		W	
Interregional migration	W-SW		W		W		W	

Apart from the migrations within the region, taking into consideration only those who are migrants between the regions the flow to the west is still prevailing. Between 1994 and 1997 for the temporary migrations crossing the borders of the regions the western vector became stronger. It may be that this modification shows the beginning of the change in tendency but we find it more real supposition that in this case we can observe a provisional fluctuation and the direction to the west and south west will resume.

It can also be assumed that for the country as a whole there is no significant difference in the basic directions of the permanent and temporary migration (though we cannot be sure whether the situation was the same in time before the periods covered by our study).

Dispersion

In general sense there may be various objections (shortcomings) to the use of gravity centres. The first one may be that the gravity centres themselves have so compact mean values that they do not show anything regarding the regional distribution of the phenomenon examined. Those who have such an opinion are right considering that really it is not possible to do much with a gravity centre alone. We can describe its location, maybe indicate it on a map but we can hardly get farther. For solution of this problem

obviously we have to seek points of comparison. Naturally it is possible to compare to the significant cities. Beside this in our case we can compare some gravity centres of migration to favoured points (e.g. Pusztavacs, the geographical centre of Hungary). Other possibilities for comparison are the gravity centre of the population or the geometric centre of the settlements of Hungary. Beside the description we find two ways for a sophisticated analysis. The first one is the dynamism in time. We may calculate the pair of gravity centre referring to one date, to one period and then also for another date and period, i.e. we widen our study in time. Doing so it is possible to make conclusions concerning the modifications in the characteristic directions, the changes in the average distances of migration. The second way of analysis – which in our case also means a widening of the regional details – is to calculate the regional gravity centres, the gravity centres of counties and even of the smaller regional units.[4] Presentation of the two ways of analysis on a map gives a synthesis of the partial result.

The second shortcoming to the gravity centres is that gravity centres are after all weighted arithmetical means and, similarly to the statistical means, they themselves do not illustrate the situation of the phenomenon studied around the gravity centre, in our case the dispersion of the migrating sub-population around the gravity centres. Various methods are known for the characterization of the situation around the gravity centre (*Tekse* [1966]). Of them Bachi's *d* standard distance was calculated (*Bene–Tekse* [1966]) at the study of the gravity centres of the population, and for possibilities of comparison we used this method to state the dispersion coefficient (*Bachi* [1962]).

$$d = \left\{ \frac{\sum_{i=1}^{n} m_i \left[(x_i - \bar{x}_i)^2 + (y_i - \bar{y}_i)^2 \right]}{\sum_{i=1}^{n} m_i} \right\}^{\frac{1}{2}}$$

Where d is the standard distance, $\bar{x}$ is the geographical line of longitude of the gravity centre of migration, $\bar{y}$ is the geographical line of latitude of the gravity centre of migration, m_i is the number of persons migrated from the settlement i, x_i is the geographical longitude of settlement i, y_i is the geographical latitude of settlement i. The figures ($i = 1, 2, \ldots n$) mean the settlements of the country. The d distance is simply the square root of the average – weighted with the population numbers – of the quadratic distances of the gravity centre of migrations and of the individual settlements.

In Hungary the dispersion around the gravity centre of the population indicated with the d distance was 132.8 km in 1900, 129.1 km in 1930, 128.3 km in 1949 and 126.6 km in 1960. *Lajos Bene* and *Kálmán Tekse* [1966] explained the decreasing tendency of the more rapid growth in the population of the urban areas. Unfortunately, at the calculation of the gravity centre of population made on basis of the data of the 1990 population census, dispersion was not calculated. As a consequence of the urbanization process, the population of the urban areas grew after 1960 on, so presumably also the tendency of de-

[4] It should be mentioned that choosing the appropriate regional unit is absolutely necessary to determine our research purposes.

crease in the *d* distance continued. If we accept this supposition then the dispersion must have most probably declined. According to our estimation the dispersion of the gravity centre of the population of 1990 might have been somewhere between 120 and 125 km. On the basis of 2001 population census the dispersion of gravity centre of total population was 123.5 km.

Due to the second type of regional selectivity of the migrants compared to the regional distribution of the total population, the dispersion of the gravity centres of in-migration and out-migration of the country must be higher than the dispersion around the gravity centre of the population (except for the temporary in-migration of 1998–2002 period).

