Explore Hungary!

On behalf of the editorial board of Regional Statistics, I would like to recommend this selection to the attention of readers. Regional Statistics was launched over half a century ago as the scientific periodical of the Hungarian Central Statistical Office, which has been ranked highly among scientific journals by the competent committee of the Hungarian Academy of Sciences. It has a wide range of authors and researchers in the fields of geography, and social and economic studies. In addition to statisticians its contributors include planners, officials and decision-makers in the areas of regional and settlement development, whose articles fill each issue month by month.

Regional aspects have always had a key role in public thinking in Hungary. Saint Stephen, our first king, organised a modern, single state on a territorial basis in the 11th century, which replaced the former social model of tribes and families. The public and church administration and territorial division established at the time still constitute the basis of the public administration system today. In the 16th and 17th centuries Hungary was split into three due to Ottoman expansion, which had an impact on the territorial development of the different parts of the country for centuries. The part of the country that came under Ottoman rule, which lasted for a hundred and fifty years, was practically laid waste and depopulated, and only earlier tax assessments and church ruins suggest a once dense settlement network. After liberation from Ottoman rule, the country had to be resettled and repopulated, which further differentiated its ethnic composition, the way of life and the settlement structure in the country. Settlements with long boundaries and large populations were created on the Great Plain with a specific symbiosis between towns and their environs.

In the Carpathian Basin a special regional economic division of labour was established built on geographical endowments, in line with transport possibilities and the system of relations between settlements. This organically developing whole was torn apart by the Treaty of Trianon after World War I. The counterpoles of Budapest became part of new nation states, and Budapest suddenly became over dominant in the country shrunk to one-third of its former size. At the same time, the arrival of intellectuals, forced to leave the succession states, exacerbated the excess weight of the capital in numerical, economic and intellectual terms. The growing preponderance of the capital and inequalities at regional and settlement levels further compounded the importance of the territorial approach.

Reducing territorial disparities, creating new urban poles and helping the countryside catch up became important political issues even in the “socialist” system, which strove for strong centralisation.

Research at the turn of the 1990s demonstrated that territorial status indices had a decisive role in social stratification. The social status of an individual or a family shows a very high correlation with their status of residence. From this one can deduct with high probability an individual’s income and property status, position in the division of labour, social prestige and cultural position.

Therefore spatial questions have always been political issues as well in Hungary, and a full knowledge of the country can only be acquired through an awareness of territorial circumstances.

Very significant intellectual capital has been accumulated in the area of spatial research in Hungary. Spatial research is very widespread in regional statistics, and serves as a basis for exploring further spatial dimensions of regional development and sectoral policies, and for preparing concepts and plans. We wish to present some extracts of these diverse and thorough research activities performed in the past two years.

In the European Union's Treaty of Lisbon socio-economic cohesion, included in its earlier treaties, was complemented by territorial cohesion, and the relevant chapter was entitled "social, economic and territorial cohesion". This modification started an intensive intellectual discussion in the community as a whole on the interpretation and practical application of territorial cohesion.

The questions which have arisen can only be answered cooperatively with others in the knowledge of the spatial aspects of one's country.

When we in Hungary examine regional disparities, the determining impact of the spatial structure, the effect of the crisis on Hungarian industry, the relation between the transformation of railways and accessibility, transport and health care in a particular region, or for example the role of the Romanian workforce in the Hungarian employment system, we do not only consider developments in Hungary but also invite others to think together with us.

A good example of thinking together is a subject chosen by the Hungarian EU Presidency: the impacts of European demographic trends and migration on the development of towns. Our study on this subject was well received and encouraged serious debate, and its effect can be perceived in the latest version of the new regulation of cohesion policy.

The study entitled "The role of neighbourhood in the regional distribution of Europe" also provides a European comparison. However, this European outlook as well as the rest of the studies report primarily on spatial conditions in Hungary.

We invite you to explore Hungary!

Péter Szaló

Editor in Chief

LAJOS MAROSI

A visit to the academic György Enyedi in the citadel of science

György Enyedi (born in Budapest, 25 August 1930), geographer, winner of the Széchenyi Award, economist, ordinary member of the Hungarian Academy of Sciences (HAS), vice-president of HAS between 1999 and 2002, editor of significant scientific journals, president of the editorial board of the journal Space and Society, author of many studies published in Regional Statistics, research professor.

Home of the Academy's research institutes at Országház u. 30 in the Buda Castle

How could you fit publishing in our modest journal into your activities? There are so many other forums where your work has been published.

It is important for me to be present in major international journals. I have always been interested in the regional differences of economy and society, in matters related to both

geography and economics. I obtained a degree in economics, then became a doctor of economic geography at the University of Economics and later a candidate of geography, but my interests have always been the same. Somehow life dictated that in the beginning I was interested in agricultural differences, and this is where the topic of villages came from, which later led to villages and towns.

Numbers have always been needed to explain regional differences. Differences have to be expressed and measured. I've never been satisfied by statements that were only based on logic or emotions. A reliable statistical data supply and source of information are essential for me. I have always valued people who produce such data and do that reliably.

After that – just at the time I entered the international scene –, a so-called quantitative revolution of geography began, meaning that formulas, models and mathematical formulas were introduced in regional process research; models of towns, modelling the catchment area of a city and so on. Since I knew the related international literature quite well despite my country's relative isolation, I was very much interested in this trend. My international career can be attributed in part to my involvement in this new trend.

I don't see statisticians as merely data providers, but as people who value data and analyse them as well. I find the job of a statistician fascinating. A good statistician does not only write data down, but is also clearly aware of the content of the data, the potential errors and what can only be estimated in a manner that is sufficiently accurate.

There were statisticians at the University of Economics, and I knew György Péter, so it seemed to be logical to be in contact with the people who produce the regional data I use for my research.

What other sources does an economist-geographer use?

Other sources were the planning departments of county councils, where you could also find data. I researched the regional differences in agriculture for a while. That was actually by chance. I finished university in 1953, and then I had four different jobs in two years, which were quite eventful. I worked in Gödöllő at the Agricultural Economy Department, so I dealt with agriculture. Even during my time at university, when I worked as an assistant lecturer for a year, I preferred agriculture because the data were reliable. Industrial data were almost impossible to work with in practice.

For political reasons?

This type of data could not be broken down into regions. But there were political reasons as well. Industrial data were very hard to access.

Were strategic sectors shrouded in secrecy?

Yes. For example, "sensitive" industries were left out of industrial statistics. And which industries were sensitive? Almost all heavy industry, chemistry and so on, was sensitive. You have to imagine an extremely imperfect service that hardly provided any data from industrial locations.

Neither do we have enough information of this sort now.

That's right. The 1970s and 1980s were better from this point of view.

At least there were no secret towns, as there were in the Soviet Union. Closed towns have been placed on the map of the Russian Federation only recently.

According to one of my Russian information sources such places still exist… So, the regional differences in agriculture are more clearly related to the geographic environment, quality of soil, climate and water, than industrial differences are. In connection with industry deployment, the theory of industrial location also described important factors, but these did not really play a role in practice, especially in the beginning.

Political reasons were more important. For example, the city of Szeged needed industries because there were not enough factories, and the working class was weak. Or there was a case when a military plant was placed in a forest. Of course, they put a sign prohibiting photography at the side of the road leading there, alerting even the worst spy to the fact that there was a military plant there.

So, when Regional Statistics was launched under different titles, a group of friends with similar professional interests developed around it, which was also a real fellowship. Long lasting friendships were made, and the group included county directors of the Hungarian Central Statistical Office and students alike.

So you have always been interested in geography, ever since choosing your career. Why? Were you not attracted by other intellectual careers, by technology or medicine? Why geography? Were you influenced by your travels or reading?

The longest journey I made during my childhood was between Budapest and Diósjenő, which is only a distance of about 50 miles. Once I visited Lake Balaton as well. However, I have always been interested in the world itself. Reading made me really curious about different people and different places. Why did I not become a geography teacher? Well, I have to admit that I did not want to be a teacher.

Why not? You attended the Piarist College, where you must have had some good teachers. At least, the results achieved by the school's pupils suggest this.

There were some good teachers there indeed, since part of my education from my school years has remained, what you could perhaps call my "classic schooling". I'm not sure. I did not really want to deal with kids as mischievous as I used to be. I was neither an eminent student, nor a sweet-tempered child. I attended the University of Economics, but I was not really aware of what would happen to me there. I immediately discovered the Economic Geography Department, where I became a kind of errand boy who dusted books and did calculations. That was already in my first year. It was a coincidence that György Markos established the Faculty of Economics and Regional Planning when I finished my second year. He was a versatile, but controversial person, who inspired his students to turn the world upside down. Regional planning and my insatiable curiosity for the world fitted together perfectly. We – as an exception – could receive our diploma by

also learning the geography material of Eötvös Loránd University. Professors came from there to teach us geography. We completed the geography and economics programmes, and those who passed a state exam in education became teachers as well. I didn't take that exam for the reasons I've explained already. So I became an economist.

I guess there are such coincidences in everyone's lives. It is important to be able to make a decision and seize the opportunity if something turns up. It was convenient that we had the library of the Hungarian Geographical Society at hand. The Society was re-established in 1952 after it had been banned in 1949.

What possible reasons could there have been to ban it?

Geographers were bad guys; they dealt with geopolitics. And Teleki was the founder of that department… Anyway, quite a lot of scientific associations like this were banned at that time. The Geographical Society was revived in 1952. Fortunately, its library was not closed and it still received forbidden Western journals, which otherwise were not allowed to be brought into the country, as swap issues. (Only their faults make dictatorships bearable.) So it was forbidden to order Western journals, but we received these ones in return. Copies of the Geographical Review were distributed by the Society, though no one was interested in them. So I was aware of the main focus of research in the world. After geography went beyond the world of description and simple reviews of nature and discoveries, it tried to formalise, describe in models and analyse from the aspect of economics the differences between towns and villages, population density and so on.

In what language did you receive information?

Of course, I had to learn some languages. I read and write in a few languages and I did not learn these as a child. The main ones are French and English. I also learnt Russian, Polish and naturally German, which any child from Budapest had some knowledge of. Latin was a key to other languages, so I also read in Italian and Spanish. However, I only give lectures in French and English.

How did you turn to regional science?

What exactly regional science is, and whether it is the same as a modern approach to geography or not, is still debated today. What I call regional science – and I accept that there might be many other definitions – is a form of interdisciplinary knowledge. It is not a kind of discipline such as mathematics or geology, or their like. When regional science examines the development of regions, it needs to compare economic incentives, environmental differences, cultural traditions and so on in order to understand why the region of Nyírség, for example, is underdeveloped. There is not simply one cause: it is not only the low level of investment, the level of education, or the quality of the soil. It is all of them, influencing one another. In my opinion, the key is the social process which either exploits or neglects a natural resource. This is why being not just a geographer, but also an economist was an advantage for me and, vice versa, as someone who deals with regional economy it was an advantage to be a geographer, too.

I was not just involved in economic differences, but even ventured into the field of sociology to some extent as I was a professor at the Sociology Institute of Eötvös Loránd University. I lectured in the same field there as I did elsewhere, the development of settlements, only with greater emphasis on the social aspect. This approach provides an answer to the often raised question: why is the relationship between the countryside and cities like this or like that? Why are they enemies or allies? What kind of regional differences concern everyone in a country, in Europe, in the world, and why are there such differences? I define regional science as the discipline that answers these questions.

It was surely not by chance that you became the first director-general of the Centre for Regional Studies? How did you become involved in its foundation and how is it that you are still involved there today?

To begin with the last part of the question, this is due to the attention and kindness of my successors after I resigned from management at the age of 61 (quite wisely I think), because I did not want to deal with administration. The best age for this kind of science organisation management is from 40 to 60.

So you thought that you should not spend time dealing with administration as you had passed that age?

My decision to resign coincided with the change of regime in the country and I thought I would write great books on synthesis in my spare time. Of course, later I felt a certain sense of disappointment because, instead of writing books like that, I was given duties in academic life, which I naturally did with pleasure. I held offices at the Academy, including that of vice-president for a few years, thus I was involved in science organisation and decision making.

Do you regret that now?

No, I don't. I had duties with UNESCO as well. Until recently, I was vice-president of the UNESCO Intergovernmental Council of the Management of Social Transformations, which meant I stayed in Paris for 3 years and I certainly do not regret that. Thanks to UNESCO, I could get in touch with the whole world. Most European researchers only know Europe and America. Unlike them, with the help of the International Geographical Union and UNESCO, I had the chance to get to know those parts of the world where most of the people in the world live, who are presumably going to play an increasing role in the future. This diversity meant that I was not just an economist interested in regional differences – or in other words not a lawyer interested in the county system and the system of regional administration – but someone who tried to make a synthesis of these. Of course, I did not do this alone, but by working together with experts in public administration reform. So, to be able to form an opinion on the subject of "county or region", I needed colleagues with expertise in the principles of public administration in addition to my own professional knowledge.

But to return to the first part of your question, I would like to tell you about when I was at the Geographical Research Institute, where I worked from 1960 and was deputy director for a decade. There I was finally able to initiate research in this direction. We had a Regional Development Department, but natural resources were more in the focus of research in the institute, so I felt somewhat constricted. And then – a coincidence, a very sad coincidence, happened – a lawyer friend of mine Ottó Bihari, who was the director of the Transdanubian Research Institute based in Pécs, died. We first met at university. He died at an early age. He was only 62. After becoming director in Pécs, he recruited a young team in the Transdanubian Research Institute and called me to see them once a month and talk to the young men and women there because they had no idea what regional development was. Indeed, how could they have known? They were lawyers, economists, historians, who had studied in Pécs.

The deputy director in Pécs, Kálmán Kulcsár, was aware of my feelings regarding the constrictions at the Geographical Research Institute and, after the death of Bihari, told me, "Now you have the chance: if you accept the position of director there, you can keep your team in Budapest."

Could you keep your team because the new institute was intended to be a network? In other words, if you became director in Pécs, could the department in Budapest be affiliated to it?

Yes. Moreover, I was already kind of a founding father. We had created a small group researching settlements in Kecskemét and the Geographical Research Institute had a group in Békéscsaba, too. So I linked them all and this is how the Centre for Regional Studies became a network. My opinion was that regional processes can truly be understood on site, whilst living there. A researcher can only see the essence by actually living in a given county and not just by spending a week at the planning department.

So statistical data are not enough, and you may need something else as well.

When you live somewhere, you come to understand personal contacts and social traditions. Although this may not be pleasant to hear, there are some regions in this country which I once indignantly called "self-disadvantaged" because they did everything they could to remain underdeveloped. They were afraid of modernisation. They were either afraid of learning, or they could not learn. "We would do anything for development, but unfortunately we lost the battle of Mohács" – this kind of complaint has always made me really angry. As it is said, one should not curse the graves of one's ancestors, but one should go forward all the time and learn! It is possible to climb out of poverty. I'm a first generation intellectual, so I understand this very well. You need to go forward. People are often too sluggish to do anything. They do not serve the interests of their villages, towns, regions enough in order to go forward.

A memorable incident in the USA comes to mind. In 1966–67 the Ford Foundation offered me a research scholarship (once again thanks to my position at the Geographical Union). I wanted to study the agricultural regions there, and later I wrote a book on the

agriculture of the USA. I was at a small university in Missoula in Montana, which I chose because the agriculture there was typified by huge areas with extensive animal husbandry, especially cattle. I was interested in how the people in this region lived and organised a ranch of several thousand acres with only 8 workers. I financed my travels as a visiting lecturer at universities. In Missoula, they said that the students were farm boys, so I should lecture doctoral students on the demarcation of agricultural regions. I had a model, considered a novelty at that time, which was in effect about factor analysis. I was also encouraged to talk about Hungary, because they had no idea where it was. So I gave an informative presentation on the history of Hungarians: who we are, what we do and alike. In keeping with Hungarian habits I talked about the battle of Mohács as a turning point after which we could not keep up with Europe and so on. Afterwards, a student came to me and asked with no trace of sarcasm but with the best intentions, "Did I understand you right? When was that battle exactly?" I said that it was in 1526. Then he looked at me and asked, "And what have you done since then?" He was absolutely right. I realised that we always blame the past, while in the USA, which was not even 200 years old when I was there, people always look forward. I tried to learn the lessons myself and put them into practice together with my colleagues, often with success. I would point out that when I resigned as the director of the Centre for Regional Studies only one of the heads of unit was more than 40 years old, and the others were in their 30s. They are forward-looking, and the institute has been working for more than 25 years now.

So perhaps interdisciplinarity is the common denominator? Is the reason why the Centre for Regional Studies (CRS) can co-operate so well with the Hungarian Central Statistical Office, or its journal "Regional Statistics", because they collect and publish so many types of data? We, statisticians, may not be so "interdisciplinary", but we try to explain almost all areas of life in figures.

I used to attend meetings of the Regional Statistics Department. Although only one person was an expert in agriculture, the department on the whole was in practice familiar with everything that I was interested in. There was an industrial statistics expert who not only knew data but the internal organisation of the industries as well. He was also familiar with what we now call outsourcing. This process was already known at that time, and outsourced industrial units were planted in rural areas. So one person specialised in these rural industry plantations, while another was well-versed in education. Regional statistics as a profession involves a specific technique, the collection, management and evaluation of statistical data, but you also need to know what to collect. Regional statisticians do know that. The profession itself is interdisciplinary. It gives answers in the form of exact data to questions that need to be worked on and be evaluated by regional economists, public administration experts and sociologists. This is why I value the work of data collectors who know what kind of data is needed for something and how life is organised in different sectors.

And we are lucky to have the CRS, whose researchers, experienced specialists and career-starters alike, are willing to and even like to use our data for scientific methods that we, statisticians, rarely apply.

And Regional Statistics often provides space for publications in connection with methodology.

Besides young researchers at the CRS, our editors have good working relationships with professors and PhD students at the Regional Studies Department of Eötvös Loránd University. Revisers are chosen from a wider group including these people, too.

Indeed, József Nemes Nagy and his department play an important role in forming regional science. That is a good workshop. Once I used to teach him as well. I taught specialist groups, and he was a student in one of those. Imre Lengyel at the Economics Department of Szeged University of Science (who is now president of the Regional Studies Committee at the Hungarian Academy of Sciences) is also a prominent person when it comes to regional science. So not only is there a Centre for Regional Studies, but there are some departments at universities, and soon regional studies will appear in bachelor degree programmes.

You have mentioned your students many times. I've read in an interview with you that one of your students is in your family. Seeing both you and Mrs. Enyedi as authors of publications in Regional Statistics seems to confirm this…

Yes, my wife is an agricultural economist and I used to teach her. There is only one year between us. Her career began at the Agricultural Economics Institute and continued in the Institute of Economic Planning. For me the greatest joy is to see people of my grandchildren's age bringing me their manuscripts…

People of your grandchildren's age, or your grandchildren themselves?

No, my grandchildren are still quite young. My granddaughter is 20 and my grandson is only 16. My granddaughter is about to leave secondary school now and I often tell her that she is going to "train to be unemployed" because she would like to study literature.

Would you try to influence her if she asked you what to study?

No, I would not.

And did you influence your daughter? Did she ask you about becoming a film director?

We have had a good relationship ever since she was a child. I have to think for a moment to answer this question… Anyway, she finished eight semesters at the Faculty of Economic Mathematics although she did not complete her degree. However, this helped her to develop a kind of mentality. When she left school, she was not sure what to study but she got into the University of Economics. She was interested in several areas, but chose the Faculty of Economic Mathematics. In the meantime, she tried her hand at writing and in the visual arts as well, showing at a photo exhibition. In the end, she decided to study cinematography. At the time she was in her fourth year at the University of Economics, so she could have continued there had she been rejected as a film director. I said, "Of course you should try it! You want it, go for it!" 6 people were selected – including her – out of 600 applicants. It is not a problem if someone at the age of 18 is

not sure what they want to be. I think there are many young people who have multiple fields of interest. Maybe they will be the best experts due to their wide range of interests. They certainly will not have a narrow range of vision. What you are going to be comes from deep inside.

When did it first occur to you that you may become vice-president of the Hungarian Academy of Sciences? Did recognition for your achievements in science organisation and research motivate you?

I have never thought about that. I felt satisfied when I could do what I like. However, I think a good researcher is vain to some extent. Obviously, a researcher is not motivated by the desire to get rich quick, but wants to know something, and being vain means being successful in one's own field of research. How can you measure success when it comes to sciences? Being quoted, having followers, well something like that. Actually I did not plan a managerial career, but when I was asked to become the head of the Geographical Research Institute, I was just a lecturer in Gödöllő. I am grateful to Gödöllő for giving me 5 years of calm, during which I could prepare. Moreover, it was a very pleasing gesture when, half a century later, I was elected professor emeritus there a few years ago. So now I have a relationship with Gödöllő again. Perhaps saying yes to the offer at that time was due to an inclination to go forward, but I did the research to satisfy my curiosity, in other words I wanted to be successful.

So you're a curious person.

Yes, I am. I wanted to be successful, which, however, did not mean status or some kind of need for authority.

Are you still curious after many years of research, or have you become less inquisitive as you have found the answers? Or is the opposite true? Are you becoming more and more curious all the time?

I find it hard to judge myself in such terms. Curiosity does remain of course. Someone who loses it could perhaps be a successful servant of science, but not a real creator. Creative power declines as you get older. At my age, you will not make new discoveries. How long this is possible depends on the profession itself. It is said that physicians and mathematicians are only really creative until they reach 30. On the other hand, curiosity and recognition remains in such a changing world. Now, it is not me who needs to reveal secrets – I simply prepare my students and colleagues to create their own world.

You have been and still are a member of many scientific bodies. You have received many acknowledgments. What is your attitude towards these? Do you have a favourite scientific society, one you most enjoyed working for in the past or are even working for now?

Rather in the past, due to my age and health. Actually, I liked teaching. I mean teaching what I know, not what other authors wrote in their books. I was attracted by the scientific students' association, the doctoral school… and as to which society I liked best? I could

truly satisfy my interests in the context of geography. Economics had a period – which is now coming to an end – when it excluded space from its scope of scrutiny. There used to be an economic geography department at the university that I had a close relationship with. Today, economic geography is only an optional subject for students at one of the faculties. So economists are not interested in regions anymore because they have learnt by now that regional differences do count, and those great models of the world are not working in a way that the Chicago School visualised. It was a great revelation when it came to light that things are not working the way they were supposed to and that more than one model exists for the economy of the world. Emerging China and India are evidence of this. China is going to come out of the economic crisis with an enormous advantage. They have a huge amount of free capital…

So, I prefer geography. I entered the field of geography while it was being revitalised and my economic research was really useful there. I received much recognition for this from the International Geographical Union. I was vice-president of the Union between 1984 and 1992. It gave me a budget that enabled me to travel around the world.

Where is the Union based?

It does not have a base. The centre is always around the secretary-general. The secretary-general should not only have good organisational skills, but also the ability to access funds and have a strong organisation behind him. Now someone from South Korea is the secretary-general. Two years ago in Tunis I was given the highest possible award that a geographer can receive from the Geographical Union. It has a French name: Lauréat d'Honneur. I am also an honorary member of the Hungarian Geographical Society, and I still publish in the Geographical Review. Maybe this is the professional framework then. My favourites are the regionalists anyway. The Hungarian Regional Science Association.

Professor, I have here a study from Regional Statistics that you wrote 25 years ago. It would be very interesting for the readers if you published your current thoughts in connection with the future of regional development and compared these to the opinion you held a quarter of a century ago.

That is a kind offer and I can't refuse it immediately. It sounds like an interesting challenge for me. One always re-reads one's writing with pleasure as it is so good. I will read it through and will see. (I have some homework now by the way, because Ferenc Erdei was born 100 years ago and I am working on a study about him, entitled "The city and its surroundings in the early 21st century".) So I will not say a definite yes either…

Thank you very much for the interview.

And thank you for your interest and attention.

Keywords: Interview, György Enyedi, history of statistics, Regional Statistics, Hungarian Academy of Sciences, Centre for Regional Studies, geography, regional science.

Translated by Gábor Ákos Csutorás

JÓZSEF NEMES NAGY – GERGELY TAGAI

Regional inequalities and the determination of spatial structure

Introduction

Issues of spatial inequalities are not just particular and partial questions of regional policy and spatial development. Reflecting on recent or bygone events and development efforts in Hungary, we can see how the aim and idea of the progress and integration of Hungary emerges almost in every period. Essentially, it just means the need *to catch up with the western part of the continent* both in the sense of economic development and mentality or in the operation of social institutions (in a 'European' way – Europe means of course here Western Europe). Hungary's lag is factual in every respect, even without idealising the characteristics of the core areas of the continent. Up to date and current knowledge of the nature of these inequalities is necessary to help regional political decisions. Moreover, for these issues, it may well be worth considering new techniques and perspectives, which could lead to new relevant findings.

The aim of this paper is to present some actual connections of the Hungarian spatial structure and the characteristics of spatial inequalities. For this, it uses the statistical information background and analytical set of tools already proven in former research – also evaluated in the preliminaries (Nemes Nagy 1987, 2005). Moreover, the study illustrates the use of some representational methods and modelling of spatial interactions in answering different questions regarding spatial inequalities.

Hungarian dimensions – the global and European outlook

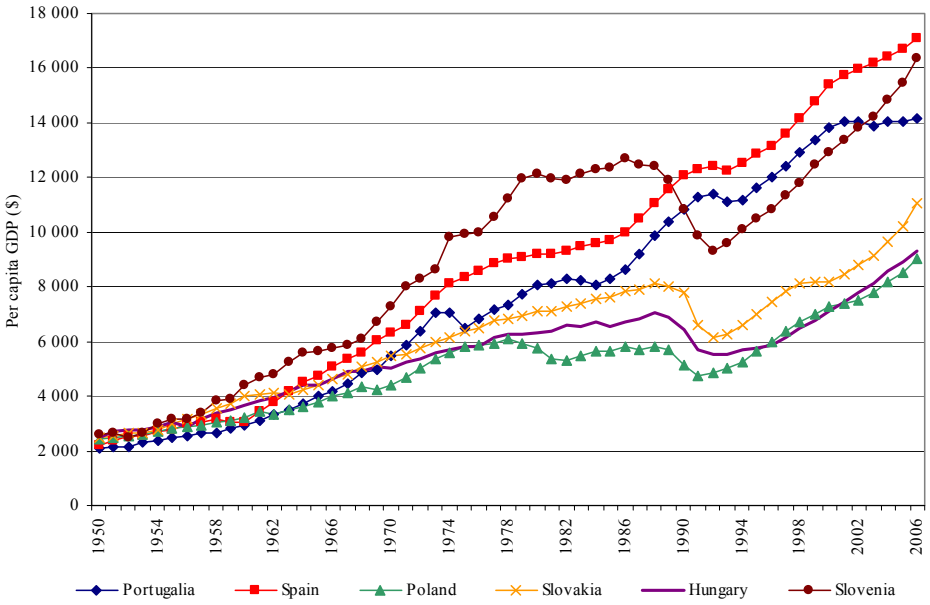
By looking at the map of global development and trying to find Hungary's place on it, it could be suggested that *Hungary represents a very special conjunction of development factors*, some of which we would like to emphasise. Its situation is similar to that of the whole East-Central European block (of countries); one which is very expressive – like a model – as it is described and managed as a homogeneous region by global financial players. The great majority of the world's population lives in countries or regions considerably more or less developed than Hungary. Due to the special 'order' of the polarised world, it *lacks a 'middle class'* – or is that middle class actually Hungary (and its companions from East-Central Europe)? The development positions of Hungary have become fixed in the course of the 20th century, and not even Budapest has been able to reach the most developed level. According to our comparative conclusions, including two thousand regions of the world (Nemes Nagy 2006), Budapest occupies only the 200th position considering the worldwide order of rank of per capita GDP. Other parts of the

country remain generally below the national average level. The development level of Hungary is similar – or even slightly higher – to that of Latin America. Countries of Western Europe or the transatlantic areas (especially their leading regions) have nowadays hugely exceeded this comparison, while the great majority of the population of the continent-sized countries with extraordinary economic dynamics (China, India), live under poorer income and general living conditions than that of Hungary.

The study does not intend to consider the character of the multi-dimensional distances of Hungary from the developed European core areas. The aim for the country is not to catch up with these regions, only with the European 'average'; this objective is a flexible but still distant entity. Nevertheless, this position and the desired developmental path is not clearly defined by any 'natural law'. There are well-known examples, when several countries had the same starting conditions (position of development), but later have taken a very different path; this is illustrated using data from five other countries in Europe compared to Hungary (Figure 1).

Figure 1

Different development paths from a similar starting point in Europe between 1950 and 2008



Data source: database of Groningen Growth and Development Centre, http://www.conference-board.org/economics/.

Positioning Hungary in a global and continental sense, we currently find the country at the end in the order of rank of "developed countries". This means that vital conditions suitable for the present era in Hungary are accessible to a wide degree, however, this situation also illustrates that despite intense progress, Hungary is unlikely to catch up with the most developed countries in a short time. While the global model of the most

developed countries that affects us daily is very distant, it could be considered as an example for us.

Trends of spatial inequalities

The global and continental development positions of Hungary are coupled with amplified social and spatial polarisation. The divergence of regional economic development following the transition processes is a clear and comprehensive trend. However, in line with the development level of Hungary, it cannot be called an individual, 'national' tendency, but the common spatial development path of transition (post-socialist) countries (Table 1). The former spatial equalisation tendencies (existing for decades in developed countries) have mostly stopped over the last 10–20 years. Elsewhere, opposite trends have occurred, but sharp differentiation – indicated in the table – can only be observed in the East-Central part of Europe (except for Austria!).

Table 1

Growing regional inequalities in the East-Central European New Member States of European Union (Dispersion of regional GDP at NUTS level 3)

(per cent)

Country	1995	2008	Change
Bulgaria	33.1	59.5	26.4
Romania	28.8	54.1	25.3
Lithuania	13.6	34.9	21.3
Hungary	*40.4*	*57.0*	*16.6*
Czech Republic	26.1	42.2	16.1
Poland	36.7	50.8	14.2
Latvia	37.9	49.2	11.3
Estonia	32.4	42.1	9.7
Slovakia	42.8	48.9	6.1
Slovenia	22.3	25.8	3.5
(+Austria)	30.1	26.2	–3.9

Sources: Szabó 2008, Eurostat, National Accounts.

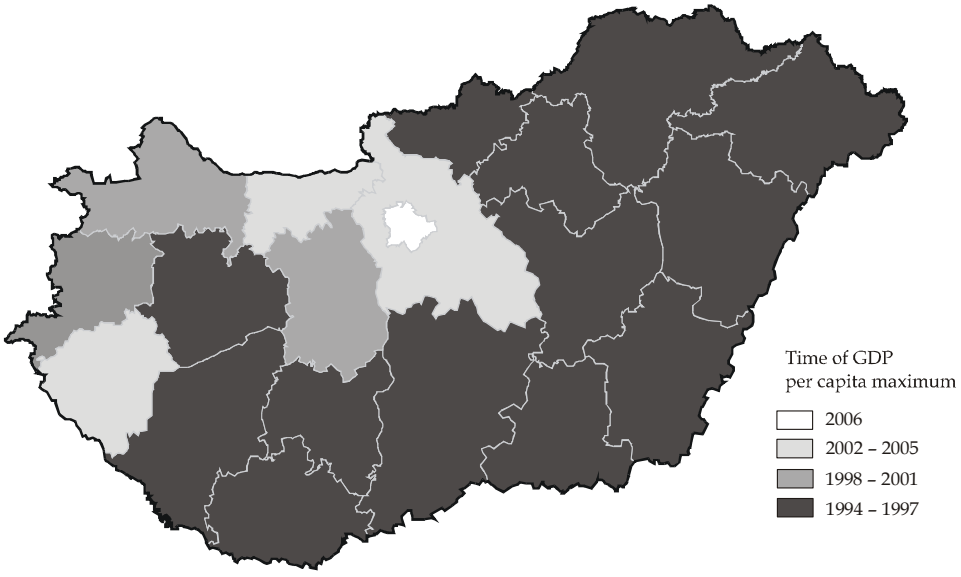
We should recognise that these countries showed strong *downward equalization* under socialism compared to their development level. Unlike in capitalist countries with the same development positions, spatial inequalities in socialist states were lower owing to a downward equalisation process, while the most developed countries showed more balanced spatial patterns due to their favourable economic positions. However, the relative spatial equalisation of socialist states had no real base according to economic processes. The socialist convergence differed from regional convergence processes of market economies, as its sectoral background was very different. While *in modern market economies, the convergence is based on the tertiarisation of economy* – in those sectors which are more strongly connected to population ratio than agriculture or industry; in socialist countries economic processes had no such content. Conversely, here, infrastructure (tertiary sector in a broad sense) was the most relegated sector. In

socialist states, the relative equalisation (financed at the cost of international indebtedness in many countries) was formed primarily by productive sectors, mass-production and equalised wage and income conditions. The change of regime resulted not only in the return to the constitutional state and market economy, but as an inevitable outcome of that it also led to *the return to the trends of market economies in the domain of regional inequalities*. This is clearly associated with *the increase of spatial differences of development and income conditions* in every socialist country owing to former relatively equalised regional characteristics.

The regional polarisation of Hungary can be illustrated in a dramatic (but not ordinary) way by mapping the maximum development levels of Hungarian counties. Figure 2 shows that except for the central parts and north-western regions of the country, every other county suffered losses in their relative development positions in the analysed period. In contrast, Budapest continuously increased its advantage (however, it has stagnated since 2006), Komárom-Esztergom is a typical example of the revived regions that although relatively recently, has closed the gap, while in the other north-eastern Transdanubian counties development positions are nowadays greatly influenced by the organic conjunctural waves of the market economy.

Figure 2

Period of maximum development levels in Hungarian counties between 1994 and 2008 (calculation of GDP per capita in relation to national average)



Source: HCSO, National accounts.

Spatial effects of last years' global economic-financial crisis are still incalculable. As we can see, these processes – with the shock to the financial sector – affects primarily export oriented sectors, whose operation is strongly related to credit activity. This can be observed mainly in central areas of the country, thus in a short time it can bring

downward equalisation. Nevertheless, as we know from the observations of many historical, economic crises, within the mid or longer term, the mechanisms of social and spatial shifting of the crisis will certainly begin. As a final point, the biggest losers of the crisis will presumably be lower social classes and the peripheries, resulting in the increase of spatial polarisation.

Patterns of Hungarian regional disparities – beyond the specifics at county level – include divergence between territorial levels (capital city–rural areas), a distinct regional dimension (west–east), and lesser or greater fragmentation within regions and spatial items with special social geographic content (development poles and axis). These different elements gain their essential meaning and function from different aspects. The strongly marked capital city–rural areas duality is the basic element of the structure, which 'from a distance' represents Hungary. It is a crude simplification but with some informative considerations, it could be suggested that this small country consists of simply Budapest and its wider agglomeration. Regional diversity underlines the dimension reflecting the level of national regional policy (as the targeted level of development and equalisation). The micro-regional mosaic and variations on a settlement level are rather the terrain of special domains of regional policy (rural and settlement development). With the rigid structure of public administration, spatial governance cannot integrate this diversity however, this is not necessary. What is required is the clear system of distinctly decentralised spatial governance with clear functions. This is still missing.

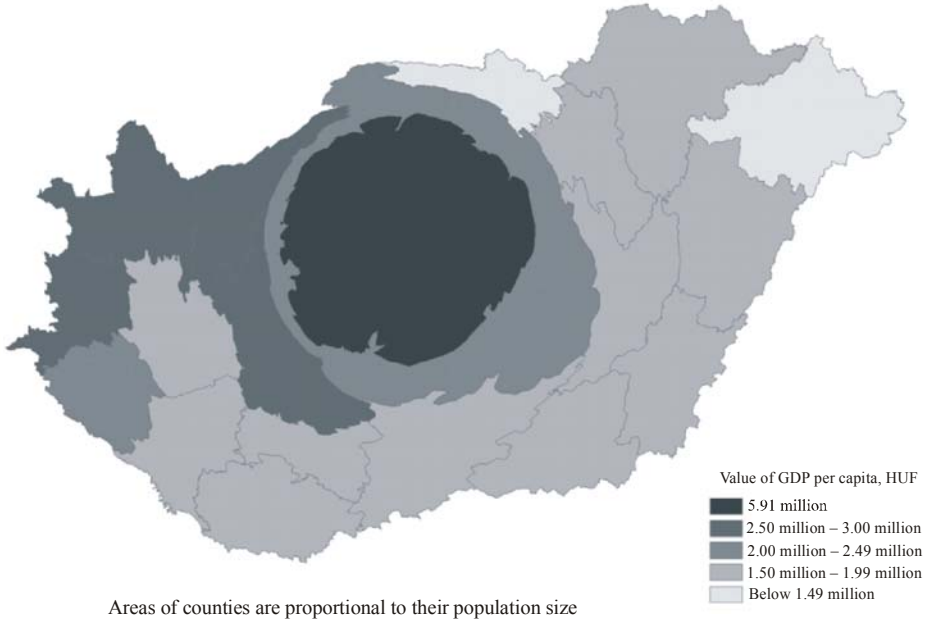
Cartograms of spatial differences in Hungary

Among the emphasised dimensions of spatial inequalities, the most fundamental is the duality of capital city and rural areas. This monocentric character is a feature of the most divided countries in East-Central Europe; beside Hungary, for example Bulgaria, Latvia and Slovakia (see Table 1).

The weight of mono-centricity in Hungary cannot be represented effectively with traditional solutions of cartography, as on these maps the unremarkable spot of the relatively small Budapest cannot express the economic and population dominance of the capital. Whereas social applications of GIS has an interesting solution used by geography for a long time. These are the cartograms. Social indicators are not represented proportional to the area of observation units (e.g. counties) on them, but proportional to the volume of population or economic power (GDP). (The topological character of these representations means that the shape of areal units changes, it becomes deformed, while their neighbourhood relations and the scheme of their spatial position remain the same). Two of these types of maps (Figures 3 and 4) are presented here to illustrate the mono-centricity of the spatial structure of Hungary. Beside this exaggeratedly emphasised aspect, other dimensions fade into the background; rural areas appear as a narrow wedge. It is especially striking viewing the cartogram based on economic power.

Figure 3

Diversity of economic development (GDP per capita) on population-based cartograms

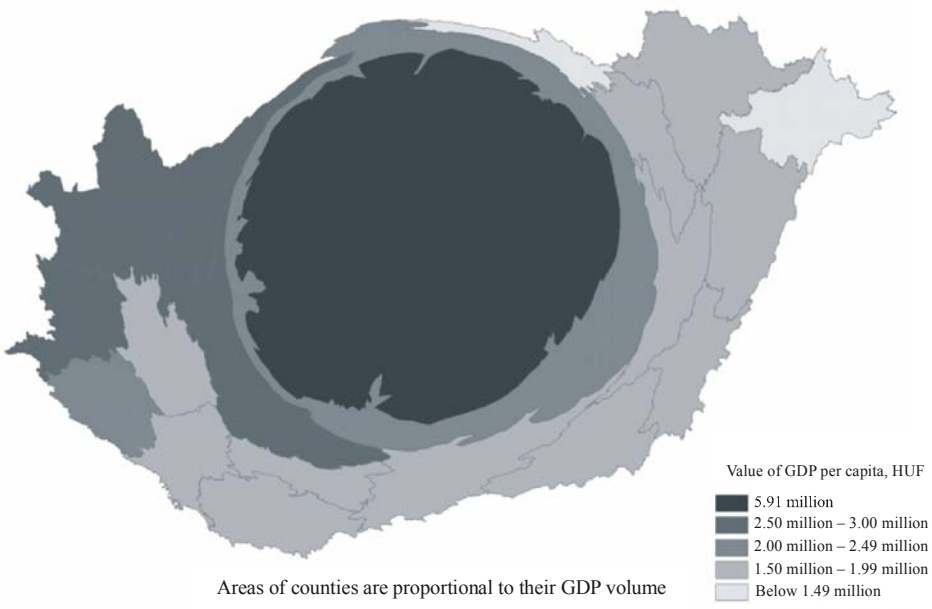


Areas of counties are proportional to their population size

Source: HCSO, National accounts.

Figure 4

Diversity of economic development (GDP per capita) on GDP volume-based cartograms



Areas of counties are proportional to their GDP volume

Source: HCSO, National accounts.

Potential models of Hungary

In social spaces, those places that have the most advantageous situation are located close to big masses, as generally, notable economic power is concentrated there and the accessibility of markets is better. These central areas – due to their positions within a given system – have the advantage over peripheries whose more isolated situation or lesser (economic) power do not allow them to be influential, active elements of the observed area.

Potential model – modelling these structures of social spaces – does not refer directly to the state of development or spatial inequalities, but explains one of their factors. Findings of international observations show that a potential model has its role in interpreting macro-structures by exploring core–periphery relations.

While the gravity model estimates the influence of a given element (e. g. a town, a country or a county) of social space on its neighbourhood, by using the potential model, we can investigate in a complex field of interactions of social space – based on the relations of mass and distance – how a single spatial item is influenced by other parts of the system. By transforming the general formula of the gravity model, it can be calculated as follows:

$v_{ij} = \frac{m_i}{d_{ij}}$, where v_{ij} is the influence of mass i in the point j, d_{ij}, is the distance between mass i and point j (distances are recorded as the shortest route – in air – among the given points). This describes the strength of the connection between the given elements of space. It can be extended in a way that the total value of potentials – of every element of the space – become interpretable, not just the interrelations between two given masses or points. For this we need to simply summarise the single potential values:

$V_j = \sum_i \frac{m_i}{d_{ij}}$, where V_j denotes the value of total potential in j. (The description of the model and the earliest applications of it relate to John Quincy Stewart – Stewart 1942, 1948).

By interpreting *the population potentials of Hungary* – considering only this country and focusing on the interrelations within it – it can be stated that core–periphery relations in Hungary are strongly correlated to the duality of Budapest and the rural areas. In the spatial field of social interactions, every area that is far from Budapest has an unfavourable position. In fact, as values of population potentials decrease along (almost) concentric circles, it seems that in the formation of population potentials, only the distance from Budapest is the determinant factor. The population mass of the other parts of the country remarkably do not even appear; they fade into the field shaped by the capital city. Only in the peripheries where the influence of Budapest decreases – due to the greater distance –are there some more populated towns that are capable of rising above their surroundings. This is the mostly observable in the area of Debrecen and Pécs, but minor ‘vibrations’ are also detectable around Miskolc, Győr or Szeged (Figure 5).

Figure 5

Population potentials in Hungary, 2008

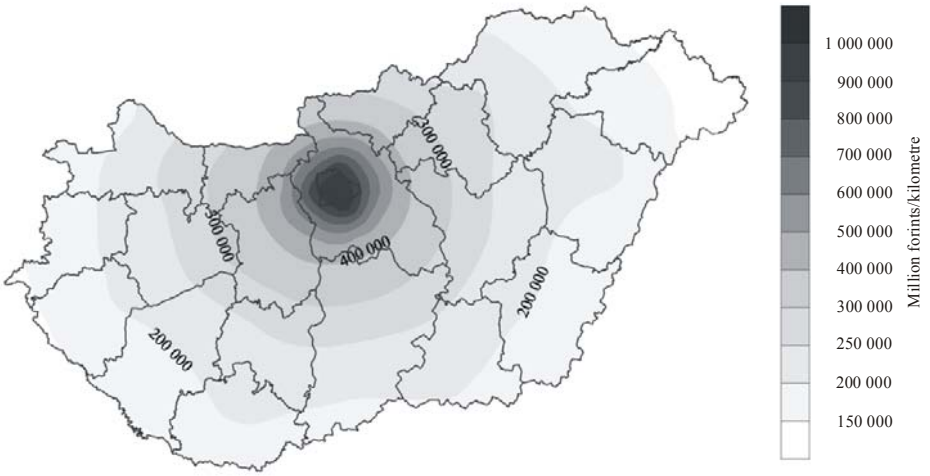
Source: HCSO, Demographic statistics.

For correctly interpreting the units of measure of potential, the labels 'person per kilometre', 'Hungarian forints (€) per kilometre' refers to the model's representation of potential intensity of economic and social interactions within a given distance. This measure gives an interpretation of the relative positions of regions within the analysed area and their favourable or unfavourable location conditions.

Economic potentials of Hungary are also mapped without external influences (from outside the country). Looking at (Figure 6), it seems obvious that contrary to the centrally positioned Budapest, the greatest part of Hungary has disadvantages according to its location conditions. In addition, the capital is closely located to the geographical centre of Hungary; its economic performance (volume of GDP) is much greater than that of the other masses. Thus, economic potential space is mainly (nearly alone) affected by Budapest, the relative spatial positions of other parts of the country depend almost only on the distance from the capital, as in the case of population potentials. The concentric decrease of potential values – increasing with distance from Budapest – illustrates this phenomenon well. This spatial pattern is not disrupted even by the county seats with notable economic weight.

Figure 6

Economic potentials in Hungary, 2008



Source: HCSO, National accounts (estimation).

While these potential maps confirm the dominance of Budapest, which is also presented on topological cartograms, something is wrong here! Every fact and analysis demonstrates the unquestionable role of the central region of Hungary, however they do not declare a concentric pattern of economic development level in the same way. Border areas have quite different positions: while the majority is typical outer periphery, there are dynamic, well-developed edges (on the western borders of Hungary) whose presence naturally cannot be explained by inner mechanisms, or by the influence of Budapest. In this case, further information can be drawn from an extension of the potential model, looking beyond the state borders, to East-Central Europe.