Earlier at the comparison of the distance between the gravity centres of migrations and the gravity centres of population we supposed that on a national scale only since 1994 is the regional selectivity of the permanent migration higher than that of the temporary migration. In case of higher selectivity it can be expected that also the dispersion around the gravity centres of permanent migrations is greater compared to that of the temporary migrations.[5] Though with time the difference decreases more and more. The higher dispersion around the gravity centres of the out-migration refers to the fact that the sending settlements are located more unevenly in Hungary. Opposite to this the location of the receiving settlements and the areas represented by them is more concentrated.

Table 4

Dispersion of nationwide gravity centres of migration, 1984–2002
(meter)

Type	Permanent				Temporary			
	1984–1988	1989–1993	1994–1997	1998–2002	1984–1988	1989–1993	1994–1997	1998–2002
	In-migration gravity centre							
All migration	126 941	126 746	125 575	123 059	123 467	123 250	123 973	124 067
Interregional migration	109 317	112 016	112 727	109 992	117 973	113 631	112 700	113 095
Intercounty migration within individual regions*	39 862	40 136	40 323	50 433	42 632	40 513	41 021	49 761
	Out-migration gravity centre							
All migration	132 900	129 958	127 140	124 974	126 315	126 362	124 810	124 922
Interregional migration	127 921	122 674	118 209	117 110	122 792	120 111	114 921	115 136
Intercounty migration within individual regions*	41 903	41 451	40 089	49 796	43 856	43 163	40 965	49 716

* Rounded arithmetic means of the distances of intercounty migration of the individual regions.

[5] With the calculation of dispersion of the gravity centres of migration we could prove that the dispersion of the permanent migration was higher than the temporary one until 1997. That means the first type of territorial selectivity of permanent migration was higher in degree than that of the temporary one. During the whole investigated period the dispersion around the gravity centres of out-migration were higher that of the in-migration one. For that reason the result of migration flows strenghtened the concentracion of Hungarian population. In Hungary as a whole the process of suburbanization (*Kovács* [2002]; *Izsák* [2003]) was not strong enough to counterbalance the process of concentration led by internal migration.

Studying the gravity centres of the migration between the regions we can still state that the dispersion around the gravity centres of out-migration is higher than the dispersion around the gravity centres of in-migrations and the difference decreases in time. It must be mentioned that the differences by pairs of the regional gravity centres of out-migration and in-migrations are much higher than to the total migration.

*

The gravity centres of out-migration and in-migration were separated from one another and were very near to the 1990 and the 2001 gravity centre of the total population. But they were not exactly in the same place. Conclusion can be made that there are territorial selectivities: on the one hand between the sending and receiving settlements (type 1), on the other hand the spatial distribution of the migrate subpopulation is not simply a representative sample of the spatial distribution of total population (type 2). These two kinds of selectivity, however, are very small. Their extent decreased uniformly in the course of time because the gravity centres of migration got closer and closer to one another and to the gravity centres of total Hungarian population until 1997. After 1998 a small growing up was investigated. Due to the second type of regional selectivity the dispersion of the gravity centres of in-migrations and out-migrations of the country are mostly higher than the dispersion around the gravity centre of the population.

The gravity centres of the migration are separated from one another. It means that flows and counterflows are not equal, so there are main streams of internal migration in Hungary. In the country as a whole the gravity centres of in-migration located to the west from the gravity centres of out-migration, thus in the period studied the dominant direction of the migrations proceed to west.

The distances between the national gravity centres of migration gradually shortened until 1997 (except for the temporary one of the 1989–1993 period and the temporary and permanent of 1998–2002). After that slight increase was measured. The length of the way made by the permanent migrants was greater compared to the temporary migrants in all of the investigated period. On this basis we can say that the permanent migrants make a longer way in the physical space.

Our opening hypothesis (i.e. that increasingly sharp territorial differences would increase the distances involved in migration) cannot be proved on a national level until 1997. From 1998 onwards, however, people involved in migration started to cover ever larger distances in physical space which shows that the hypothesis came to apply. (To explain why the appearance of larger distances delayed almost an entire decade presents a question for further research.)