Potential models of East-Central Europe

European accessibility and core–periphery models (Keeble et al. 1982, Copus 1999, Schürmann & Talaat 2002, Spiekermann & Neubauer 2002) confirm that core areas of the European Union (countries and regions lying between South-Eastern England and Northern Italy) have multiple advantages in the domain of relative location – in contradiction to peripherally located Scandinavian and Mediterranean regions. This is due to the situation that accessibility conditions of the former are favourable from every part of the continent. In addition, the biggest concentration of population and regions with the most outstanding economic power are here. In this comparison, East-Central Europe (as well as Hungary) has only the role of the periphery's periphery. Local centres of the area (e.g. Prague, Warsaw or Budapest) do not possess such an economic or

population power which could be determinant in European potential fields outside their surroundings (Tagai 2004). Analyses focusing directly on Hungary also show that in a wider outlook, the pattern of Hungarian spatial inequalities is largely determined by the influence of the core areas of the European Union – e.g. location advantages of Western Hungary can be shown on the basis of this (Nemes Nagy 1998).

The area of Hungary and its neighbours cannot be seen as an independent and isolated system, the influence of regions outside the area (primarily that of the Western European countries) should also be considered. This can be realised by the calculation of outer potentials – influence coming from outside the analysed area. In this case, the formula of the potential model is changed by the replacement of the considered masses within the system to elements with a central role outside the analysed area:

$V_{jk} = \sum_k \frac{m_k}{d_{jk}}$, where V_{jk} is the outer potential of point j and m_k denotes the mass of a given centre outside the area. The circles of the outer centres of influence cover the whole of Europe (NUTS2 units in the case of Norway and Switzerland, as well as other countries such as Albania, Republic of Macedonia, Belarus, Moldova and further parts of Ukraine). However, eventually only those elements were considered as parts of outer potentials whose measurable influence was notable in the totalised outer potentials (more than 0.5%).

An almost overall picture of spaces of social interaction can be interpreted by the calculation of totalised potential influences within and outside the analysed system. Further, the strength of a given area (self-potentials) is also considerable. This cannot be calculated by using the basic formula of the potential model – to avoid the division by zero ($V_{jj} = \frac{m_j}{d_{jj}}$). However, to every single areal unit, a fictive self-distance can be attached which can be defined for example by the calculation of the radius for a circle, whose area is equal to the area of the given NUTS 3 unit.

With the calculation of outer potentials and the consideration of patterns of interaction within a system like the self-strength of the analysed areas – summed as total potentials ($V_{jt} = V_{jj} + V_j + V_{jk}$) – those interrelations can be explored, which help to interpret the socio-economic characteristics of a given area on the basis of its relative location within a system, together with its inner structures.

The main feature of *population potentials* characterising Hungary and its surroundings is the tendentious decrease of potential values towards the south and east. This can be interpreted as a result of the impact of outer potentials of the analysis – mainly that of the Western European core as the topmost point of the slope on the population surface. In this way, it denotes the peripheral situation of Hungary and its surroundings (primarily southern and eastern neighbours) within Europe. Naturally, in this part of Europe, there are also large towns, populated places with several million inhabitants, but these look small beside a metropolis like London or Paris. Moreover, conurbations like Randstadt in the Netherlands or the Ruhr district in Germany have not formed within the surrounds of Hungary. It is typical in countries of this part of Europe, that the capital can have (one–two) millions of inhabitants while other towns can reach only a fraction of it. In addition, larger centres are distant from each other, thus synergic

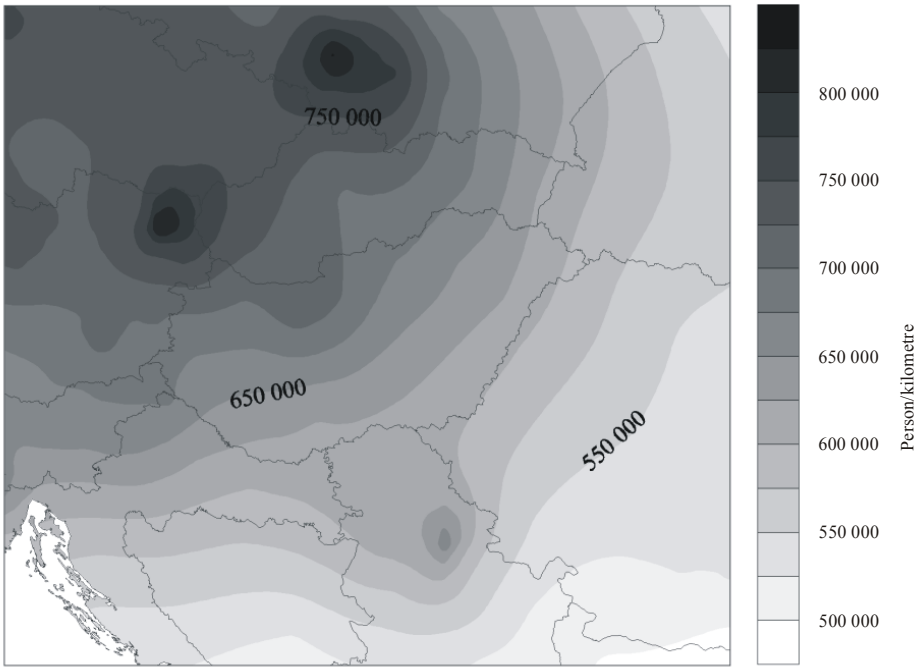
effects – raising the western part of Europe above other areas in the fields of spatial interactions – cannot be effective (Figure 7).

However, there is an exception. The conurbation of Silesia in Southern Poland is the biggest contiguous populated place in East-Central Europe (about 5 million inhabitants). As in the surroundings of Silesian NUTS 3 regions, there are other highly populated areas (Krakow or Ostrava and its neighbourhood in the Czech Republic), that generate medium synergic effects. Due to this, in the wider surroundings of Hungary, values of population potentials reach their local maximum here.

Although the effect of Western European population centres is greater in Austria due to their relative geographic nearness, here only the eastern part of the country (Vienna) can rise above its surroundings. Conversely, potential intensity is below the population potential level of Southern Poland. Starting from Vienna and the surrounding NUTS 3 units, the surface of potential space declines not just towards the south and east but also the west, which denotes that the neighbourhood of Vienna – including the near Bratislava, capital of Slovakia – forms a positive anomaly in the interaction structure of Europe.

Figure 7

Population potentials in East-Central Europe, 2008



Source: Eurostat, Demographic statistics.

In Hungary, the population concentration of Budapest and Pest county with 3 million inhabitants is actually the southern extension of this anomaly. Otherwise, the decline of the population potential surface in Hungary would fully adapt to the south-eastern

direction, but the capital is such an important local centre (the real centre of the Carpathian basin), that it does not fade into the general patterns, moreover it also raises its surroundings. Positive effects of Budapest and Pest county also reach some parts of Slovakia whose facilities are otherwise mostly formed by the neighbouring regions of Austria, Czech Republic and Poland.

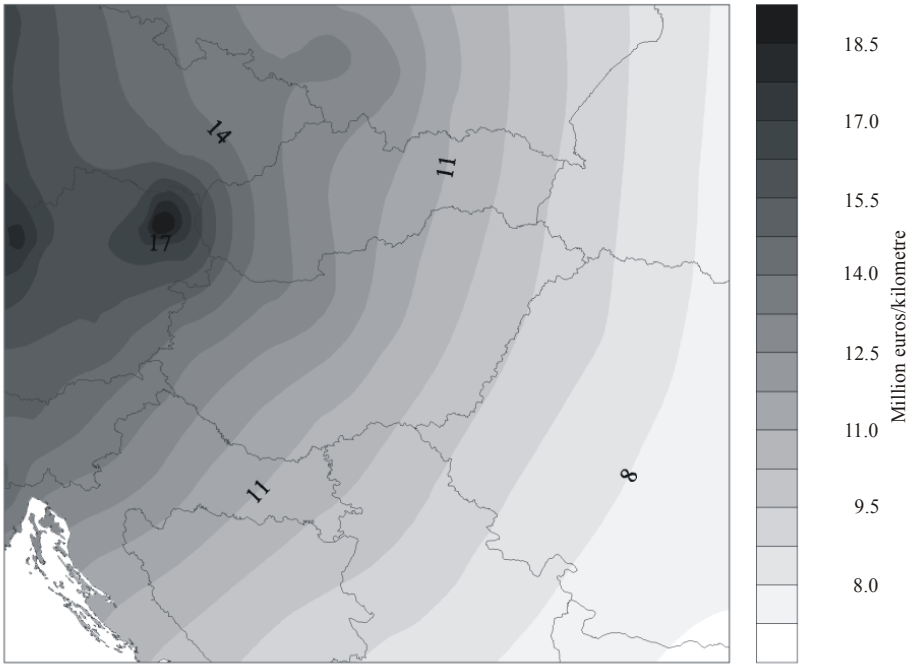
The other notable towns, more populated regions of the surrounding countries hardly benefit from the synergic effects coming from the population weight of the mentioned local centres. They fade into the general European pattern; they appear at most as vibrations in the otherwise smooth-running potential curves (e. g. the neighbourhood of Graz, Zagreb or Kosice). The only exception is Belgrade, capital of Serbia with one million inhabitants, which can moderately rise above its surroundings. However, the potential level of social intensity is below the volume of population potentials measurable in the greater part of Hungary.

Patterns of potential economic interactions – modelled with economic performance (GDP) – are much clearer than population potentials. The interaction influence of economic centres outside the analysed area (almost the whole of Europe) practically dominates the structure of economic potential space. Considering population concentrations, East-Central Europe can more or less reach the level of the western part of the continent (with its metropolises and conurbations with some millions of inhabitants) – at least East-Central Europe also has local centres appearing as positive anomalies in the population potential space. Conversely, considering economic power it lags far behind the western economic core. Thus, Hungary and its wider neighbourhood are only really peripheries compared to these core areas due to their limited economic power, the poor synergic effects, and the distance from the western core. This area is not an individual and active region, forming the spaces of interactions, but it is greatly influenced and its economic potentials decrease almost uniformly – beside some anomalies – towards to the south-eastern edge of the continent (Figure 8).

As an advanced outpost of the Western European economic core, Vienna is the only real active unit of the space of economic potentials. Due to its proximity, its direct influence on the eastern part of the Czech Republic and in the western regions of Slovakia and Hungary is highly notable, but its indirect synergies are also detectable as for example it presumably strengthens the positive anomaly of Silesia. In this pattern of economic interaction space Silesia is a minor but slightly appearing local centre. It cannot exert much influence outside its close neighbourhood, which could counterbalance the level of peripherality resulting from the great distance from the western core.

Figure 8

Economic potentials in East-Central Europe, 2008



Source: Eurostat, National accounts.

Emphasising the position of Hungary, it can be said that the patterns of economic potentials hardly differ from the structures of the well-known factors of development: the basis of the (spatial) economic inequalities can be described with the elevation of the central part of the country (mainly Budapest) and a slope facing south-east. It confirms the supposition that the western counties of Hungary have advantages in their relative location in contrast with the eastern part of the country. The modelled effect, the positive impact of the relatively smaller distance of the Western European core is really working. Budapest, as the economic centre of Hungary rises only slightly above its surroundings under these circumstances, its active area is also limited, and it fades gradually into the space of economic interactions dominated by the Western European core.

Conclusions

Beyond emphasising some interesting methodological elements of this paper (that may provide inspiration for their use to the readership) and the repetition of the most important findings, as a conclusion we close the study with some ideas for regional policy and strategy – that have not been mentioned before.

The first of them can be stated in relation to the *monocentric* character of Hungary (declared in almost all the analytical works). The dominance of the capital within the

country is an unchangeable fact – naturally none of this can hide the divided nature and the inner problems of the capital and its region. Regarding the moderation of duality between the capital and the rural areas, *the size and the weight of the aimed areal units* have an essential importance (beside many other conditions). The dynamising of small, fragmented regions, the "counter-pole" programme focused on a county seat level (incommensurable with the capital) had no chance in this sense, although their content could support local development. The only considerable administrative level should be the level of NUTS2 *regions*. The loss of their importance as well as the appreciation of any other administrative units of development (spatial units with local role but without the capability of correcting the lack of balance, e.g. small districts, towns) – instead of the comprehensive and rational development of regions, is a *serious error of regional policy*.

Another emphasised finding of this study is *the existence of active mechanisms of spatial organisation irresistibly breaking through national borders*. This draws attention (also in the sense of methodological, thematic issues) to the need for abandoning provincialism experienced in many works dealing with the analysis of regional processes, and to the need to strengthen the role of international comparative investigations. This idea should have a major role in Hungarian spatial planning, which in most cases only realises international character in attaching development projects to the financial sources of the European Union.

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Keywords: Regional inequalities, determinations of spatial structure, autocorrelation, space–time map, topologic cartogram, gravity modelling, potential model, potential space.

TAMÁS DUSEK

The effect of the reduction of the Hungarian railway network in 2009 on accessibility*

There are two aims of this study. Firstly, to give a quantitative overview on the changing railway accessibility due to the reduction of the railway network in 2009 in Hungary. Secondly, to discuss various forms of detour indices, the main method of analysis. From previous quantitative analyses of the Hungarian railway network, Csaba Kovács's (1973) study is to be noted, in which he analysed the geographical location of 197 settlements on the railway network. Gábor Szalkai's (2001) study included dynamic comparisons in addition to the static characteristics of the railway network at that time. In addition, it described the impacts of unmounting the circular railway network due to the Treaty of Trianon after the First World War, of mutilating the branch line network after 1968, and of a potential new Kecskemét–Dunaújváros–Szolnok line on accessibility. The present study diverges primarily in two aspects from these analyses. On the one hand, it concerns a smaller railway network after the reduction of railway network in 2007 and in 2009. As the study also aims to analyse the impact on accessibility of closed branch lines after the schedule change in December 2009, it deals with two networks (smaller than the ones examined in earlier studies). However, it does not deal directly with the impact of restarting some lines in June and December 2010. On the other hand, the set of data used is wider in the sense that it uses actual schedule data regarding temporal accessibility between stations.

The study is concerned both with descriptive analysis of situation and temporal comparison; however, it does not deal with economic, cost-effective, environmental, schedule and other concerns of railway transport, but focuses solely on its supply-side. Traffic data would be interesting for weighted calculations with the particular network elements, but these are not available. I do not touch upon conceptual issues of accessibility, which are well described in Tamás Fleischer's two studies (Fleischer 2008a, 2008b). In the present analysis, accessibility means whether a given settlement can be approached by train, and if so, how far it is from the other settlements.

Analysis database

Data regarding the length of the railway network differ to some extent in various sources of information; a completely accurate number also cannot be expected due to methodological reasons. The network used for passenger transport was approximately 8 000 kilometres in 2008. As a consequence of schedule changes at the end of 2009, transportation has ceased on a section of 868 kilometres according to the data indicated in the schedule (Table 1 and Figure 1). From the branch lines, 10 are feeder lines, that is, of

* The research was supported by the János Bolyai Research Scholarship of the Hungarian Academy of Sciences.

its two end-points, only one has connection or continuation to a national base network or sub network, and the other one has not. Some 15 branch lines have connections or continuations on both ends. Due to reduction of branch lines, the accessibility of 202 previous stations (or stops) has ceased. On the Veszprém–Zirc line, transportation was available for three train pairs a day on weekends only, from December 2009 to its restart in July 2010, and was not available on weekdays. I employed the weekday (Thursday) schedule in the analysis. In Table 1, the number of the directly concerned population means the total population of settlements having a discontinued station. The number of actually, directly concerned people may be lower owing to the disadvantageous position of certain train stops in terms of passenger traffic, and the number of those indirectly concerned may be higher. A more accurate definition of concern would be impossible, or difficult.

Table 1

Passenger transport has ceased according to time schedules on 13 December 2009, on the following lines

Line	Length, km	Number of stations	Number of cancelled stations	Number of inhabitants directly concerned[a)]
	Feeder lines			
Mezőfalva – Paks	40	7	6	35.1
Godisa – Komló	19	7	6	29.2
Pécs – Pécsvárad	23	9	8	7.4
Sáránd – Létavértes	20	5	4	17.2
Fehérgyarmat – Zajta	25	8	7	5.8
Csenger – Kocsord alsó	33	8	5	11.4
Kisszénás – Kondoros	6	2	1	5.7
Körösnagyharsány – Vésztő	32	6	5	8.0
Nyíregyháza átrakó – Balsa-Tiszapart[b)]	39	21	21	14.9
Herminatanya – Dombrád[b)]	28	10	10	19.3
Sum	*265*	*84*	*74*	*154.0*
	Not feeder lines			
Almásfüzitő – Esztergom-Kertváros	42	15	13	28.6
Szilvásvárad – Putnok	35	8	6	5.1
Abaújszántó – Hidasnémeti	30	10	8	8.2
Lajosmizse – Kecskemét	25	13	11	0.0
Székesfehérvár – Komárom	82	17	15	39.6
Körmend – Zalalövő	23	4	2	2.1
Balatonszentgyörgy – Somogyszob	59	10	7	21.7
Börgönd – Sárbogárd	30	8	6	8.7
Galgamácsa – Vácrátót	15	4	2	1.2
Karcag – Tiszafüred	44	10	8	10.8
Ohat-Pusztakócs – Tiszalök	65	13	11	21.8
Kecskemét– Kiskőrös[b)]	54	20	18	9.8
Törökfái – Kiskunmajsa[b)]	44	14	13	8.2
Hódmezővásárhely – Makó	34	7	5	3.3
Veszprém – Zirc	21	3	1	0.5
Sum	*603*	*160*	*128*	*169.6*
Total sum	*868*	*244*	*202*	*323.6*

a) Explanation in the text.

b) Narrow-gauge line.

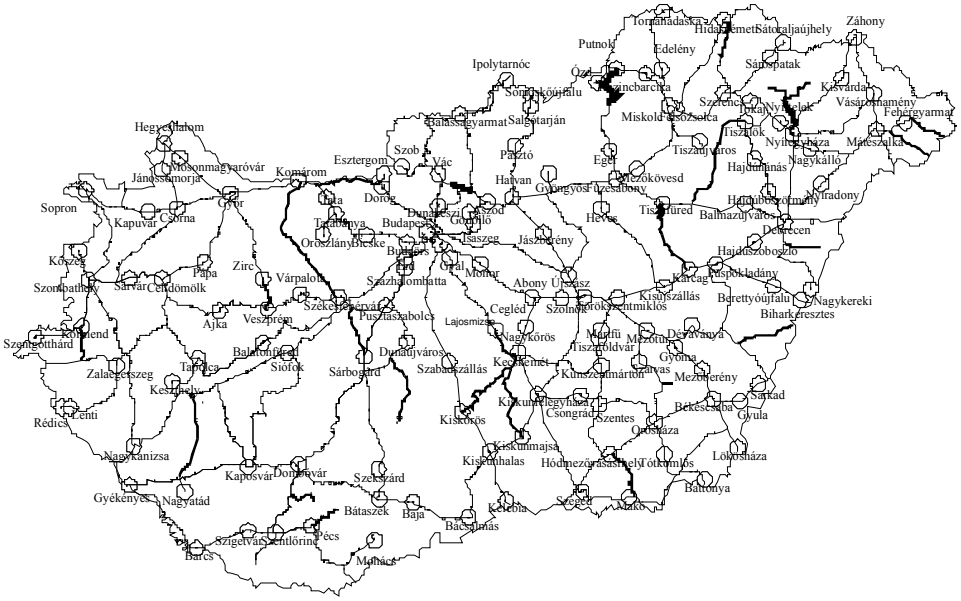
Source: schedule of Hungarian State Railways.

In the course of analysis, a mid-size network containing 143 settlements has been analysed. In selecting the 143 settlements, their size and their position in the railway network has been taken into consideration. Based on the latter aspect, network end-points and terminals of feeder lines have been included, independently from the size of settlements. Based on the two criteria, the settlements are distributed evenly in the country, as there are no significant differences in the density of the railway network on a regional level either.

For the examination, matrixes of railway network distance (in kilometres) and time distance (in minutes) were created between the selected settlements. Data are from the schedule of Hungarian State Railways; in the case of time distances, the option of the shortest time has been chosen from the options offered by the "Elvira" for each connection. The kilometre distance matrix is symmetrical, however, the interval is not, predominantly due to transfers and less due to the direction dependence of journey times. An example of the latter is that the (schedule) journey time of trains going to Budapest is mostly longer with one, two or three minutes than that of trains leaving from Budapest. Overall, (together with transfer impact) the difference between the average journey time of trains leaving from Budapest and of trains arriving in Budapest is 2.3 minutes on average.

Figure 1

Passenger transport has ceased according to the time schedule on 13 December 2009, on the following lines (heavy lines) and the settlements in the analysis



Source: own drawing according to schedule of Hungarian State Railways.

As a reference, the air distance matrix was created between train stations based on the coordinates of the Uniform National Projection. By comparing it with network distances,

it has become evident that kilometre distances of schedules sometimes slightly differ from the actual data for stations close to each other. Altogether, it is most obvious in 23 cases, where air distances between stations are greater than those indicated in the schedule. For instance, the Abony–Szolnok distance is 11 kilometres according to schedule, 12.16 km according to the geographical coordinates of train stations, and 12.198 km based on the coordinates of the Uniform National Projection. Some further examples: Budaörs–Budapest South railway station (10.33 km in air distance, 10 km according to the schedule, the actual network length measured from the UNP map is 14 km), and so forth. Based on further random measurement the errors are not so significant that they would obstruct the analysis, and they do not play a role in temporal comparison in any case. In the 23 cases, network distances have been increased to the smallest whole number that minimally exceeds air distance.

Impact of the network reduction on accessibility

The reduction of the network affects accessibility in three different ways. First, certain settlements become completely inaccessible by train (e.g. Kisbér or Kondoros). Secondly, still accessible settlements can be accessed from fewer settlements. Thirdly, distances between accessible settlements may also change. The discontinuation of feeder lines has no impact, only those lines, where both end-points are connected to the national network. For example, the impact of the discontinuation of the Fehérgyarmat–Zajta feeder line is that railway accessibility of settlements between Fehérgyarmat and Zajta has decreased to zero, but the discontinuation of this network element does not influence the accessibility relationship between still accessible settlements. At the same time, discontinuation of the line between Tiszafüred and Karcag not only makes the settlements along the railway line between the two locations inaccessible but it also has an impact on accessibility between Tiszafüred and Karcag or Füzesabony and Püspökladány which are still accessible but only with a detour compared to the earlier state. The analysis involves only the settlements accessible at both dates; therefore, the aim of the present study is to quantify the third level of impact.

Methodological questions in the calculation of the detour index

The detour index in the most general case is the ratio of network distance and air distance between two points of interest. Its minimal value is 1, if the route between the two points is in a straight line. The detour index can be calculated between two points in only one way, but it is possible to calculate it for a set of points in several ways. In Csaba Kovács's paper and Gábor Szalkai's calculations on railway and public road networks (Szalkai 2001, 2003, 2004), it was computed in the following way:

$$H_i = \frac{\sum_{\substack{j=1 \\ j \neq i}}^{n} dh_{ij} /(n-1)}{\sum_{\substack{j=1 \\ j \neq i}}^{n} dg_{ij} /(n-1)}$$

The numerator[1] of the formula comprises the average network distance of a given settlement from the other settlements; its denominator contains the average air distance.[2] Tamás Fleischer (2002) used the reciprocal of the formula with regard to the public road network. This procedure of calculation is distance weighting, that is, it gives greater weight to larger distances and smaller weight to smaller distances. In the formula giving a unit weight for every pair-wise detour index, the averages of pair-wise detour indices are presented:

$$H_i(b) = \frac{\sum_{\substack{j=1 \\ j \neq i}}^{n} \frac{dh_{ij}}{dg_{ij}}}{n-1}$$

At the same time, based on the consideration that the relationship between settlements located closer to each other may be stronger than the relationship between settlements situated farther from each other; smaller distances may also be given greater weight. The simplest way to do this is weighting by the reciprocal of distance:

$$H_i(c) = \frac{\sum_{\substack{j=1 \\ j \neq i}}^{n} \frac{1}{dh_{ij}} * \frac{dh_{ij}}{dg_{ij}}}{\sum_{\substack{j=1 \\ j \neq i}} \frac{1}{dh_{ij}}} = \frac{\sum_{\substack{j=1 \\ j \neq i}}^{n} \frac{1}{dg_{ij}}}{\sum_{\substack{j=1 \\ j \neq i}} \frac{1}{dh_{ij}}}$$

Another possibility is to weight either by the reciprocal of the detour index itself, or by the square of the reciprocal, or combining the two possibilities, which is better in terms of taking into account the straight-line difference in the case of smaller distances. The present study does not aim to discuss further methodological details; therefore, other versions of different distance weighting are not examined in this instance.

The common problem of the so far described versions of detour indices is that they do not take account of how significant the settlement is. For instance, in the detour index of Budaörs, the Budaörs–Ipolytarnóc and the Budaörs–Budapest relationships have the same weight, while of course Budapest (with almost two million inhabitants) is more significant than Ipolytarnóc (with only 500 inhabitants). To eliminate the problem, we can weight the particular relations. Csaba Kovács used the total quantity of goods sent from or left at the given settlement in his calculation of weighted indicator. In case of no traffic data, the simplest way is to apply population number. The previous three formulas have to be modified in the following way (p is the sign for population):

$$H_i(d) = \frac{\sum_{\substack{j=1 \\ j \neq i}} p_j * dh_{ij}}{\sum_{\substack{j=1 \\ j \neq i}} p_j * dg_{ij}}, \qquad H_i(e) = \frac{\sum_{\substack{j=1 \\ j \neq i}} p_j * \frac{dh_{ij}}{dg_{ij}}}{\sum_{\substack{j=1 \\ j \neq i}} p_j * (n-1)}, \qquad H_i(f) = \frac{\sum_{\substack{j=1 \\ j \neq i}} \frac{p_j}{dh_{ij}} * \frac{dh_{ij}}{dg_{ij}}}{\sum_{\substack{j=1 \\ j \neq i}} \frac{p_j}{dh_{ij}}} = \frac{\sum_{\substack{j=1 \\ j \neq i}} \frac{p_j}{dg_{ij}}}{\sum_{\substack{j=1 \\ j \neq i}} \frac{p_j}{dh_{ij}}}.$$

1 The average distance of each settlement from all the other settlements computed in different ways is not a significant indicator itself as it will be primarily the function of delimitation of area. In spite of this, the indicator is calculated by different weighting of accessible masses and distance (Tóth 2006, Tóth & Kincses 2007). Its calculation is justified to some extent in the case of totally closed systems with no external spatial connections.

2 dh_{ij}: network distance between i-th and j-th settlements in kilometres; dg_{ij}: air distance between i-th and j-th settlements in kilometres.

Possible differences of the six indicators compared to each other may provide interesting information on whether the accessibility of a given settlement is divergent from closer and farther settlements, or from larger or smaller settlements. For instance, if the versions weighted by population number are lower than the versions not weighted by population number, it indicates that from the given settlement, the accessibility of larger settlements is relatively better compared to smaller ones. The indicators have been computed, but only the first version on a settlement level has been described in detail due to lack of space; in the case of the others, only the most significant differences are highlighted.

Detour indices can also be calculated if the concepts of distance to be compared have divergent measures, for example, time and cost distance can be compared with air distances and network kilometre distances. In this case, given distances have to be expressed as a distribution ratio in proportion to total network distances (or of other more aggregated forms). At this point, unit value of indicator means that the proportion of the two kinds of distances is equivalent within the two types of total distances.

Of course, the set of settlements involved in the analysis has an effect on the value of the indicators; however, significant differences can only emerge between the values of indicators computed with different networks if the spatial distribution of settlements involved in the analysis is very uneven. Uneven spatial distribution has a similar impact to weighting by population number. Liquidation of lines connected to the network at both ends increases the value of the indicator, while liquidation of feeder lines may decrease or increase it.

Choropleth interpolated maps have not been used to describe detour indices, but their values are indicated by numbers next to the settlements involved in the analysis, furthermore, the size of circles marking settlements is also in proportion to their values. Interpolated maps are more spectacular, but their use is methodologically justified if they apply to a phenomenon that is spatially everywhere interpretable (e.g. amount of precipitation, sunlight), the value of which can be recorded only in certain observation points. Railway accessibility can be conceptually interpreted only at railway stations, and combined with other forms of transport it is the lowest at the points of railway stations; moving away from them, it becomes more unfavourable. Consequently, applying traditional interpolation procedures is not justified in this case.

Tendency of some indicators of total network

Total distance of network expressed in kilometres (the sum of distances of each settlement from all the other settlements) has increased by 1.9% as a result of the new schedule (Table 2). Total journey time has increased only by 0.6%, as discontinued lines belong to those of slower average speed; however, favourable schedule changes, such as better transfer possibilities, may have also contributed to the difference. The average of detour indices weighted by population is lower than that of the unweighted ratios, primarily owing to the good accessibility of Budapest, but they would also decrease if we did not take Budapest into consideration. On the other hand, detour indices weighted by population have increased to a smaller extent than their unweighted counterparts, which

shows that accessibility has declined towards and between smaller settlements to a greater extent on average, than towards and between larger ones.

Table 2

Some indicators of the whole network

	2009	2010	2009[a)]	2010[a)]	2009[b)]	2010[b)]
Air distance, km	3 561 301	3 561 301	3 476 535	3 476 535	86 163	86 163
Network distance, km	4 953 446	5 047 528	4 828 904	4 893 962	118 402	119 508
Network distance/Air distance	1.391	1.417	1.389	1.408	1.374	1.387
Total running-time, minute	5 236 226	5 266 974	5 052 782	5 056 098	113 917	113 686
Average speed, km/hour	56.8	57.5	57.3	58.1	62.4	63.1
Mean of indicator H	1.393	1.421	1.391	1.410	1.377	1.391
Mean of indicator H(b)	1.454	1.497	1.430	1.458	1.348	1.367
Mean of indicator H(c)	1.447	1.486	1.443	1.468	1.390	1.408
Mean of indicator H(d)	1.345	1.364	1.354	1.369	1.325	1.335
Mean of indicator H(e)	1.383	1.412	1.381	1.400	1.332	1.345
Mean of indicator H(f)	1.362	1.385	1.360	1.375	1.309	1.320

a) Network with 141 settlements, without Lajosmizse and Zirc.
b) Network with 23 towns of county rank.
Source: own calculation according to schedule.

Indicators with different distance weighting show that detour indices on average are higher between settlements located closer to each other than ratios between settlements located farther apart. Although the lowest network ratios are mostly between settlements close to each other, it is also frequent that adjacent straight-line settlements do not have direct connections. In case of settlements far from each other, the impact of unevenness and deficiencies of the network decreases.

In Table 2, two further results regarding smaller networks are shown. Two settlements, Zirc and Lajosmizse became terminals at the end of a feeder line and therefore they have the greatest impact on the results. Studying only towns of county rank, changes have a smaller effect, and temporal accessibility (although to a hardly detectable extent, by 0.2%) has also improved between them. It is clearly shown that the reduction of the network has affected smaller settlements in a more disadvantageous way. Indicators and their changes are spatially uneven, for example, the average of journey times has decreased for 63 settlements, exceeding 5 minutes for 18 settlements. Subsequently, spatial distribution is analysed in detail.

Greatest changes of detour indices

The highest values of detour indices are taken up between settlements that are close to each other in air distance, but do not have direct connection (Table 3). Since there are other transport possibilities besides the railway, these extremely high values of the table rather indicate only theoretical possibilities. The eight-kilometre distance between Biharkeresztes and Nagykereki can be covered faster even on foot than by train (the fastest way is three hours with two transfers).

Table 3

The highest pair-wise detour indices
(according to the time schedule, February 2010)

Settlements	Network distance, km	Air distance, km	Detour index
Biharkeresztes–Nagykereki	147	8.6	17.1
Veszprém–Zirc	197	16.6	11.9
Ipolytarnóc–Somoskőújfalu	181	16.5	11.0
Esztergom–Szob	111	10.6	10.5
Várpalota–Zirc	219	22.1	9.9
Lajosmizse–Kecskemét	157	16.9	9.3
Ipolytarnóc–Salgótarján	175	19.7	8.9
Lajosmizse–Nagykőrös	142	16.1	8.8
Bátaszék–Mohács	184	22.3	8.2

Source: own calculation.

As a result of changes in schedule, detour indices have increased to the greatest degree between Zirc and settlements lying south of it, and between Lajosmizse and settlements lying south-west of it (Table 4). As from the 143 settlements, 129 could be accessed from Zirc in a shorter southern direction via Veszprém (all settlements with the exception of the North Transdanubian ones), the absence of this section affects Zirc in a much more disadvantageous manner than Veszprém. The accessibility of 63 settlements has become longer from Lajosmizse due to the suspension of the Lajosmizse–Kecskemét line.

Table 4

The largeest increase in detour indices

Settlements	Network distance, km		Air distance, km	Detour index		Difference
	2009	2010		2009	2010	
Veszprém–Zirc	21	197	16.6	1.27	11.85	10.58
Várpalota–Zirc	43	219	22.1	1.95	9.91	7.96
Lajosmizse–Kecskemét	25	157	16.9	1.48	9.29	7.81
Lajosmizse–Nagykőrös	40	142	16.1	2.48	8.82	6.34
Siófok–Zirc	114	296	42.0	2.71	7.05	4.33
Székesfehérvár–Zirc	66	242	42.4	1.56	5.71	4.15
Lajosmizse–Kiskunfélegyháza	50	182	41.2	1.21	4.42	3.20
Lajosmizse–Cegléd	58	124	26.5	2.19	4.68	2.49
Karcag–Tiszafüred	45	132	38.4	1.17	3.44	2.27
Esztergom–Tata	51	123	33.7	1.51	3.65	2.14
Dorog–Tata	50	116	31.1	1.61	3.73	2.12
Komárom–Esztergom	53	143	46.4	1.14	3.08	1.94

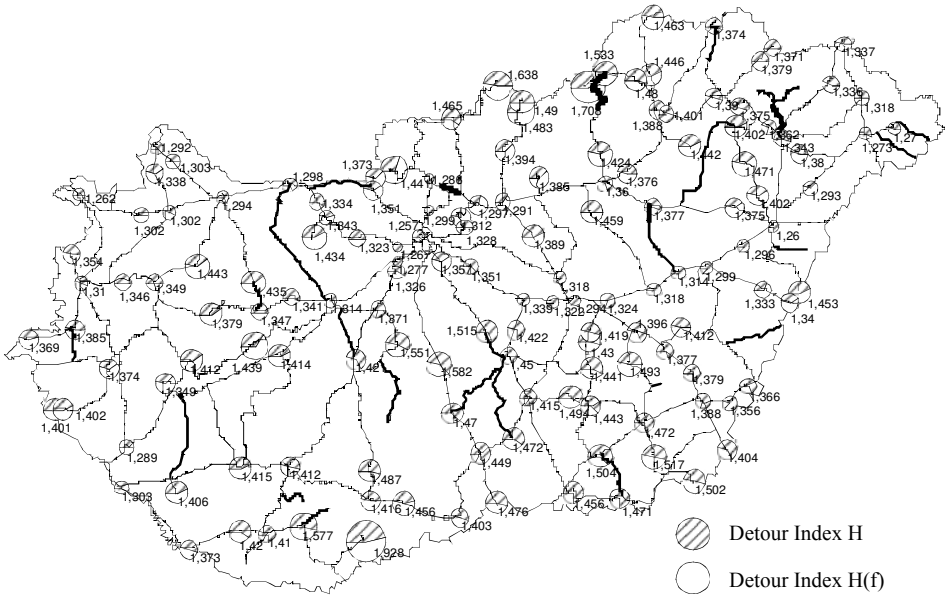
Source: own calculation (for Lajosmizse and Zirc, only the first four settlements).

Detour indices and change of detour indices

The values of detour indices by settlements (H indicator) are shown in Figure 2 and 3, and their changes are indicated in Figure 4. The size of circles is proportional to the value of the indices. The value of detour indices is the lowest along the main lines and settlements located at railway junctions; it is highest at the ends of feeder lines. The orders of magnitudes of indicators computed in different ways are equivalent, but differences between them further refine the picture. If the H and the Hf indicators are equal, the areas of the two sectors of the circle are equivalent. A more significant difference between the H and the Hf indicators primarily emerges for settlements where the accessibility of a nearby city (Budapest or county seats) is considerably worse than the average: Gödöllő, Aszód (although the railway connection is direct to Budapest, the alignment has an eastward direction as far as Pécel, then northward, slightly north-westward as far as Gödöllő), Szob (impact of the Danube Bend), Berettyóújfalu (it has no direct connection with Debrecen, its network ratio with Debrecen is 2.22) and Balatonfüred (its network ratio with Veszprém is 6.04).

Figure 2

Detour indices
(November, 2009)



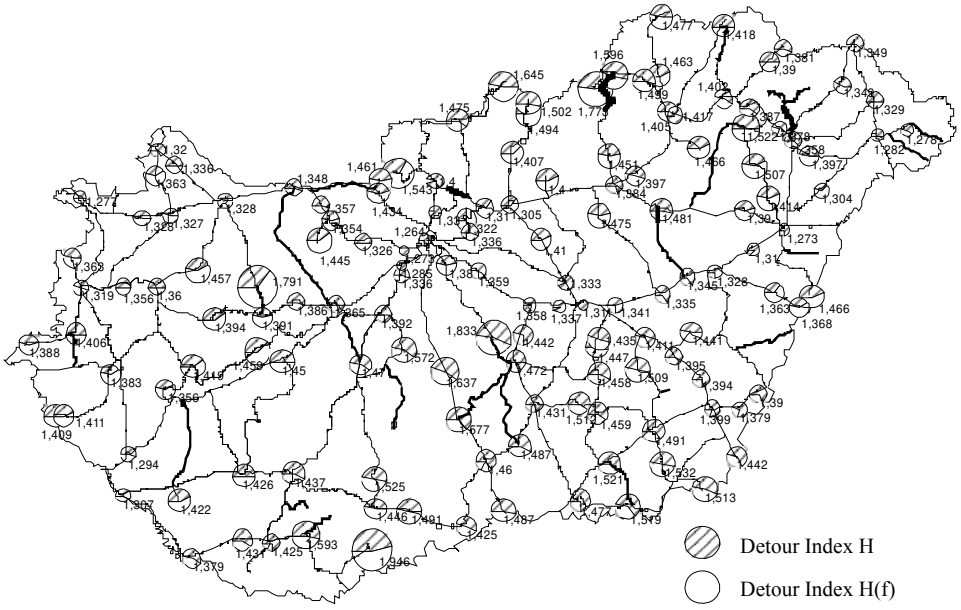
Source: own calculation (beside the settlements the value of indicator H can be seen).

The H indicator has increased on average by 0.028 between the two dates. Detour indices of the previously mentioned Zirc and Lajosmizse have increased to the greatest extent, since the two settlements (provisionally) have become the end-points of a quite long feeder line. Further settlements whose network ratios have changed to an extent

exceeding 0.05 are the following: Tiszalök, Vác, Szob, Tiszafüred, Kiskőrös, Esztergom, Dorog, Ózd, Putnok, Szabadszállás, Székesfehérvár and Komárom. Such an important branch line was discontinued near these settlements, that it has made not only relatively close settlements accessible with a considerable detour, but also several farther settlements can be accessed only with a substantial detour compared to the earlier state. On a regional level, the entire North and Central Transdanubia have increased above average (West and Southwest Transdanubia have not). The eastern half of the country does not have continuous regions increasing above the average; however, discontinuation of the Karcag–Tiszafüred line has noticeably raised the indicators of neighbouring settlements. For Székesfehérvár, the impact of discontinuing three branch lines can be summed up accordingly: the Börgönd–Sárbogárd line has made Southeast Transdanubia more distant (not only from Székesfehérvár, but also from settlements lying north-northwest of it); the Székesfehérvár–Komárom and the Veszprém–Zirc lines have made North Transdanubia more remote.

Figure 3

Detour indices
(February 2010)



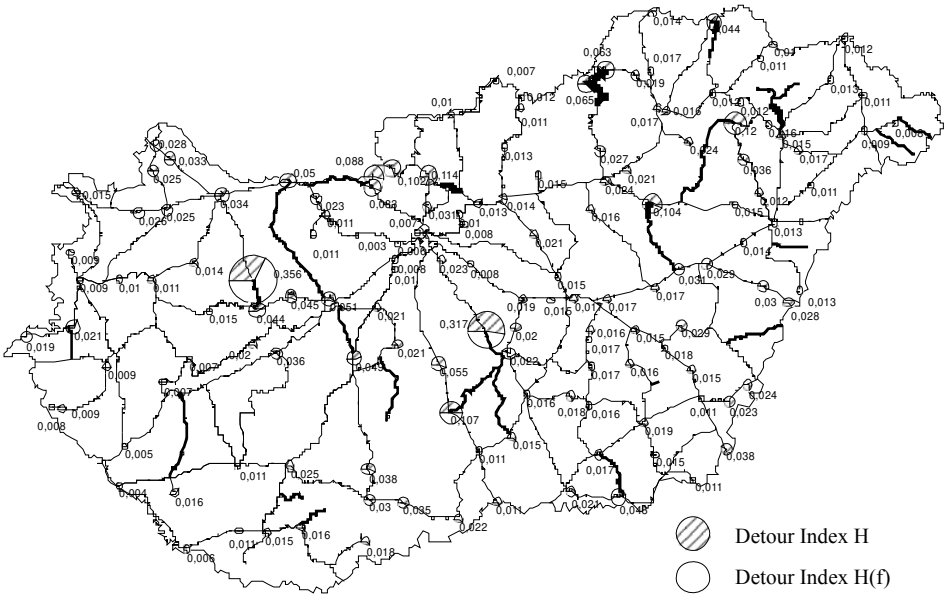
Source: own calculation (beside the settlements the value of indicator H can be seen).

Discontinuation of the Kecskemét–Kiskőrös, Törökfái–Kiskunmajsa, Balatonmária-fürdő–Somogyszob, Makó–Hódmezővásárhely, Körmend–Zalalövő, Abaújszántó–Hidas-németi lines either do not have, or have a minimal spillover impact on further settlements apart from those located at the end-points of lines. Nevertheless, the slight impact of the discontinuation of these lines on regional accessibility does not indicate that problems

cannot occur on a local level, due to the liquidation of an earlier existing connection. Discontinuation of the Szilvásvárad–Putnok line has created a peculiar situation as it has made 80% of settlements more distant from Putnok and Ózd in network kilometre distance and correspondingly in cost distance, but not in time distance because the settlements accessible previously in fewer kilometres via Eger and Mezőkövesd, have had the lowest time demand via Miskolc. Even the Putnok–Eger section has been temporally shorter with a maximum of 48 minutes, making a detour to Miskolc rather than on the section via Upponyi mountain; this according to the schedule is shorter by 45 kilometres and can be covered with a (in fact only three-minute) transfer in Szilvásvárad. Suspension of the Lajosmizse–Kecskemét line has a partly similar impact, which has increased accessibility by eight kilometres between Budapest and the South Great Plain. It has not changed temporally either, because the Budapest–Lajosmizse section is 108 minutes, the Lajosmizse–Kecskemét is 35 minutes, while Budapest–Kecskemét is 77 minutes via Ferihegy. The difference is that Lajosmizse has become the end-point of a long dead end in the middle of the country and therefore its railway connection to the South Plain has ceased.

Figure 4

The change of detour indices between November 2009 and February 2010



Source: own calculation (beside the settlements the increase of indicator H can be seen).

Detour indices of several settlements have only imperceptibly increased, the less effected settlements are the following: Bicske, Budaörs, Monor, Budapest, Kiskunhalas, Gyékényes, Kelebia, Isaszeg, and the indicators of a further approximately fifty settlements have only minimally increased.

Temporal accessibility and change of temporal accessibility

The investigation of temporal accessibility raises much more interesting and complex questions than the study of network kilometre distances, as here schedule constraints also have to be taken into account. In the present study, I have calculated in the simplest way, the shortest possible accessibility times from the options provided by the "Elvira" on-line internet timetable search. I am not concerned with the direction dependence of temporal accessibility, as the average of outward and return journeys has been used. Furthermore, the calculations do not deal with the differences of journeys that are the shortest temporally and the shortest in terms of cost[3], with the impact of service frequency and with many further issues.

It has already been shown in Table 2 that despite a reduction of the network, the average temporal accessibility has remained almost unchanged. The accessibility of 42% of settlements has improved, the rest has declined; the greatest changes are indicated in Table 5. From the improving settlements, Ózd has to be noted; its detour index has considerably declined, but as has been mentioned, liquidation of the slow branch line has not influenced temporal accessibility. From the declining settlements, the unfavourable change of Gyula, Sarkad, Lenti and Rédics cannot be explained by network reduction. These settlements are examples for how significant temporal saving, or time margins can result from schedule changes. Apart from this, however, temporal changes do not diverge considerably from that expected due to network changes.