The gravity centre of the population for 2001 is further east than was the gravity centre of 1990. This fact seemingly contradicts one of the main results covered in the paper, whereby internal migrants move dominantly in a western direction. This paradox may be explained sufficiently by involving two factors. One is the natural increase characteristic of the eastern parts of Hungary because of a higher fertility rate prevailing there. The second factor is connected to the territorial distribution of international migrants. The majority of immigrants and new citizens settled east of the Danube and in Budapest. Thus we may state as conclusion that the sum of the effects arising from fertility and the

selective nature of international migration surpassed that of the effect of internal migration on the spatial distribution of the total population and pushed the population gravity centre toward the east.

REFERENCES

ÁBRAHÁM T. [2000]: Az USA fekete lakosságának migrációja a XX. században. *Demográfia*. Vol. 43. No. 1. 161–175. p.

BACHI, R. [1962]: Standard distance measures and related methods for spatial analysis. Regional Science Association. *Zurich Congress Papers*. Vol. 10. 83–132. p.

BOTTLIK, ZS. [2002]: A szlovákok etnikai súlypontjának változásai a Dunántúli-középhegység területén a XVIII. századtól napjainkig. *Területi Statisztika*. Vol. 42. No. 6. 551–561. p.

BENE, L. [1961]: Magyarország népességi súlypontja. *Demográfia*. Vol. 4. No. 1. 91–102. p.

BENE, L.–TEKSE, K. [1966]: *Vizsgálatok a népesség területi eloszlásának alakulásáról Magyarországon 1900–1960*. KSH Népességtudományi Kutató Csoport Közleményei. 9. köt. Budapest. 65. p.

COMPTON, P. A. [1971]: *Some aspects of the internal migration of population in Hungary since 1957*. (Publications of the Demographic Research Institute.) Budapest. No. 33.

CSÉFALVAY, Z. [1993]: Felharmadolt ország. *Valóság*. No. 7. 1–17. p.

DARÓCZI, E. [1998]: Residential moves within Hungary, 1985–1996. *Espace, Populations, Societes*. Vol. 27. No. 3. 381–388. p.

DOBOSI, E. [2003]: A komplex regionális fejlettség matematikai-statisztikai elemzése. *Területi Statisztika*. Vol. 43. No. 1. 15–33. p.

DUSEK, T. [2003]: A gravitációs modell és a gravitációs törvény összehasonlítása. *Tér és Társadalom*. Vol. 17. No. 1. 41–58. p.

ENYEDI, GY. [1994]: Területfejlesztés, regionális átalakulás. *Társadalmi Szemle*. Vol.49. No. 8–9. 133–139. p.

ENYEDI, GY. [1996]: *Regionális folyamatok Magyarországon az átmenet időszakában.* Hilscher Rezső Szociálpolitikai Egyesület. Budapest.

ERDŐSI, F. [1985]: Az ingázás területi-vonzáskörzeti szerkezete Magyarországon. *Demográfia*. Vol. 28. No. 4. 489–498. p.

HORVÁTH, GY.–RECHNITZER J. (ed.) [2000]: *Magyarország területi szerkezete és folyamatai az ezredfordulón*. MTA Regionális Kutatások központja. Pécs.

ILLÉS, S. [2000]: Changing levels of spatial mobility in Hungary. In: *Kovács, Z.* (ed.): *Hungary towards the 21st century.Geographical Research Institute Hungarian Academy of Sciences*. Budapest. 137–149. p.

ILLÉS, S. [2002]: *Költözünk vagy vándorlunk? In Ezredforduló – magyar valóság – cenzusok.* Magyar Statisztikai Társaság. Budapest. 37–51. p.

IZSÁK, É. [2003]: *A városfejlődés természeti és társadalmi tényezői*. Budapest és környéke. Napvilág Kiadó. Budapest.

KOVÁCS, T. [1985]: A népesség területi mozgásának főbb jellemzői az elmúlt 30 évben és valószínű jövőbeni vonásai. In: *Káposztás, F.* (ed.) *A népesség területi elhelyezkedése és mozgása*. KSH Népességtudományi Kutató Intézet Kutatási jelentései 25. kötet. Budapest. 19–30. p.

KOVÁCS, T. [2002]: A területi fejlettségbeli különbségek alakulása Magyarországon. *Területi Statisztika*. Vol. 42. No. 6. 506–517. p.