Table 5

The biggest change in temporal accessibility

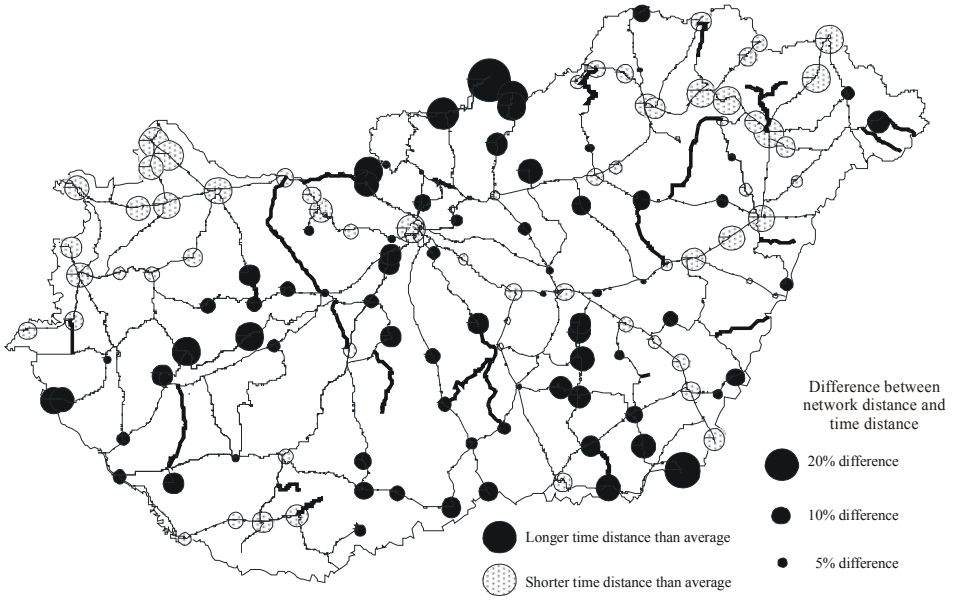
Settlement	Average improvement, minute	Settlement	Average growing, minute
Ipolytarnóc	7.6	Lajosmizse	42.5
Csongrád	6.4	Zirc	32.6
Zalaegerszeg	5.7	Tiszafüred	14.3
Barcs	5.5	Vác	8.6
Salgótarján	4.4	Gyula	7.7
Ózd	4.3	Sarkad	7.1
Várpalota	4.2	Esztergom	6.9
Pusztaszabolcs	4.1	Szob	5.7
Somoskőújfalu	3.6	Lenti	5.5
Szarvas	3.6	Rédics	5.5

Source: own calculation.

3 Its one aspect is that in the case of longer journeys, which direction is it worth going from, i.e. stations where fast trains do not stop if the aim is to minimize time distance (Kotosz 2007, 2009).

Figure 5

The ratio of time distance and network distance
(February, 2010)



Source: own calculation.

The situation in "time space" of each settlement can be compared to the geographical situation (to air distances) and network situation (network kilometre distances). Due to the different measures, I have compared the extent of differences between the rates of distances of settlements computed in different ways within total distance. Figure 5 includes the rates of every time and every network distance according to the state in February 2010. It clearly shows that, apart from the Budapest–Székesfehérvár line planned to be renovated by 2013, the settlements located along main lines are in the best position in temporal accessibility alongside their better network ratios. This is also supported by the positive correlation between the two kinds of ratios (Table 6). The significant exceptions of this correlation include Pécs, Putnok and Ózd in a positive direction (their temporal accessibility is better than their network position) and Fehérgyarmat, Mátészalka, Érd, Százhalombatta, Dunakeszi, Nagykanizsa and Gyékényes in a negative direction. The settlements in the most favourable situation are shown in the top left cell of Table 6, the most unfavourable ones are found in the bottom right cell, the first and last five settlements are indicated in Table 7. It is noteworthy that among the settlements of the most disadvantageous position there are two towns with county rank, namely Dunaújváros and Salgótarján.

Table 6

The number of settlements above the average and below the average according to time distance and network distance

	Time distance compared to network distance		Sum
	under the average	above the average	
	November, 2009		
H below the average	52	27	79
H above the average	20	44	64
Sum	*72*	*71*	*143*
	February, 2010		
H below the average	51	32	83
H above the average	15	45	60
Sum	*66*	*77*	*143*

Source: own calculation.

Table 7

The best and worst settlements from the point of view of time distance (ratios of the shares from the various types of distances, February, 2010)

Settlement	Time distance/ Air distance	Time distance/ Network distance	Network distance/ Air distance
Budapest	72.1	83.1	86.8
Hegyeshalom	76.9	82.6	93.1
Sopron	77.7	86.2	90.1
Debrecen	77.8	86.7	89.8
Mosonmagyaróvár	78.1	82.9	94.2
Nyíregyháza	78.6	82.1	95.8
Kisvárda	79.5	83.5	95.2
Győr	79.6	85.0	93.7
Dunaújváros	121.3	109.3	110.9
Salgótarján	121.9	115.6	105.4
Somoskőújfalu	124.7	117.7	106.0
Balassagyarmat	127.1	122.2	104.1
Battonya	133.4	125.0	106.7
Zirc	137.3	108.3	126.8
Lajosmizse	141.1	109.1	129.3
Mohács	141.2	102.8	137.3
Ipolytarnóc	159.7	137.6	116.1

Source: own calculation.

Conclusions

As a result of network reduction, in addition to a decrease in railway accessibility, differences between the accessibilities of settlements have also increased. Settlements

along the main line that had good position earlier, Budapest at the head, have largely further increased their advantage in contrast to the other settlements. However, the completely unambiguous quantification of impacts is not possible, because the results partly depend on the number of settlements symbolising the network, on their position and on the choice of weighting. The detour index computed in the study has also taken account of connections, which rather come up only as theoretical possibilities (such as the mentioned Biharkeresztes–Nagykereki or Jánossomorja–Fehérgyarmat). In the interpretation of results, these constraints have to be considered. At the same time, these calculations have approached accessibility from the supply side; different objective calculation may be possible by knowing traffic data.

Apart from methodological observations and certain general characteristics, owing to the restarted lines from June 2010 (Székesfehérvár–Komárom, Zirc–Veszprém, Karcag–Tiszafüred, Lajosmizse–Kecskemét and Csorna–Pápa which had been suspended since 2007), the presented changes have historical significance and they rather indicate what would have happened in case of permanent or eventual suspension of all discontinued lines. In addition, the analyses have demonstrated that these lines (with the exception of the Csorna–Pápa line, which has not been included in the analysis) have had the greatest impact on the increase in the detour index; therefore, their restarting was actually the most justified from this point of view.

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Keywords: Railway, accessibility, spatial analysis, detour index.

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Spatial aspects of the ambulance service in Hungary

Introduction

The investigation of the structural components of human life quality (both spatial and temporal) has yielded substantial results in recent times (Bácsy & Vizi 1998, Fekete 2006, Hankiss & Manchin & Füstös 1978, Kopp & Kovács 2006). The relevance of this issue in current day Hungary is ensured by the fact that the political-social transition is prolonged and is accompanied by strengthening social and spatial polarisation. Experts in spatial planning and development have gradually recognised the importance of knowledge in this field, and the creators of concepts and plans now rely on these results. Correlations between life quality, life expectancies, health conditions, and place of residence are becoming increasingly acute; their recognition by people other than just the small community of professionals is because of the need for spatial rationalisation, which is a determining element in the structural reform of health services, and for equal opportunities. In the present study, the authors provide an account of the spatial differences in the availability of the ambulance service, this field representing a special segment of health services. Within the health system, it is a specific area in which highly appreciated changes have already taken place; the quality of services has improved, cost-efficiency has increased, and the availability of equal opportunities has strengthened.

Preliminaries and methods

Hungary's largest health service organisation of the time, the Hungarian National Ambulance and Emergency Service (HNAES; Országos Mentőszolgálat – OMSZ) was established soon after World War II, in 1948. Following a recommendation by the Economic Advisory Committee, the government decided to bring the existing historic ambulance services – the Budapest Voluntary Ambulance Society and the National Ambulance Society of Counties and Municipalities – under governmental possession, and ordered this measure to be implemented in Governmental Decree 4980/1948.

As established by the decision, a centralised ambulance service was created that had country wide competence, was funded by the state, and was operated along uniform principles. At the same time, a decree by the competent Health Minister was also issued (217.760/1948), in which the main goal of the society, determining also the then current method of operation and development, was already formulated: "*gradually organises and establishes ambulance stations and first-aid spots throughout the country*" (Cselkó 1987).

* '*Science Please!*' Innovative research team (TÁMOP–4.2.2/08/1/2008–2011).

On 1st February 2010, the HNAES had 228 ambulance stations, with 772 organised ambulance vehicles (mobile units) in service. The service network development before 1990 aimed to provide ambulance availability in a 30 km radius from each station (Debrődi 2003). Today, the basis of the improvement concept for the ambulance network is to ensure arrival anywhere in the country within 15 minutes from the emergency phone call, which is a generally accepted standard in Europe, allowing the best survival chances for ER patients.

For the South-Transdanubian Health Development Council and later for the HNAES itself, the Institute of Geography at the University of Pécs performed several studies (1999, 2002, 2005, 2009), analysing the spatial pattern of hospital and ambulance service availability, as an output of which regional and later national service availability maps and network developmental recommendations were produced. The authors believe that it is a particularly fortunate situation that these recommendations could be realised – such a direct relationship is very rare, almost unique in Hungarian spatial development *sensu lato*. In our study, we provide an analysis of the current situation and the results of improvements, as well as attempting to provide new recommendations, sometimes re-grouping certain settlements among the ambulance districts, or creating new service formations, in order to further improve the standards of ambulance services, and through that, the life quality of citizens.

As part of our analysis, emergency ambulance response times were calculated, based on the district division made available by the HNAES, using route-planning software. The advantage of this GIS-based method is that the 15-minute isochron lines drawn from the input data are based on true travelling speeds applicable for particular road sections, and are thus supposed to be highly realistic. The program made its calculations in "normal" passenger car mode, (i.e. it did not consider the time gain that is the case with the travelling response unit using its emergency signals) practically making up for the time lost between receiving the emergency call and launching the response unit. In several of the European countries, the 15-minute response time standard is calculated as: 2 minutes departure response interval plus 13 minutes travelling time (Veen et al. 2001). Most certainly, the speed advantage arising from the use of emergency signals of the response unit travelling larger distances or between settlements will result in precious minutes and kilometres, thus effectively expanding the size of the supplied area. However, there is a factor of error in the calculations, in that ambulance arrival times were calculated from the exact address of ambulance stations to the centre of the settlements. For that reason, quite substantial differences could arise between calculated values and the actual response times measured, when accessing certain settlement parts or streets.[1] In our analysis, we were not able to tackle this problem, as setting up a street-based database is beyond our current resources and capabilities. Thus, we can assume that the population reached by the emergency medical service within less than 15 minutes is actually smaller than that is indicated in the database. It is particularly so in the case of the larger settlements, especially cities and villages with extensive peripheral zones

1 In several developed countries, practical databases are maintained relying on daily ambulance rescue activities. Actual response time is recorded upon the arrival of the unit to the rescue scene, and service districts are formulated based on such data input.

where such an effect should be considered. We can assume but cannot support with factual data that the two types of errors with opposite directions balance each other, meaning that response and availability figures are exact, if not for each and every settlement, but certainly for larger area units (country, regions, maybe counties as well).

Spatial aspects of ambulance availability and response

Currently there are 228 ambulance stations in Hungary, of which 13 are in Budapest, and 215 in the rest of the country. The districts supplied by these stations cover the entire country, with each of the settlements being allocated to one of them. Ambulance stations are normally located in urban environments: about 200 of them operate in towns, 10 in large villages, and 18 in villages. When establishing a new ambulance base, normally the more important, developed settlements have priority; the majority of which are large villages with a large population, or an important attraction zone. The creation of new bases also has a certain type of urbanisation effect as the settlement will have yet another central role; one that is highly influential on people's lives. In many cases, the existence of an ambulance station is one of the arguments in the process of town rank acquisition.

The extent of the districts supplied by a single ambulance station is highly dependent on the geographic environment, but many other aspects also play a role. The most highly populated districts, are of course those of large cities (such as Debrecen, Miskolc and Pécs, in order of size), where the inhabitants of villages and small towns linked to them add another 50–60 thousand people to the population that has to be supplied. (This figure, in itself, exceeds the population of several districts in the countryside, and is certainly much higher than the populations of any newly planned ones.) The highest number of settlements are also found in more or less the same districts: the Zalaegerszeg district supplies 81 settlements, Pécs supplies 86, Kaposvár 88, and in the capital cities or small towns (e.g. Lenti, Dombóvár) of counties with small villages, districts with 40–60 settlement units are also typical. The opposite extremes are to be found in the eastern parts of Hungary: Hajdúböszörmény in itself, Hajdúnánás with Hajdúdorog, Gyula with Kétegyháza and Elek, Egyek with Tiszacsege and Újszentmargita making up single ambulance districts.

On regional and county level, the picture of emergency ambulance services with the currently operating stations is shown in Table 1. Among these indicators the most important and most expressive one is the proportion of people (relative to the total population of the unit) living in settlements reached within 15 minutes. In this respect, the figures on a county level – apart from Budapest – range from Békés county with 71.4% and Somogy county with 71.5%, to the counties of Pest, Komárom-Esztergom, Veszprém, and Nógrád just exceeding 88%.

Table 1

Population and settlement data of ambulance/emergency medical service availability, 2009

Capital, county, region	Settlements reached within 15 minutes:				Settlements reached in more than 15 minutes			
	number	proportion, %	population size	proportion in population, %	number	proportion, %	population size	proportion in population, %
Budapest	1	100.0	1 696 128	100.0	0	0.0	0	0.0
Pest	141	75.4	1 036 799	88.1	46	24.6	139 751	11.9
Central Hungary	*142*	*75.5*	*2 732 927*	*95.1*	*46*	*24.5*	*139 751*	*4.9*
Győr-Moson-Sopron	107	58.8	371 295	83.9	75	41.2	71 372	16.1
Vas	147	68.1	230 084	87.4	69	31.9	33 167	12.6
Zala	116	45.1	233 906	79.7	141	54.9	59 537	20.3
West-Transdanubia	*370*	*56.5*	*835 285*	*83.6*	*285*	*43.5*	*164 076*	*16.4*
Fejér	69	63.3	352 825	81.9	40	36.7	78 181	18.1
Komárom-Esztergom	52	69.3	275 705	88.2	23	30.7	37 036	11.8
Veszprém	143	65.9	320 517	88.1	74	34.1	43 189	11.9
Central-Transdanubia	*264*	*65.8*	*949 047*	*85.7*	*137*	*34.2*	*158 406*	*14.3*
Baranya	69	25.5	294 836	74.4	202	74.5	101 425	25.6
Somogy	95	38.8	235 017	71.5	150	61.2	93 479	28.5
Tolna	66	60.6	191 517	79.5	43	39.4	49 449	20.5
South-Transdanubia	*230*	*36.8*	*721 370*	*74.7*	*395*	*63.2*	*244 353*	*25.3*
Borsod-Abaúj-Zemplén	198	55.3	605 254	84.3	160	44.7	112 929	15.7
Heves	75	62.0	247 859	77.7	46	38.0	71 061	22.3
Nógrád	93	71.0	187 422	88.0	38	29.0	25 608	12.0
Northern Hungary	*366*	*60.0*	*1 040 535*	*83.2*	*244*	*40.0*	*209 598*	*16.8*
Hajdú-Bihar	58	70.7	477 132	87.5	24	29.3	68 329	12.5
Jász-Nagykun-Szolnok	48	60.8	337 277	83.4	31	39.2	67 298	16.6
Szabolcs-Szatmár-Bereg	141	82.0	473 249	87.6	31	18.0	67 298	12.4
Northern Great Plain	*247*	*74.2*	*1 287 658*	*86.4*	*86*	*25.8*	*202 925*	*13.6*
Bács-Kiskun	61	51.7	392 512	74.1	57	48.3	137 421	25.9
Békés	39	52.0	272 138	71.4	36	48.0	109 180	28.6
Csongrád	30	50.0	352 793	83.3	30	50.0	70 958	16.7
Southern Great Plain	*130*	*51.4*	*1 017 443*	*76.2*	*123*	*48.6*	*317 559*	*23.8*
Hungary	1 749	57.1	8 584 265	85.7	1 316	42.9	1 436 668	14.3

Source: edited by the authors, based on data of HNAES.

A cartographic chart (Figure 1) indicating the currently operating ambulance stations and the response times calculated for various settlements is intended to assist a more detailed spatial analysis. Differences between county level and regional statistical data appear quite spectacularly in the graphical chart, too. Here the scale, instead of having only two levels, is more differentiated when showing response times, since it is obvious that the difference between 14- and 16-minute response times is much less significant than between 20 and 30 minute times.

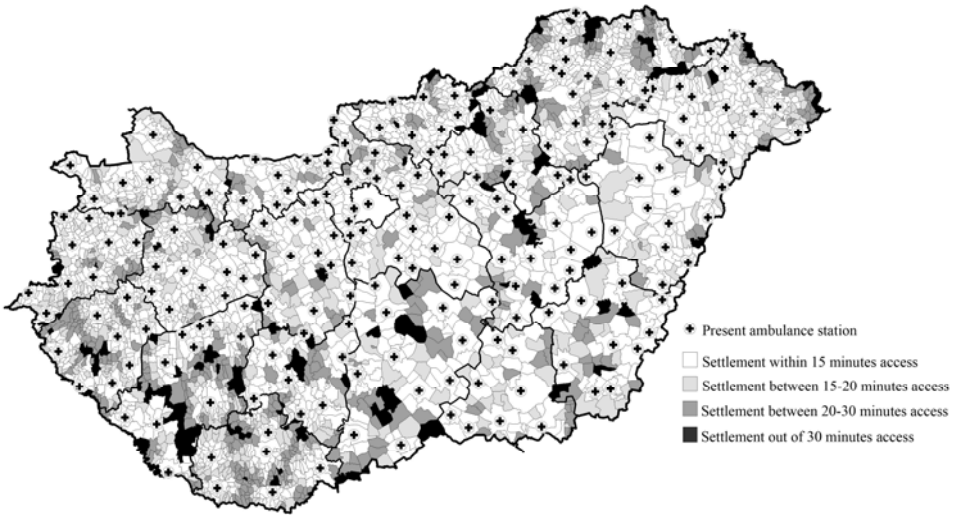
The settlement, which is in the worst situation of all, is Kálmáncsa in Somogy county, with a response time of nearly 60(!) minutes, reached from Kaposvár. Arrival times beyond 30 minutes, which can often easily exclude the possibility of survival, is what can be expected by about 100 000 people living in 127 settlements. The majority of these long response time cases could be improved by means of some type of re-arrangement, or re-grouping; such suggestions will be made later in the study.

The location of regions with accessibility problems is more or less in line with what one could expect from spatial meso- and micro-structures. It is mostly the spaces with a looser structure (Tóth 2004), typically the outer and inner peripheries that appear boldly in the picture. Life quality in this respect, too, is the worst in spaces characterised by a deficiency of towns, or at least urban deficit in a functional sense (Tolna hills, Ormánság area, Zemplén mountains, Cserehát regions), and in many cases in regions along county borders. Not only in emergency medical rescue are such shadow zones typical, research in recent years has revealed some areas that are critical in this respect, leading to re-grouping in certain cases. Such is the Baranya hills, more precisely the Sásd micro-region, which was originally supplied with ambulance service from the town of Komló, but after a re-organisation, the majority of medical emergency service duties were given to Dombóvár (i.e. a different county). Although such measures were successful in reducing poor response times, in most of the cases the situation remained just beyond the critical level.

Within the ambulance service, outer peripheries appear only along certain boundaries, illustrated quite sharply in Szabolcs-Szatmár-Bereg county, particularly in the Bereg area. Although less marked, the periphery effect is also present along part of the Hungarian-Romanian border (e.g. around Battonya), as well as along the Hungarian–Croatian state border section.

Figure 1

Spatial structure of the ambulance service, 2009



Source: edited by the authors.

The situation of Bács-Kiskun county is quite special in that the problems in ambulance response there appear mostly in the central areas. Nearly 100 000 people in 38 settlements live outside the 20-minute isochron, including Lajosmizse with 11 000 inhabitants, the second largest town with response times beyond the 15-minute standard. The situation is similar in Békés county; the similarity is a result of low settlement density and the extensive, yet functionally weak network of small towns.

Current issues of network development

Having given an account of the situation prevailing in the country, the following recommendations have been formulated in order to reduce the extensive "white patches" on the map (shown in grey in our figures). In order to solve the problems experienced in ambulance availability, HNAES has planned a project that is intended to be an important element of the ambulance service network development; its funding provided by the TIOP[2]_EÜIF_V_4 scheme. The 11.5 billion HUF budget of the TIOP 2.2.1 distinguished funding scheme entitled "Development of emergency services – ambulance and air rescue" can be used, among others, for the improvement of the network of ambulance stations. Following preliminary activities in 2007–2008, the exact planning of network development started in spring 2009 (Figure 4).

According to our calculations, the planned 23 new ambulance stations would significantly improve the emergency services for a quarter of a million people. The figures of weighted response times[3] calculated for the involved settlements will improve by 56%, improving by not only some minutes, but also changing categories: the decreased 14.6 minute average response time by settlement generally means that the villages (sometimes towns) move from the 20–25 minute range to the 10–15 range.

The involved districts are usually small-village regions, the mean settlement size just exceeding 1 000 individuals. Naturally, such spatial fragmentation is not beneficial for improving efficiency: the average population size of ambulance districts is 11 000 individuals, with only the region of Sárospatak standing out with its 28 000 inhabitants. Low figures of average population size are accompanied by a low total population size. According to the plans, Aggtelek would provide an ambulance service for altogether 7 villages with an average population size of 310 individuals; the district of Igal includes 14 settlements with 6 800 people, including the centre, which has already become a town. In the district of Zalalövő, there are 15 settlements and in that of Sásd, 16 settlements with an average population size around 500. The smallest one of all the newly planned district centres is Krasznokvajda, with a population of 541; the 17 settlements supplied by this centre have a total population size just exceeding 4 000.

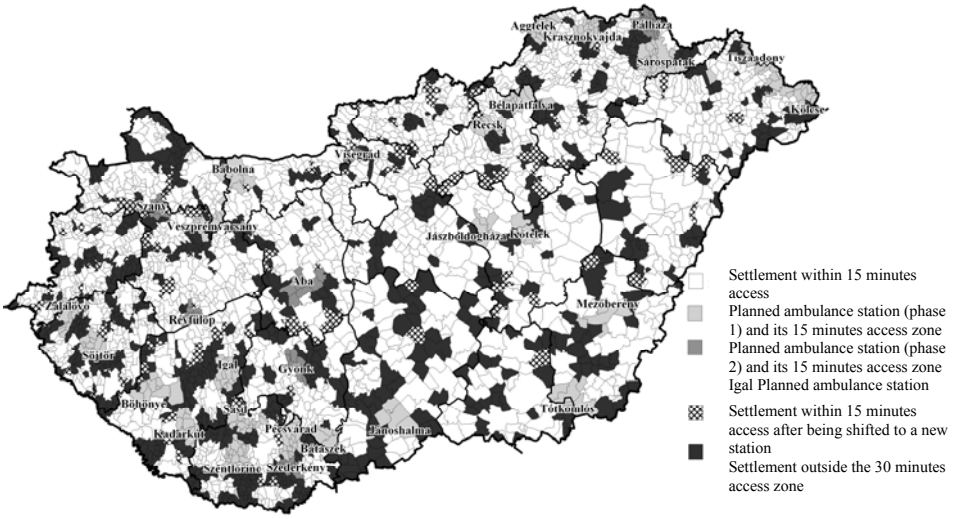
The majority of response problems and the highest number of new centres are in the small-village regions of South-Transdanubia: there will be seven new stations altogether aimed at improving the situation, three of them in Baranya, three in Somogy and one in Tolna county.

2 TIOP: Operative Programme for Society and Infrastructure.

3 Weighted response time: average response time (or its decrease) multiplied by the population size of the particular settlement (unit: minutes × individuals).

Figure 4

Improvements of the ambulance network, as planned by HNAES, with recommendations by the authors



Source: edited by the authors, based on data from the HNAES.

There will be two new stations in Zala county, and one in Győr-Moson-Sopron county, both located in West Transdanubia. Unlike in the previously mentioned new centres, where it was mostly the large districts of county seats that were cut into smaller units; there will also be peripheral centres here, with their districts divided up into smaller areas (e.g. Őriszentpéter, Tét).

In the region of North Hungary, five new stations will be created, of which the ones in Heves county (Recsk, Bélapátfalva), in practice will result in the dissection of the Eger district, ensuring minutes of improvement in response times for a population of 10 000 people each. In Borsod county, the centres in Aggtelek and Krasznokvajda should ease the situation in the Cserehát mountain region, an area with small villages, a poor general public health situation, and bad accessibility. In this area, the town of Sárospatak should also be mentioned, which used to be the largest Hungarian settlement without an ambulance station. Although it is located within the 15-minute response time zone of the neighbouring Sátoraljaújhely (this town also having a hospital), its size justifies the setting up of an own ambulance centre which can also serve settlements further to the south of the district.

Improvements in the Great Plain region are of a different nature. It is only Kölcse and Tiszaadony, the two stations in Szabolcs-Szatmár-Bereg county, whose creation can be explained with the same strategy as for the formerly mentioned ones (i.e. providing an ambulance service for small-villages and peripheral regions with poor response times). Jászboldogháza and the nearby Kőtelek in the Jászság region mean improvements for only three and five settlements, respectively, although these improvements are quite substantial. In Békés county, the settlements Tótkomlós and Mezőberény are those each

given a new ambulance station, yet a significant breakthrough could be achieved only if the elements of the current network had been relocated and totally re-organised.

It appears from the data, that even a considerable improvement of the network (from which the region of Central Hungary was left out due to project-technical reasons of the TIOP funding scheme) cannot provide a remedy for all the problems.

In addition to the plans specified in the TIOP-project, in our research we have proposed recommendations for establishing further possible ambulance districts (Table 2).

The districts included in these recommendations are small: with one exception (Aba), their total populations do not reach 10 000 each, but even the smaller ones are at least twice as large as the new Aggtelek district. The weighted response times calculated for these districts are higher (63%) than those of the ones planned in the TIOP project. Average population size is yet smaller (meaning that we further progressed towards smaller settlement networks), and the recommended improvement affects a total of 52 000 people in 57 settlements.

Among the recommended new units, both in the case of Visegrád and Révfülöp, there is a new factor that has not been emphasised so far: their tourism attraction potential means that the population temporarily present there, as well as other visitors and hikers significantly increases the number of potential emergency rescue cases. Furthermore, the weighted response time value would also improve, even if the affected population were not significantly large.

Table 2

Further improvements and their possible results

Centre of the planned new ambulance district	County	District from where settlements would be taken over (number of settlements to be taken over)	Number of settlements in the district	Total population of the district	Average population size of the settlements	Average response time, minutes			Decrease of the weighted response time, thousand	Rate of decrease in the weighted response time, %
						currently	with the new district	difference, decrease		
Aba	Fejér	Sárbogárd (4), Székesfehérvár (2)	6	17 546	2 924	22.0	11.3	10.7	1 122.9	48.5
Gyönk	Tolna	Szekszárd (6), Simontornya (1), Tamási (1)	8	4 573	571	35.0	9.4	25.6	937.5	73.2
Pálháza	Borsod-Abaúj-Zemplén	Sátoraljaújhely (13)	13	4 675	359	24.3	6.6	17.7	1 075.3	72.8
Révfülöp	Veszprém	Tapolca (7), Nagyvázsony (1)	8	4 479	559	21.9	6.8	15.1	542.0	69.1
Szany	Győr-Moson-Sopron	Csorna (6), Pápa (1)	9	5 776	641	21.3	8.2	13.1	681.6	61.5
Szederkény	Baranya	Pécs (5), Mohács (5)	10	9 540	954	17.4	6.6	10.8	1 030.3	62.1
Visegrád	Pest	Szentendre (2), Esztergom (1)	3	6 134	2 044	20.3	5.3	15.0	276.0	73.8
		Total	57	52 723	925	23.3	7.7	15.6	5 665.5	62.9

Source: calculated and edited by the authors.

Due to study length limitations, we cannot go into details about every planned new district, but we can point out a few. One is Szederkény, the zone sandwiched between the Mohács and Pécs districts, beside the newly opened highway; although this station would

bring considerable improvement to the ambulance service of the involved settlements, it is questionable economically. The only way to improve ambulance availability in Baranya – a county with a special settlement structure – would be to revise the locations of the currently existing stations. Sellye is the historic centre of the Ormánság (South Baranya) region, yet its ambulance station is unable to reach substantially large areas within the time standard. A possible new station in Vajszló, another centre in the same region with a traffic node function as well, would mean considerable overlap with the Sellye district, thus it is not justified to create one there under the current circumstances. An ideal distribution could be achieved if new ambulance stations were created, instead of Sellye, in Drávafok and Vajszló, and another two in Harkány and Villány to replace the one in Siklós (in this case, building one in Szederkény would be pointless).

The situation of Gyönk is quite special, for the following reasons. The large district of Szekszárd is like those of the other county seats, characterised with a geographically quite asymmetric shape, stretching along road No. 63 in a north-western direction. It is here in this region of the Tolna hills, where we find settlements with the worst ambulance response time values maybe in the entire country, and often served by the Szekszárd ambulance centre even when Hőgyész would be a more rational solution. In our opinion, the currently very bad response time indicators would certainly justify establishing a new ambulance centre in Gyönk, a settlement having received town rank in the meantime. As shown in the above table, this would mean an average of 25 minutes (!) improvement in response times in the case of eight settlements, this difference being the second highest value among all the plans and recommended changes that we have introduced so far.

Finally, the prospective ambulance station of Aba[4] would be the one on our list whose creation is the least questionable. A population of 17 000 people, formerly belonging mostly to the Sárbogárd district, would be served from here in the southern part of Fejér county; this number undoubtedly justifying the establishment of a new centre.

By providing an analysis of the recommended new ambulance stations we intended to demonstrate how difficult it is to further develop the ambulance service: ultimately it is almost impossible to achieve spectacular results without relocating some of the currently existing stations to different places (generally less central, but more advantageous from a traffic network point of view). Such an investment, due to the extra costs (new stations have to be built) is a difficult path, not to mention the conflict of interests in the case of existing stations to be eliminated. We are currently working[5] on a computer software tool that could assist in designating "mobile" ambulance stations. Based on access information and the demographic data of different settlements, the application could calculate the ideal location where ambulance unit(s) could be positioned temporarily (e.g. during high traffic periods or in the case of extreme weather), along highways, in larger shopping centres or at the vacant side of a petrol station.

There is yet another possibility the authors have looked at, namely the re-grouping of certain settlements from one district to another (Figure 4). The majority of such cases could be handled in a way that the transformed districts cross county borders, especially

4 During the time that has passed between preparing the original study and its English version, Aba became involved in the TIOP project, which already has reached a stage where there are signed contracts for establishing new ambulance stations.

5 'Science Please!' Innovative research team (TÁMOP–4.2.2/08/1/2008–2011).

in the case of Heves, Jász-Nagykun-Szolnok, Pest, Nógrád, Győr-Moson-Sopron, Somogy and Fejér counties. There are altogether 178 settlements in which a re-grouping would (theoretically) bring the response time to below the 15-minute limit, and a considerable decrease would occur in ambulance service time. Although quite a few of them would not meet a number of other professional requirements required for emergency medicine, approximately half probably would, making them worth considering.

Summary

There is a plan, relying on a more or less professional consent, for creating 23 new ambulance stations, with the prospect of becoming a reality in the near future, and aiming to improve the life quality of about 253 000 people. By completing these plans with our recommendations (7 new stations serving 52 000 people), and also calculating with another 90 000 people that will fall within the 15-minute response time limit if some settlements are re-categorised between districts, the results will be impressive. If the improvement figures of the life quality of these nearly 400 000 people (about 4% of Hungary's population) are added to the corresponding figures of Table 1, the difference projected for the total population will be almost 90%. Although the authors are admittedly unaware of the minimum size of a cost-effectively operated ambulance district and station, the traditional strategy relying on network development thus comes close to its realistically achievable maximum. Human life is, of course, an absolute value, yet because of the limited capacity of the country and the state health system, together with the need to also fulfil other health related political duties, it is necessary to set realistic limits.

As uninvolved researchers having dealt with the current issue for years, the authors are convinced that HNEAS understands the problem that has been dealt with for 15 years in a complex, spatially well thought out manner, not regarding it solely as an emergency rescue issue, and that this direction of thinking is worth following. HNAES has succeeded in communicating that the outdated, rigid concepts (settlement hierarchy, county borders, district boundaries) can be overwritten, and that the ambulance service can be handled in a flexible way, thus an existing structure can and should be transformed. If, by publishing our thoughts about this issue, as geographers, we have been able to contribute to improving the situation, and are delighted and proud to have wandered beyond the boundaries of traditional disciplines.

* * *

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www.mentok.hu

Keywords: Life quality, ambulance service, health politics, spatial organisation, spatial rationalisation, response time, accessibility.

NÁNDOR NÉMETH – ANDRÁS CSITE – ÁKOS JAKOBI

Employees with Romanian citizenship in Hungary

Introduction

In August 2007, about 67 thousand foreign citizens possessed a valid work permit, a Green Card certificate, and complied with the obligations of employment registration in Hungary. More than 28 thousand of them were Romanian citizens, which means that 43% of the foreign employees in Hungary came from Romania. This is however a relatively small percentage. According to the data of the National Employment Service (hereafter referred to as ÁFSZ), the number of Romanian citizens among the legally employed in Hungary was close to 60% at the beginning of 2000; what is more, it even exceeded this percentage in 2002. This means that from year to year the biggest group of foreign citizens working in Hungary consists of employees coming from Romania.

In our study, we have presented the sociological features of the group consisting of around 30 thousand Romanian citizens who are legally employed in Hungary. We also analysed the territorial equality of their employment. Our investigation is based upon the results of a comprehensive research, which examined the supply aspect, social composition and labour market situation of this group, and also revealed the motivations that encouraged them to work in Hungary. The research also analysed the employers' aspects, their employment motivations, and their level of satisfaction.[1] Our study aims to introduce the territorial characteristics of an economic phenomenon, which rarely appears in the regional literature, and wishes also to make the national labour market better understood.

Working as a foreigner in Hungary – the legal environment

Hungarian employees with foreign citizenship can be divided into two main groups: the first group contains those, who have the freedom to work in Hungary; the second group contains those, who need permission to work here. In 2007, the first group included citizens coming from countries, which had acceded to the European Union before Hungary, and opened their labour market to Hungarian citizens without any constraints. Therefore, based on reciprocity, their citizens did not have to ask for any permission to work in Hungary either. The regulation was amended on 1st January 2009, enabling all citizens of the European Union and their families to work in Hungary without any

1 The research entitled "Examining the presence of employees with Romanian citizenship in Hungary" was carried out between May 2008 and May 2009 at the Institute of Economics belonging to the Hungarian Academy of Science, with the participation of the Genius Loci Non-profit Foundation at Kecskemét. The research was supported by the National Public Employment Foundation (OFA). The full final report of the research is available here: http://econ.core.hu/kutatas/labour_proj.html

permission. They are only obliged to notify the locally competent employment office of their employment. After Romania joined the EU in 2007, the Hungarian regulation concerning Romanian citizens was modified and gradually liberalised. The first step was the adoption of the Government Regulation No 354/2006, which abolished the obligation for Romanians to apply for a work permit as of 1st January 2007. This regulation was repealed on 1st January 2008, and was replaced by the Government Regulation No 355/2007 (XII. 23.). This regulation stated that no permission is needed for the further employment of a Romanian "if he has been legally employed uninterrupted from or after 1st January 2007, with an employment contract for at least 12 months". In any other cases the employment centre with competence had to assess the labour market situation, advertise the job, and issue the work permit only if no Hungarian citizen could fill the vacancy. However, according to the Government Regulation No 322/2008 (XII. 29.), which replaced the Regulation No 355/2007 (XII. 23.), *as of 1st January 2009 all types of required work permits have been abolished for Romanian citizens, and they have the freedom to take all kinds of jobs in Hungary*. It is only the employer who should comply with the collective registration requirement: this entails an announcement of the number of the employees using a simple form.

This legal environment is important from an analytical aspect, as the employment register contains only those foreign citizens, who need permission to seek a job, or the law requires them to announce their employment. All those who can take a job freely in Hungary are invisible to the statistics. Thus, for a realistic estimation on the number of employees with foreign citizenship, it is necessary to know every national regulation valid for different country groups. Due to the high level of liberalisation, the number of the foreign workers in Hungary could possibly be tens of thousands higher than the registered 50–60 thousand people.

Romanian employees in Hungary: results of the statistical analysis

The data of foreign employees, who are obliged to register or should have a work permit, are collected by the locally competent employment offices and are transferred to a special electronic registry system. We had the opportunity to access this electronic database, instead of using only the ÁFSZ's summary reports. In this way, our job was groundbreaking, as the ÁFSZ has never given free access to this database before.

According to the ÁFSZ database, Romanian citizens constitute the biggest segment of foreign employees in Hungary (they are followed by Slovakian and Ukrainian citizens). In 2007, the majority of the so-called Green Card certificates and seasonal agricultural certificates were claimed by Romanians. Some 227 124 Romanian citizens were registered during the assessed period, and the work permits' average term of validity was 1 year. After the EU accession of Hungary in 2004, and mainly in 2005 and 2006, the number of registered employees increased exceptionally. However, from 2007 on, it has continuously and markedly decreased. The reason for this process was partly Romania's EU accession, and partly the transformation of national employment regulations. By 2009, the employment registrations had almost ceased; thus, our research was conducted in the last period when the situation and the composition of Romanian employees could be analysed in detail.

In accordance with the limited extent of our study, we briefly summarise the main conclusions on the composition of Romanian citizens and their labour market situation in Hungary based upon the ÁFSZ database and our own data collection.[2] We had to carry out our own survey for several reasons. On the one hand, the ÁFSZ database does not include all the relevant information concerning the employees: the ÁFSZ has deleted for instance the personal identification number, as well as the identification of sex. Moreover, the office does not inquire about the nationality or the mother tongue of the employee. Similarly, it was only a small amount of information we could find concerning a particular employer: the ÁFSZ database includes only the company's ISIC-code, its location and the place of employment with the postal code. These data fail to reveal which companies employ Romanian workers and why. In addition, we could only explore with the help of our survey, why people from Romania come to work to Hungary, what their motivations are, and what they expect from having a job in Hungary. Our outcomes coincide with several points of the literature's general statements on the international migration (for more on this see e.: Rédei 2006).

The majority of the Romanian employees are men. As the ÁFSZ database does not include any information on this, we could only rely on our own survey. On this basis, we estimate the men-women ratio to be 2/3 to 1/3.

It is rather the Hungarian nationals with Romanian citizenship who come to work in Hungary; people of Romanian nationality barely occur in the Hungarian labour market. We have examined this issue from different sources, and found hardly any information about Romanian nationals; however, they also seem to speak Hungarian at least on a basic level. According to our estimations, working-age Hungarians with Romanian citizenship work in Hungary in the same proportion as working-age Romanian nationals work abroad.

Romanian employees are in general *lower educated*: approximately 2/3 of them completed elementary school as the highest level of education at best. In case of 2/3 of them, the scope of their activity belongs to the group of "*non-vocational elementary occupation*" (9th SCO-main group) (Table 4). The wide range of occupations (unskilled worker, unskilled worker in construction industry, semi-skilled worker, agricultural worker, agricultural unskilled worker) generally requires a lower level of qualifications or an expertise that is easy to acquire. The vast majority of Romanian workers are employed as *manual labour force*.

The most dominant employer sector is the *construction industry*: 1/3 of the Romanian employees work here. In addition, *agriculture* and *retail trade* also have a significant role, but their employment rate is under 10%.

Almost all Romanian employees work 40 hours per week, i.e. *they have a full-time job*. The majority are employed by continuously producing companies; that is, they do not have a seasonal job. Accordingly, employment contracts of an indefinite duration are the most frequent.

More than 1/3 of the Romanian employees work in Budapest, whereas the whole Central Region of Hungary represents 70%, which means that their employment is

2 In the full research report, we describe the method and the efficiency of the data collection in details.

geographically strongly concentrated. In addition, the Central Transdanubian Region and the Southern Great Plain Region provide 9% and 8% of their jobs respectively.

Table 4

Number of employees per county by employment groups (SCO-2) and the place of work (the 10 most frequent occupations), 2000–2009 in aggregation*

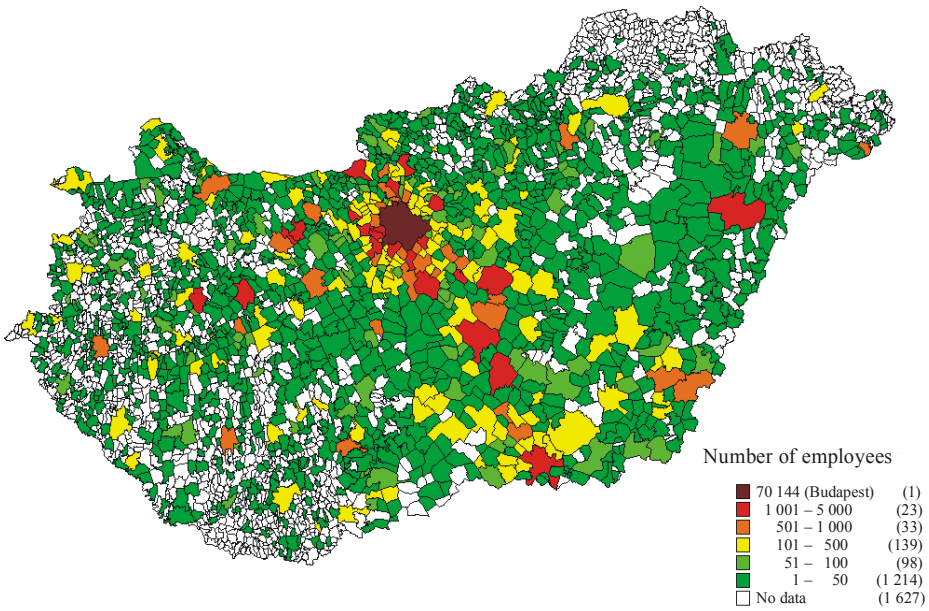
Capital city, counties	Employment groups (SCO)									
	91	92	73	51	74	76	81	61	83	32
Budapest	47 517	737	818	1 807	1 107	589	407	235	1 448	707
Baranya	342	23	76	101	137	52	16	83	27	34
Bács-Kiskun	2 323	1 178	94	90	138	94	155	1 321	67	122
Békés	276	656	237	149	215	116	19	168	36	361
Borsod-Abaúj-Zemplén	46	6	33	20	61	64	32	27	15	13
Csongrád	1 487	3 121	46	216	49	167	10	157	14	21
Fejér	1 372	379	745	208	554	306	269	225	96	61
Győr-Moson-Sopron	1 000	410	191	150	193	197	101	19	118	67
Hajdú-Bihar	206	135	259	58	140	204	31	24	100	114
Heves	695	686	299	230	152	165	122	82	71	23
Jász-Nagykun-Szolnok	224	121	118	204	168	60	28	40	61	39
Komárom-Esztergom	405	253	556	121	382	420	1 235	148	51	46
Nógrád	346	263	32	55	47	16	26	146	7	17
Pest	34 808	7 498	3 232	2 570	2 402	1 896	930	880	363	175
Somogy	347	134	169	560	145	247	130	69	5	48
Szabolcs-Szatmár-Bereg	243	82	556	131	89	67	176	68	44	34
Tolna	335	201	77	353	83	65	19	19	49	226
Vas	607	102	212	82	488	109	279	138	34	80
Veszprém	1 524	58	533	652	881	372	213	142	72	86
Zala	213	10	321	218	201	75	122	49	23	54
No data	6 031	26	30	98	38	168	8	53	35	2
Total	*100 347*	*16 079*	*8 634*	*8 073*	*7 670*	*5 449*	*4 328*	*4 093*	*2 736*	*2 330*

* Meanings of SCO-codes: 91: elementary services occupations; 92: elementary jobs in agriculture and forestry; 73: light industry; 51: trade, catering trade; 74: steel- and metal industry; 76: construction industry; 81: manufacturing machines operators; 61: agricultural occupations; 83: mobile machines operators; 32: healthcare occupations.

The results on the level of local settlements show that the number of registered employees in Budapest is much higher than in other areas of the country (Figure 2). Considering the place of work, settlements in the neighbourhood of the capital (Érd, Budaörs, Biatorbágy etc.) provide the most job opportunities, while *moving away from the agglomeration the density gets generally lower*. Among the most frequent settlements, areas that have specialised in a particular or given activity can also be found. However, the number of registered employees in the region of the Great Plain is also significant, particularly in the centreline of Szeged–Kecskemét–Cegléd–Budapest, as well as in urban settlements.

Figure 2

Number of employees according to the location of activity by settlements (LAU2) between 2000 and 2009



The internal sectoral labour market structure of Hungarian counties also affects the opportunities of the Romanian citizens. Budapest and Pest County provide the most unskilled (elementary) job opportunities on a national scale for Romanian employees; although considering their number, they play a significant role in every employment sector. Thus, there is a remarkable territorial concentration of these occupations. At the same time, in the counties of the Transdanubian Region, especially in those belonging to the Central Transdanubian Region, employees in the industry and construction industry represent the biggest rate. Furthermore, in Bács-Kiskun County and in some other counties of the Great Plain and the Transdanubian Region, agricultural and forestry jobs also have visible roles.

In general, the distance from *the Hungarian-Romanian border has only a minor effect on the employees and on the employers' decisions*; the level of the daily, or even the weekly commute is very low. The number of Romanian employees on the Hungarian-Romanian border is not significant.

Processes act upon the *movement of labour from Hungary to Romania, instead of the movement from Romania to Hungary*. Due to Romanian labour shortages, attempts have already been made to attract available labour force from the border zone to Romania.