KOVÁCS, Z. [2002]: Az urbanizáció jellemzői Kelet-Közép-Európában a posztszocialista átmenet idején. *Földrajzi Közlemények*. Vol. 126. No. 1–4. 57–78. p.

LANGERNÉ RÉDEI, M. [1986]: A kistérségi népességmozgások. *Statisztikai Szemle*. Vol. 64. No. 11. 1093–1107. p.

LUKÁCS, É.–KIRÁLY M. (ed.) [2001]: *Migráció és Európai Unió*. Szociális és Családügyi Minisztérium. Budapest.

MÉSZÁROS, Á. [1995]: A népesség területi átrendeződése és települési koncentrációja. *Statisztikai Szemle*. Vol. 73. No. 7. 533–542. p.

MÉSZÁROS, R. [1994]: *A település térbelisége*. JATEPress. Szeged.

NAGY, G. [2002]: Oldódtak-e az öröklött területi különbségek a rendszerváltás éveiben? In: *Abonyiné et al*. (eds.) *A magyar társadalomföldrajzi kutatás gondolatvilága.* Szegedi Tudományegyetem Gazdaság és Társadalomföldrajzi Tanszéke. Szeged. 211–225. p.

NEMES NAGY, J. [1987]: *A regionális gazdasági fejlődés összehasonlító vizsgálata*. Akadémiai Kiadó. Budapest.

NEMES NAGY, J. [1998]: *A tér a társadalomkutatásban. Bevezetés a regionális tudományba*. Hilscher Rezső Szociálpolitikai Egyesület. Budapest.

NEMES NAGY, J. [2002]: Spatial gravity centres of the dynamics and the crisis in Hungary. *Hungarian Statistical Review*. Special number 7. 75–85. p.

NULTSCH, H.-G. [1968]: A népességi súlypontok. *Demográfia*. Vol. 11. No. 2. 260–264. p.

RÉDEI, M. [1991]: Close migration directions under changing propensity. In: *Józwiak, J.–Kotowska, I.* (eds.) *Usefulness of demographic modelling*. Szkola Glówna Handlova-Instytut Statystyki i Demografii. Warszawa. 159–177. p.

REES, P.–KUPISZEWSKI, M. [1999]: *Internal migration and regional population dynamics in Europe: synthesis*. Council of Europe Publishing. (Population studies, No. 32.) Strasbourg.

SÁRFALVI, B. [1965]: *A mezőgazdasági népesség csökkenése Magyarországon*. Akadémiai Kiadó. Budapest.

SÁRFALVI, B. [1991]: *Magyarország népességföldrajza*. Tankönyvkiadó. Budapest.

SZÁSZI, F.–HAJNAL B.–RESZLER G. [2003]: *Tanulmányok Szabolcs-Szatmár-Bereg megye népességének belső (belföldi) vándorlásáról (1869–1995)*. MTA Szabolcs-Szatmár-Bereg Megyei Tudományos Testületének Közleményei. Stúdium Kiadó. Nyíregyháza.

SZIGETI, E. [1997]: Urbanizáció, városhálózat, várossá nyilvánítás. *Területi Statisztika.* Vol. 37. No. 1. 66–79. p.

SZIGETI, E. [1998]: Új községek – új önkormányzatok. *Területi Statisztika*. Vol. 38. No. 1. 20–33. p.

TEKSE, K. [1966]: A népesség koncentrációjának jellemzéséről. *Demográfia*. Vol. 9. No. 4. 564–576. p.
TRÓCSÁNYI, A.–TÓTH J. [2002]: *A magyarság kulturális földrajza II*. Pannónia Tankönyvek. Pro Pannónia Kiadó Alapítvány. Pécs.
VALKOVICS, E. [1998]: Kísérlet a belföldi vándorlások x éves korban várható átlagos számának becslésére. In: *Illés, S.–Tóth, P. P.* (eds.) *Migráció*. (Tanulmánygyűjtemény) I. köt KSH Népességtudományi Kutató Intézet. Budapest. 189–216. p.
WUNSCH, G.–TERMOTE, M. [1978]: *Introduction to demographic analysis*. *Principles and methods*. Plenum Press. New York and London.