Concerning their role in the labour market, *Romanian employees bear a considerable resemblance to Ukrainian employees, whereas the Slovakian labour force holds an essentially different position*. The sole motivation to employ Romanian workers is almost only to address the Hungarian labour shortage (especially in the Central Region). Although the national unemployment rate is high in Hungary, and serious employment

problems exist among the less-educated working-age population, national enterprises cannot provide enough job opportunities for these Hungarian citizens. Namely, labour shortage hit sectors, where dominantly unskilled manual workers are needed, but anomalously, these businesses prefer to fill these positions with Romanian employees. There is also a strong regional character, as Romanians are mainly employed in Budapest and its vicinity, where the unemployment rate is low, and economic growth is relatively fast, which might be an explanation for the labour force shortage. It is thought provoking as to why the internal unskilled labour force cannot utilise the job offers around the capital more intensively, and why they cannot satisfy the needs for local employment in the Great Plain agriculture in their immediate vicinity, when the unemployment rate is high. Nevertheless, this result is consistent with the experiences concerning Slovakian employees in Hungary: the main motivation for their employment is also the shortage of local labour (Estélyi & Keszegh & Kovács & Mikóczy 2006).

We explored two types of labour shortage. The first one is an actual labour shortage, where the workforce for the particular job is not sufficient in the neighbourhood. The previous point refers essentially to this. The machine factory in Biatorbágy, as included in our business case studies, faced this problem, as it could not find enough unskilled labour. Similarly, the shoe manufactory in Csepel was unable to find a skilled labour force in the neighbourhood. At the same time, according to our experience with agricultural companies, another type of labour shortage also exists. In this case, there is a sufficient (primarily unskilled) labour force in the neighbourhood, but the particular manual work is so hard, or the conditions are so bad, that the locals simply do not take the job. Meat production belongs to this category, especially cattle slaughter. Similarly, conditions in fruit and vegetable production or livestock production can also be bad: there is no weekend or holiday, large distances have to be travelled, individuals homes may be left for long periods, and one might even have to live in livestock establishments. These jobs are occupied by thousands of Romanian (and Ukrainian) migrant workers.

Most of the Romanian employees live in, or near to the settlement of the workplace, usually in a workers' hotel. Those having a seasonal agricultural job *behave as typical guest workers*: their residence in Hungary is only temporary; it serves only to be able to work here and is not an integral part of their environment. However, a section of the Romanian citizens acts like internal employees: they already have, or try to have a home of their own, the whole family has moved to Hungary, and wishes to stay here. This attitude is typical at workplaces where employment is continuous, even among the lower educated.

Personal contacts, relations in the settlement, and weak ties have key roles in the employment of Romanians. Job information spreads through word-of-mouth even if the position job is initially filled through an advertisement; when the workforce is changed later on, it is rather these weak ties, which arrange the employment. A reason for this might be that they are employed for elementary, unskilled manual work, and in this case filling positions efficiently through informal links seems to be working well. In case of individual job opportunities – usually concerning an intellectual activity – recruitment is mostly through advertisements.

The majority of Romanian citizens are bound to the Hungarian labour market in a special way: *only a small section has worked in another (Western or South-European) country*, and even lesser figure has had a job in Romania in recent years.

The most important aspect of their Hungarian employment is their *language knowledge, but geographical distance is almost of the same importance*. Expectations of a higher salary also play a role. This suggests that people come to work in Hungary to avoid Transylvanian unemployment. In addition, the Hungarian market provides better conditions for them due to the language knowledge (as well as identical culture and belonging to the same nation), as if they tried to seek a job in parts of Romania populated by Romanians.

Employers are mostly satisfied with their Romanian employees, with no specific issues related to their work or performance has arisen. At the same time, neither was it highlighted that it would be easier to work with them, or they would be more reliable, or more productive than domestic employees. Companies employing them have simply searched for a workforce and have decided to hire them; they had no particular expectation towards them, except for carrying out the work assigned. The reason for this attitude is obviously labour shortages as well as the fact that the majority of these jobs are simple and require no skills.

As a result of these findings, a typical Romanian employee in the Hungarian labour market has the following characteristics:

- unqualified man, who
- works as an unskilled or semi-skilled worker
- in Budapest (in the construction sector).

The importance of Romanian employees in the Central Hungarian Region's economy

The ÁFSZ's webpage includes the distribution of the main employment types by area (by counties).[3] According to this database, around 20 thousand unskilled workers[4] are employed in Budapest – under normal work conditions –, but their total number does not exceed 23 thousand. If we add the semi-skilled workers, this labour group has about 90 thousand members. With Pest County, the number grows to 132 thousand. Taking the ÁFSZ database of the registered foreign employees as a basis, the distribution shows that at least 40% of the Romanian employees belong to this category (see partly Table 4). No exact statistical number is known, as only the names of the occupied jobs are available, but whether they belong to the unskilled or semi-skilled categories, as described in the 6/1992 Ministry of Social Affairs and Labour regulation, is not clear. For this reason, 40% is a cautious estimation, and the real data should be around 2/3 or rather 80%. If we base it on 40 thousand Romanian employees, 70% of whom work in Budapest and Pest County, we get the number as per Table 5, showing how many Romanian citizens can work legally in the Hungarian region as unskilled or trained workers.

3 http://www.afsz.hu/sysres/adattar/tables/T06_01.html.

4 According to the Ministry of Social Affairs and Labour regulation 6/1992. unskilled workers are: *"Classification requires one month of training at maximum, and no qualification is necessary. The employed worker can usually start work without any training."* It also provides a definition for trained workers: *"Classification requires no qualification, but it takes more than one month of training to acquire skills needed for the tasks".*

Table 5

Estimation on how many Romanian unskilled and trained workers can work in the Central Hungarian Region

Estimation criteria	Estimation results, person
Estimation: 40% If 40% of the Romanian citizens working in Hungary are unskilled or trained workers	11 200
Estimation: 2/3 If 2/3 of the Romanian citizens working in Hungary are unskilled or trained workers	18 480
Estimation: 80% If 80% of the Romanian citizens working in Hungary are unskilled or trained workers	22 400

Their number may be around 15–20 thousand, which indicates that the capital and its vicinity suffer from a labour shortage to at least this amount concerning unskilled manual jobs. This number is increased for instance with the number of Ukrainian citizens, who we know to have the same role in the Hungarian labour market as Romanians. In addition, the same situation can be assumed about Serbians, Moldavians as well as others. If we only look at legal employment, this entails at least 30 thousand employees. It should be emphasised that these foreign citizens work:

- legally (their employment is registered), with an employment contract;
- under no extreme, but normal physical conditions;
- for a salary that meets normal Hungarian wages.

Meanwhile, in different – mostly peripheral – areas of Hungary, the unskilled working-age population is unemployed in large numbers. The state launches training for them, and the office for the 33 most disadvantaged micro-regions handles the funds of the European Union separately for them. At the same time, thousands of job opportunities are advertised for unskilled and semi-skilled workers in the central region, that are filled by Hungarian nationals from Transylvania, South-Carpathia, and Vojvodinia. Therefore, Budapest, as the central settlement of the Carpathian basin, organises the whole area of Hungarians partly into one labour market. It is a significant question as to how the potent influence of the capital could contribute more effectively in solving the employment problems within the country's borders.

Summary

Our research results fundamentally coincide with the statements of national literature concerning the labour market's regional differences, and particularly those concerning its long-term stability. Károly Fazekas already found in the early 90s that the unemployment rate is substantially lower than the average in areas where the number of entrepreneurs is higher; the infrastructural conditions for doing business are better; the educated population is younger; the size of the settlement is bigger; soil fertility is better, and industrial traditions are stronger than the average. The unemployment rate proved to be significantly lower in business-industrial areas than in business-non industrial, non business-industrial and non business-non industrial areas (Fazekas 1993). It is particularly interesting for us that when Fazekas repeated his research a few years later, he found similar results, and could again point out the regional differences of the labour

market, as well as the greater stability in the micro-regions (Fazekas 1997). The literature concerning general (developmental) inequality still confirms this stability and the uniformity of this configuration (Nemes Nagy–Németh 2005, Németh 2009); whereas, on the labour market it is rather the negative tendencies that dominate, instead of positive ones (Fazekas & Telegdy 2006, Szabó 2006). One of the main results of our research is that it attracts attention to a practical factor that stands behind these regional differences, and has partly evolved because of them. The Hungarian labour market struggles with a territorial structural crisis that heavily burdens the national budget: the social system finances unskilled, working-age Hungarian citizens, while the most developing region of Hungary, which is also competitive on a European level, would need thousands of exactly this type of workforce.

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Keywords: Labour market, foreign employees, territorial inequality.

GÁBOR MICHALKÓ – TAMARA RÁTZ – GÉZA TÓTH
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Research on the quality of life in the spa towns of Hungary*

Within the framework of the Széchenyi Plan, the realised spa investments and the accommodation investment related to them significantly improved the quantitative and qualitative indicators of the health tourism supply in Hungary. The health tourism developments promoted by the tourism politics (Budai 2001, Budai & Székács 2001), and the closely related marketing communication motivated the researchers to devote more attention than previously to the examination of seemingly positive changes of the socio-economic effects (Mundruczó & Szennyessy 2005, Formádi 2007, Ács & Laczkó 2008). In connection with the topic, with the co-ordination of Hungarian Academy of Science Geographical Research Institute, in the summer of 2007, a research began that primarily concentrates on giving an overall picture about the quality of life of the population of the settlements in connection with health tourism.

The tourism that influences the strengthening of the regional competitiveness, becomes the measurable depositary of the living conditions of the given settlement, on one hand by satisfying the needs of visitors (developing a service industry), on the other by improving the local population's living conditions (creating a liveable settlement) (Dobos & Jeffres 1993, Jurowski & Brown 2001).

It is recognised that the Hungarian nation, which is struggling with significant challenges in relation to physical and mental health, can improve some of the aspects defining the quality of life by the active consumption of the supply of health tourism (Kopp & Kovács 2006). However, is the quality of life better for those citizens, who live in a settlement that offers health oriented tourism? To be able to give a cautious answer to this question an overall research is needed. The first step of the research is to analyse the guest turnover rates of spa towns in Hungary (especially focusing on investments relating to the Széchenyi Plan), and the mathematical-statistical analysis of socio-economic affects. With this, we aimed to create a comprehensive picture about the processes that were generated by the spa developments, as they are commonly success stories, especially regarding the demand changes that are directly/indirectly influencing the quality of life and their impression on local society and economy.

The dynamic role of spas in guest turnover

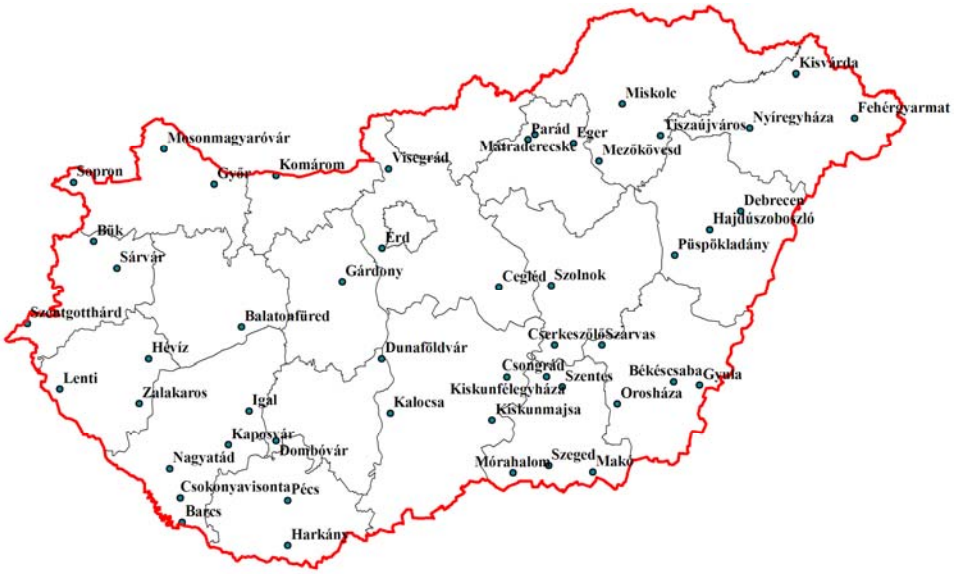
In the first phase of our analysis, we paid particular attention to answer the question that compared to the national average, how much more favourable or unfavourable the tourist

* This study was carried out with the support of the Bolyai János Research Scholarship and the OTKA (K67573).

arrival indicators of the qualified spa towns (later spas) are. In 2006 there were 50 settlements operating a spa.

Figure 1

The analysed spas



Considering that commercial accommodation was only established in Mórahalom in 1998 and in Mátraderecske in 2002, for the longer time series and a comprehensive comparison of dynamics, these two settlements' indicators were not taken into account. The observations focused on the tourist arrivals of the 48 analysed settlements between 1995 and 2006, during which base indexes were calculated and were used to reveal the most important tourist developments over the 12 years. The source of these data was the KSH (Hungarian Central Statistical Office) informative database. Nationally on average the number of tourist arrivals increased by 39.6% from 1995 to 2006, in which the expansion rate for domestic travellers was 70.9% and for foreigners it was 15%. There are 16 settlements among the spa towns, where the number of guests decreased during the examined period. The most significant decline happened in Barcs (nearly 90%). There are another 13 settlements, where between 1995 and 2006 the increase in the number of tourist arrivals is below the national average. In the examined period, the most substantial increase was observed in Kisvárda (473.2%).

Regarding the number of domestic guests, there are only 10 settlements where in 2006 the number of tourist arrivals decreased compared to 1995, although there are another 15 settlements where the expansion rate is below the national average. The most significant decline also occurred in Barcs (68.5%), while the largest increase was in Zalakaros (650.1%). In contrast, the number of foreign visitors fell in 34 settlements, with 2 additional settlements registering slower development than the national average. The most considerable decline occurred in Fehérgyarmat (97.2%), while the largest increase occurred in Szentgotthárd (3 115 %). (This means a 31 times higher increase, but we respect the author's choice of % format – editor).

The number of tourism nights on a national level grew by 20.3% from 1995 to 2006. Within this, we observed a 51.5% growth for domestic tourism nights and a 0.5% growth for foreign tourism nights. In the analysis, we found 22 settlements where the number of tourism nights decreased, and at 3 further settlements the rate of increase did not reach the level of national indicators. Considering the total tourism nights, Barcs is representing the worst situation with a decrease of 92.6% and Szentes is in the most favourable situation with an increase of 433.4%. The number of domestic tourism nights decreased in 11 settlements during the investigated 12 years and in further 10 settlements the rate of expansion was below the national average level. The 2 extremes are Barcs (–75.3%) and Cserkeszőlő (521.9%). Regarding foreign tourism nights, the situation is even worse; there was a decrease in 31 settlements, while in Parád the rate of stagnation was equal to the national average. The rate of decline is the highest in Barcs (97.7%), while in contrast we can experience an expansion of 2 026.7% in Szentgotthárd.

Therefore, we cannot say that the tourist arrival indicators of spa towns in Hungary are better than the national average. There are many towns where the dynamics of tourism demand is considerably above the national average, but there are more settlements that are below the average.

In order to exclude the distorting effects of the significant tourist destinations (Budapest, Balaton) which highly influence the national indicators, we separately examined how the tourist arrivals of spa towns relate to the processes of their counties.

For this analysis, the base index of all settlements was compared to the adequate data of their county. In our opinion, in such cases it is easy to represent how important a role the spa towns play in the tourism life of the county.

Analysing all the tourist arrivals together, we can conclude that in more than half of the settlements (28 settlements) the dynamics was less favourable than the county average. The most significant differences were represented by Lenti (–127.2 percentage points) and Szentes (425.1 percentage points). Regarding the number of domestic tourist arrivals, there are 26 settlements that represent a more unfavourable dynamic than the county average. The two cornerstones are Nagyatád (–163.3 percentage points) and Szentes (526.5 percentage points). Regarding the number of foreign visitors, 28 settlements have less favourable dynamics than the county average, with the extremes represented by Cegléd (–79.6 percentage points) and Szentgotthárd (3 073.7 percentage points).

Regarding all the tourism nights, we could find 28 settlements where the registered growth between 1995 and 2006 was below the county average. In Fehérgyarmat, the dynamics of all tourism nights was 113.7 percentage points lower, while in Szentes (404.8 percentage points) it was higher than the average of the county. In case of domestic tourism nights at half of the settlements (24 settlements), we experienced more favourable dynamics than the county average. Barcs was far behind (with 140.2 percentage points) the county average and Visegrád exceeded it to the greatest extent. The situation is even worse regarding the foreign tourism nights; most of the settlements (26 settlements) were below the county average. The extremes represented by Fehérgyarmat, (–94.5 percentage points) and Szentgotthárd (2 003.1 percentage points).

It is therefore possible to conclude that the majority of spa settlements did not become the driving force of their counties in determining the dynamics of tourism during the reviewed period. It seems that in most cases the attraction of health tourism does not

equal any potential advantage compared to other tourist facilities of settlements in the county.

The effects of the Széchenyi Plan on the guest turnover of spa towns

The Széchenyi Plan affected a significant proportion of the examined settlements. In the following, we are trying to find an answer as to whether there is a connection between the dynamics of tourist arrivals, and the investments that were part of the development plan. For this reason, we divided the test period into two equal parts, the period from 1995 to 2000 and 2001 to2006. The first period was considered as the reference period, while in the second one we expected the plan based investment to have an impact. Although the projects were completed at different times, we chose this solution to best illustrate any differences – if the project was successful – regarding the dynamics between the two periods. In this case, the difference was measured by the annual average increment.

Regarding the national average of the number of visitors between 1995 and 2000, we can see that the increase was 1 percentage point higher than the annual average increase between 2001 and 2006. Of the examined 48 settlements, 34 have implemented some kind of investment within the framework of the Széchenyi Plan. Among the 34 settlements, there are 11 settlements where the increase in tourist arrivals from 2001 was lower than during the previous 6 years. We cannot state that we can expect increases only in those settlements, which are in connection with the Plan. The evidence for this is that 5 out of 14 settlements that were not connected with the Széchenyi Plan, experienced an increase in the annual dynamics compared to the previous years. As can be seen, the Széchenyi Plan did not mean an improvement in the dynamics of tourism nights by itself, but it is noticeable that those settlements, where an investment of HUF 2 billion or more was carried out from 2001 are representing a higher annual average increase than previously.

Among the settlements with positive dynamics, Cserkeszőlő carried out the lowest cost (HUF 147 million) investment. In this case, in the first period a 3% of annual increase was recorded, which was followed by the second period with a 19% increase. The most significant investment of the Széchenyi Plan was carried out in Bük (HUF 8.8 billion). Here in the first year the number of tourist arrivals was stagnant, but this period was followed by an annual 12% increase after 2001.

Analysing the tourism nights, it can be ascertained that according to the national average, compared to 1995–2000, the annual average increase fell by 0.2 percent points in the period from 2001 to 2006. By the second period, the growth rate had slowed in 21 out of the 48 settlements, while in other settlements it stagnated or increased. The most significant decline happened in Csongrád, where the annual average 75% increase in the first period, was followed by an 8% decrease in the second period. On the contrary, in Mezőkövesd there was a 10% annual average decline, which was followed by a 14% increase in the second period. Of the Széchenyi Plan affected settlements, 13 experienced a decline in the annual growth rate by the second period, while in all others the growth stagnated or increased compared to the first period. Regarding the tourism nights, it is not possible to present a connection between the cost of investment and the improvement of

turnover dynamics, since the largest investment happened in Bük, but in this situation the recovery of the turnover was only 4% between the two periods, while there was a more significant improvement – as we have already stated – in Mezőkövesd, where the cost of investment was only HUF 460 million.

It is therefore concluded that in many settlements regarding the spa project investment of the Széchenyi Plan, very good growth trends can be shown. However, it is not possible to generalise since most of the settlements regarding tourist arrivals were not able to benefit from the investment. This can be due to quite a wide range of reasons, and in order to explore theme, a case study could clarify the issues by investigating the settlements separately.

The economic stimulating role of spas

From the aspect of our research topic, we considered it extremely important to explore to what extent that tourist arrivals are able to influence the income situation of each settlement. The analysis of this issue possesses several problems. It is difficult – especially in settlements with a higher population – to separate what proportion of development, or what proportion of income comes from tourism, and to what extent it is the consequence of other investments or developments. We wanted to demonstrate that even if only partially, tourism has an impact on economic processes. Since the role of tourism has a different emphasis in the life of the settlements, thus we examined the change in the relationship between the settlements with 1 000 inhabitants per commercial accommodation and income from 1995 to 2006. In this case the correlation coefficient (r=0.52) indicates a moderately strong relationship, that is, the tourism of the analysed settlements has a minor impact on income growth. We looked also for a similar relationship between the difference of the domestic migration annual average per 1 000 people from 1995 to 2006, and the number of bed-places at public accommodation establishments per 1 000 people. The correlation coefficient (r=0.62) was higher than the previous ones. The most significant relationship was detected between the change in the size of the population from 1995 to 2006 and the number of bed-places at public accommodation establishments per 1 000 people (r=0.65). Therefore, we can conclude that there is a connection between the tourism in the settlements and income, as well as the ability to prevent the population from leaving their hometowns.

On this basis, we examined how competitive the spa settlements are in relation to the country's relation. Indeed, we can see the competitive settlements, or that settlements more involved in tourism can expect positive socio-economic trends. To illustrate this, the relative households' incomes have to be divided into a well and clearly defined multiplication of socio-economic factors (Lengyel 2000, Nemes Nagy 2004). After some mathematical transformations (taking the logarithm of the values), the figures become more manageable and are derived according to the following formula:

$$\log\left(\frac{Income}{Population}\right) = \log\left(\frac{Income}{Employees}\right) + \log\left(\frac{Employees}{Active\_aged\_people}\right) + \log\left(\frac{Active\_aged\_people}{Population}\right).$$

Since we started the measurements from the levels of the different settlements, in the case of income, it was considered as the current year's income, which is subject to

income tax. The number of employees are people who paid tax in the given year; the active aged population are women between the ages of 15 to 60, and men between the age of 15 to 61; while the population refers to permanent residents. The income per taxpayer is essentially representing the economic productivity of the settlements; the proportion of taxpayers within the active population gives an acceptable estimation, while the proportion of active aged people within the population is a kind of calculator number, since it is considering the younger demographic image as a positive regional resource.

The division of these factors is used to standardise the region. We adopted József Nemes Nagy's findings showing that the pay gap is preliminarily shaped by productivity, while the effect of the age factor is very small (Nemes Nagy 2004). The basis of standardisation are the values of certain settlements in relation to the national average, examining household' income and the three factors referred to. Adapting the technical solutions of Nemes Nagy (2004), in the second column of the first chart (categories of competitiveness), 1 represents the above average and 0 represents the below average factors. (The first digit of the code is a symbol of household income, the second digit is productivity, the third is the level of employment, and the fourth is the age structure factor.) Regarding the concept of competitiveness, we consider competitive those settlements where the income of inhabitants is above the average, and we consider uncompetitive those settlements where the income of inhabitants is below the average. Within this we can determine a complex competitive advantage if the given settlement regarding all the three components values of household income is above the average, whereas competitive advantage is more of a single factor, if only one of two factors meet the condition. The competitive disadvantage is identified in the analogy.

Table 1

The competitiveness and the tourist arrival processes of the examined settlements

Settlement	Competitive category	Tourism nights, 2006 (1995=100%)	The annual average increase of tourism nights, %		The difference between the two periods , pp.
			1995–2000	2001–2006	
Balatonfüred*	0011	81.1	98.4	96.4	–2.0
Barcs*	0001	7.6	84.1	77.9	–6.3
Békéscsaba*	1011	91.4	96.5	103.5	7.1
Bük*	0011	160.9	102.3	106.7	4.5
Cegléd*	0000	71.8	91.8	99.8	8.0
Cserkeszőlő*	0000	248.1	104.0	110.7	6.8
Csokonyavisonta	0000	62.2	176.0	93.0	–83.0
Csongrád	0010	33.3	176.0	93.0	–83.0
Debrecen*	1101	103.9	99.5	102.2	2.7
Dombóvár*	0001	56.9	92.2	98.1	5.9
Dunaföldvár	0000	135.5	109.2	94.3	–14.9
Eger*	1111	132.6	104.7	99.6	–5.1
Érd*	1101	130.1	98.8	105.3	6.5
Fehérgyarmat	0001	51.7	91.5	93.6	2.2
Gárdony* (Agárd)	1111	35.4	87.6	97.7	10.1
Győr*	1111	135.4	108.9	95.5	–13.4
Gyula*	0011	78.0	98.1	98.1	0.1

(The table is continued on the next page.)

(Continued)

Settlement	Competitive category	Tourism nights, 2006 (1995=100%)	The annual average increase of tourism nights, %		The difference between the two periods, pp.
			1995–2000	2001–2006	
Hajdúszoboszló*	0011	198.5	107.9	104.3	–3.6
Harkány*	0000	98.7	102.2	97.8	–4.4
Hévíz*	0010	157.1	104.7	102.6	–2.2
Igal*	0000	26.4	91.8	77.8	–14.0
Kalocsa	0001	74.5	94.2	101.2	7.0
Kaposvár	1011	128.2	128.7	81.6	–47.1
Kiskunfélegyháza	0011	163.2	94.4	108.1	13.7
Kiskunmajsa	0000	144.8	107.9	104.3	–3.7
Kisvárda*	0001	371.7	95.2	115.7	20.6
Komárom*	1111	90.7	100.1	99.6	–0.5
Lenti*	0011	65.5	96.5	99.7	3.2
Makó	0000	254.5	102.7	112.3	9.5
Mezőkövesd*	0010	130.4	90.3	114.2	23.8
Miskolc*	1101	93.4	98.7	97.8	–0.9
Mosonmagyaróvár	1011	67.2	102.2	94.5	–7.7
Nagyatád	0011	141.7	95.6	103.2	7.7
Nyíregyháza*	1001	123.0	105.0	97.6	–7.4
Orosháza	0011	320.0	143.5	131.6	–11.9
Parád* (Parádfürdő)	0000	277.9	104.2	106.5	2.3
Pécs	1110	105.3	98.9	99.7	0.7
Püspökladány*	0001	92.7	89.3	106.7	17.4
Sárvár*	1011	92.6	101.7	98.9	–2.8
Sopron*	1011	129.8	106.2	98.6	–7.6
Szarvas*	0010	405.7	110.0	116.0	6.0
Szeged*	1111	121.4	96.1	104.5	8.4
Szentes*	0010	533.4	111.1	112.5	1.3
Szentgotthárd*	1111	95.2	108.6	91.3	–17.3
Szolnok*	1111	107.3	98.0	98.4	0.4
Tiszaújváros	1111	248.1	118.0	103.1	–14.9
Visegrád*	1110	504.7	115.0	120.2	5.2
Zalakaros*	0010	266.9	104.6	111.7	7.1

Note: the first number of the four-digit code represents household income, the second number represents productivity, the third number represents employment, and the fourth represents the factor of age structure. The value of 1 represents the value above the national average, and the value of 0 represents the value under the national average. The mark * identifies those settlements, that had developments within the framework of Széchenyi Plan.

Based on 2006, 8 settlements can be characterized by complex competitiveness with 5 of these settlements experiencing an increase in tourist arrivals. However, in the period of 2001 to 2006, only 8 out of 19 settlements experienced an accelerating pace of progress in relation to the annual average growth, where one or multi factor competitive advantage can be identified. A growing number of tourist arrivals in relation to tourism nights can be identified in 6 settlements. Of 29 settlements that experienced a certain competitive disadvantage, 16 experienced a tourist arrival increase, so in our opinion these are the settlements where in many cases the only opportunity for catch up is medical tourism; it is also true that there are significant barriers to their development.

The regional effects of the operation of spas

In the next step, we wanted to find the answer to the question of how the tourist arrivals of spa settlements correlate to regional tourist demand. We started out from the hypotheses that advantageous and disadvantageous sub-regional processes affect the settlement and vice versa, the process can take away energy from other settlements in the sub-region, but can also provide strength for growth.

We can conclude that the tourism nights from 1995 to 2006 are broadly similar in the examined settlements and in their sub-region. There are only a few positive and negative divergences. Regarding Kiskunfélegyháza and Pécs, despite the declining regional indicators they were able to expand the number of tourism nights. On the contrary, in 4 settlements a negative trend has been registered compared to the micro-region. These places are Harkány, Mosonmagyaróvár, Cegléd and Fehérgyarmat.

From the aspect of our study, it is worth noting how the settlements tourism nights share changed in connection to the micro-region from 1995 to 2006. This way it is possible to show to what extent spa settlements can be considered as the driving force for their micro-region and to what extent their development serves the micro-region in a positive or negative way.

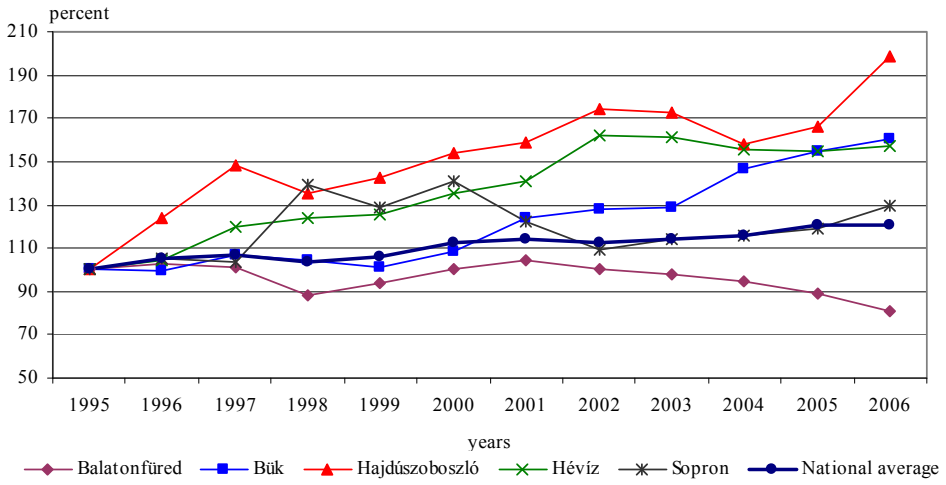
The analysis shows the tourism night shares in the micro-region, regarding 48 settlements, in 26 of them shares fell, 2 remained unchanged, and only 20 settlements increased their shares. The most significant share decrease happened in Cegléd (50.4 points), Fehérgyarmat (44.8 points) and Mezőkövesd (42.4 percentage points). The most significant share increase happened in Visegrád (50.3 points), Kiskunfélegyháza (35.2 points) and Csokonyavisonta (30.3 percentage points). The increase of these settlements is so significant that it was partly harmful for the micro-region.

Among the 46 settlements, based on the data of 2006, Hévíz, Hajdúszoboszló, Bük, Balatonfüred and Sopron are the top five regarding tourism nights. In 2006, these settlements provided 15.1% of the total tourism nights in Hungary. Since they have such a significant share, we found it worthy to compare their tourism nights to the national average. We can see that all of the above mentioned settlements, except Balatonfüred, have more favourable dynamics than the national average of 20.3% (Figure 2). Hajdúszoboszló has the best dynamics, where the pace of increase reached the 100%.

From 48 settlements, 23 are located in Western Transdanubia, 25 are located in Eastern Hungary. A significant difference can be observed depending on whether we examine the share of domestic or foreign tourism nights. The analysis is based on the data of 2006. In Transdanubia, in 10 out of 23 settlements the proportion of foreign tourism nights is more significant. The smallest proportion of foreign tourism nights was experienced in Visegrád (13.7%), while the most significant was in Csokonyavisonta (76.0%). Alternatively, in Eastern Hungary there is only a single spa town where the proportion of foreign tourism nights is higher than the domestic nights, namely Püspökladány (59.2%). In Eastern Hungary, the smallest number of foreign tourism nights was registered in Parád where it did not reach 2%.

Figure 2

The five most important spa towns' tourism nights, 1995–2006 (1995 = 100%)



In analysing the spa towns, we concluded that the regional differences are stronger. Based on the data of 2006, we can see that the proportion of foreign tourism nights in Western Transdanubia spa towns (48.9%) approaches the domestic demand, while in Eastern Hungary the proportion of foreign visitors (27.9%) is well behind this. This fact of course influences the development and future prospects of the given settlements. Compared to the base year of 1995, in Western Transdanubia guest nights increased by 728 000, while in Eastern Hungary it had increased by 700 000 by the 2006. This represents a 22.1% increase in the West and 31.3 % increase in the East. Out of 23 analysed spa towns in Western Transdanubia, 12 experienced a decline in tourism nights during from 1995 to 2006. In most cases, the decline was caused by the loss of foreign demand. By contrast, in Eastern Hungary there were only 7 settlements, where the number of tourism nights fell by 2006 compared to 1995, in these cases the loss of foreign sales is in the background of this negative indicator. The decrease in the number of foreign tourism nights was 4.7% in the West, while 13.6% in the East. This affected 14 settlements in the West, and 16 in the East. The number of domestic tourism nights increase was 67.3% in the West, while in the East it was 64.4%. In Eastern Hungary we found only 4 settlements where compared to the base year the number of domestic tourism nights decreased, while in Transdanubia this number reached 7!

The spa-based developments and improvements

So far, we have been focusing on tourist arrivals to Hungarian settlements with a spa but we should also mention the effects of tourism on the society and economy. In the next part of our study, we are going to deal with these effects in detail, not simply to compare the related index-number of tourism to the index-number of society and tourism, but to

search for deeper connections. Some components of this area that have been examined have a complex relationship, in which the difficult cause-and-effect relationships of the changing components have a particular network. Whilst we do not intend to reveal this complex system entirely, we merely would like to get an answer to the question as to whether the touristic investments in the 34 settlements relating to the Széchenyi Plan have a demonstrable social-economical influence. In this analysis, we used the numbers of the active age group per 1 000 inhabitants, natural increase per 1 000 inhabitants, migration balance per 1 000 inhabitants, the number of legal persons and unincorporated businesses per 1 000 inhabitants, the personal income tax per person paying a tax and the registered number of job-seekers per 1 000 inhabitants. We analysed the changes during a 12-year-period between 1995 and 2006 in order to show the effects of the support. We examined all the settlements of Hungary. We wanted to get an answer to our question as to whether the sponsored investments of spas had or may have had a significant effect that could generate social-economic changes beyond the borders of tourism in the narrow meaning. In our analysis, we do not intentionally mention the specific touristic features. We focus on the specific social and economic area affected by the changes we have chosen, where we have all the settlements as a control group and can compare the temporal movements of the supported settlements to this group.

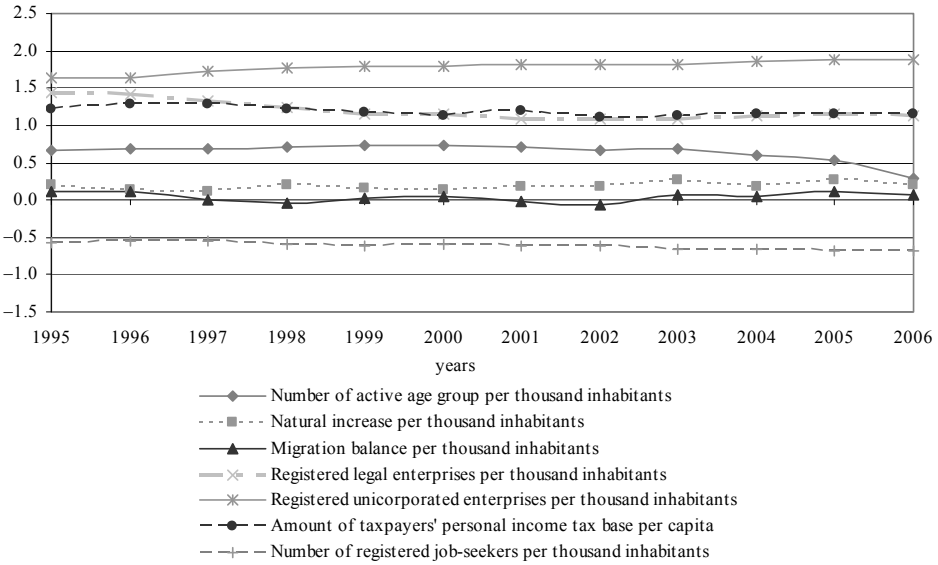
We have to consider the cause and effect statements of our analysis very carefully. It is not possible to decide unambiguously whether a settlement works better because of its additional touristic resources, or assume that it has worked well because of these additional resources. It is not always possible to state this clearly, since out of a multivariate chain we are only aware of two factors. The detection and the excavation of the relationship are the tasks of the researchers, no matter what the length the time series is that we are testing, it is quite difficult and dangerous to conclude that in a settlement, behind the strong or weak economic and social performance the only driving force is a Széchenyi Plan supported touristic investment. Therefore, in this place the only goal is to find contacts and to show that there were some changes in the mentioned variables, or modification between those variables. Can the signal started by the investment, or its modified form be considered somewhere in the analysed space? If so, what is the direction, how large are the differences between the supported settlements and are there successful and less successful projects? Before the tests, we standardised our variables. Thus, the average value for all the seven variables is zero for all villages, the deviation of the variables is a unit. Therefore, positive values are greater than the average; the negative values are smaller than the average. This can be exploited to examine the average values of the supported settlements along the variables:

Between 1999 and 2001, we can observe smaller turning points and inflection points (Figure 3). We can conclude that in the period between 1998 and 2002, a slight increase can be experienced in taxpayers' personal income tax base and that the rate of unemployment decreased slowly in the examined 34 settlements. The number of enterprises per 1 000 inhabitants is growing, not forgetting that the national average in every year, for every variable is zero! We can also see that the settlements – which have already won the tender – were representing better indicators than the average even before the tender, and after a permanent “lurch”, were even able to strengthen them. The

standard deviations are smaller than the national unit, and decrease slowly through to 2006.

Figure 3

The examined socio-economic variables regarding the averages of the supported settlements, 1995–2006



So far, the data of socio-economic space was examined plotted against time. Our task, however, requires analysing the relationship between the variables and the whole space defined by the variables in a more detailed way. It is important to note that these seven criteria are not independent from one another. Factor analysis was used to reduce the number of variables and to create a less complex socio-economic indicator. In this way, a new variable and fewer axes were defined, than the original seven factors. On one hand, these are uncorrelated with each other, and on the other they are covering most of the characteristics of the analysed space. (For a more detailed description of the method, see Hajdu Ottó (2003): Multivariate statistical calculations, pages 362–438.) The factor analysis with all the seven initial variables was performed for each year between 1995 and 2006 for all the villages in Hungary.

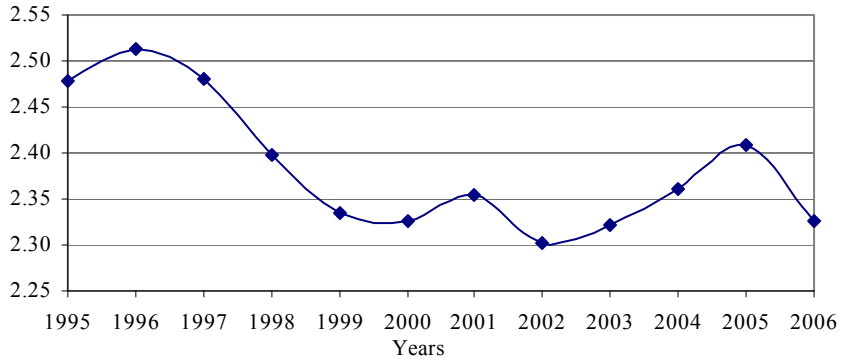
The calculation of the principal components is a base transformation, where the new basic elements are the axis. We have carried out a coordinate transformation, by searching for the ai vectors (These vectors belong to the eigenvalues of the correlation matrix of the basic data matrix), in which the Xst*aitr deviation is the maximum (Xst is a standard basic data matrix, which includes the original seven variables.) The resulted Yi = Xst*aitr vectors are called the main component vectors. These are the highest values along the dispersion, and here we can experience the biggest differences. The retained principal components can be summarised by a variance condense. We only kept the >1 value for each year from the eigenvalues belonging to the basic data. Thus, three eigenvalues remained, which explain 63–65% of the total variance. The three

eigenvectors corresponding to the eigenvalues, i.e. the relations between the main axis and the original variables are very strong in the different years. We can see that the strongest relation with the main component is the number of registered legal enterprises and unincorporated enterprises per 1 000 inhabitants, the amount of taxpayers' personal income tax base per capita and the number of registered jobseekers per 1 000 inhabitants. The main component is in opposite relation with the last one, while in positive relation with the others. Therefore, the economic indicators are strengthened by the increase of the first principal component. Regarding the second principal component a close relation can be seen between the number of active age people per 1 000 inhabitants and the natural increase per 1 000 inhabitants. The demographic progresses and the complex indexes are changing in the same direction. Our third principal component is explained by the internal migration, separated from the other basic data. Thus, from the original seven variables we developed a complex three-dimensional space, where the new variables condense economic, demographic, and internal migration data.

From this we can examine how the settlements, which were subject to the research have changed in this demographic and economic space over time, not forgetting that the data of all settlements are included in the analysis, and the average of the new variables are also zero! This means that values better than the average will be positive and values worse than the average will be negative.

Figure 4

The changes of the first principal component in time according to the average of the subsidised settlements, 1995–2006



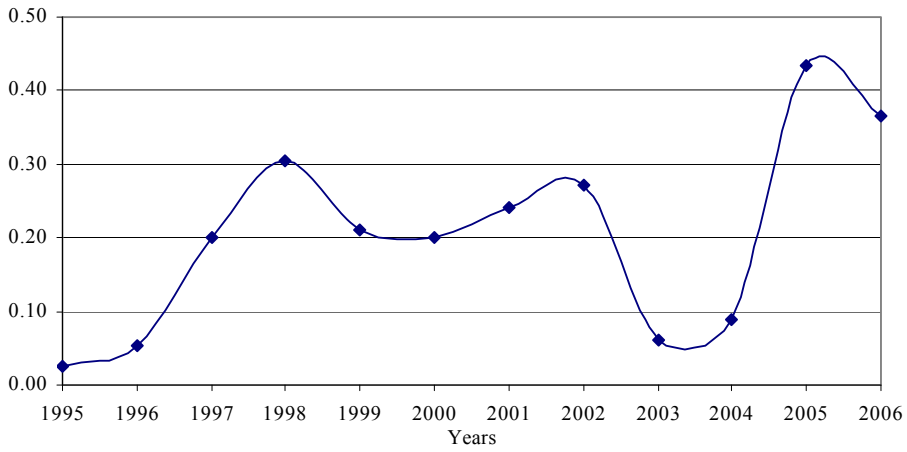
We can see a strong decline regarding the economic variable in the first half of the test period compared to the national average, and then after the transitional period between 1999 and 2002, a three-year increasing period can be seen, which seems to settle in 2006 (Figure 4). We can assume that the effects of spa thermal investments or the transformation of these effects can be observed in this three-year rise. This hypothesis is supported by the fact that nearly all the 34 supported towns present a similar pattern, which shows a relative improvement compared to the other Hungarian settlements. Since these settlements were not influenced by anything else during the same period, neither in financial support nor in development and there are no close economic ties among them, it is likely that the impact of the support has been identified.

We should not forget to state that the effects of one-time investments began to decrease after the start-up period, showing that a single investment is not enough for the economy, for the participants of the economy and for the settlements to launch a long-term economic development. Of course, the next few years will show whether it is only a downturn, or the termination of the affects creating benefits for the settlement compared to the country. Analysing the specific settlements we can say that the above mentioned statements are absolutely true for the largest investments like Bük, Hajdúszoboszló, Hévíz, Balatonfüred, and Sopron, where the city experienced a strong recovery and then a strong decline. For the above average Harkány, Barcs and Igal, these are representing a negative difference, while Visegrád, Cserkeszőlő and Szeged are representing a positive difference. These observations are coherent with the competitiveness represented in the first chart. We can see that in the first three settlements the increases are barely detectable, while in the latter three cases the signs of the decrease or reversal of the increase cannot be detected.

Regarding the second main component, which includes the demographic trends, the average of the supported settlements compared to the other settlements is very hectic in time, thus for this complex variable we cannot clearly present the effect of the support (Figure 5). We realised that in an economic sense, an economic investment has an economic, rather than a demographic impact. Probably for demographic (natural increase, the number of economically active citizens) variables only a longer term, multiple, high investment can exert an appreciable effect.

Figure 5

The changes of the second principal component in time according to the average of the subsidised settlements, 1995–2006

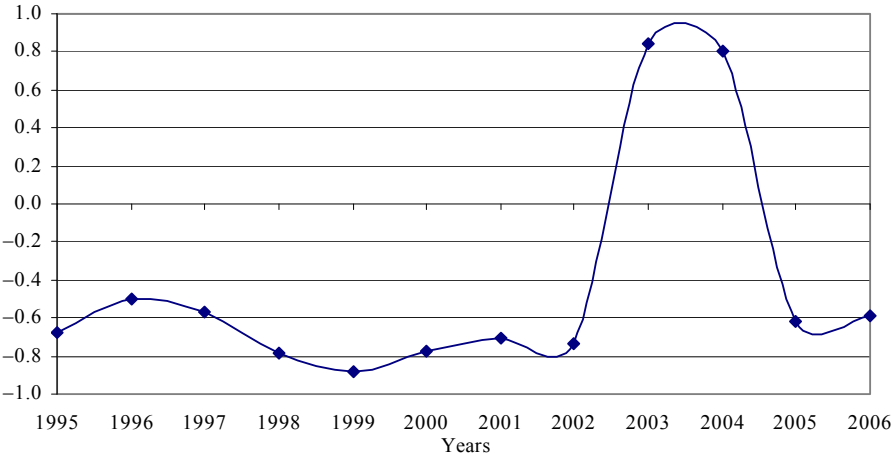


Surprisingly, the third principal component, the effect of tourism investment in the test space can be observed at the domestic (temporary and permanent) migration, with the rapid decay of the effect being the most striking here (Figure 6). Out of the three complex variables, the third variable's value was below Hungary's average and returned to the original level after a 2-3 year migration wave. The investments and their multiplier effects have implicated strong mobility towards these settlements. Here we have to

mention, that regarding the settlements almost collectively, they have improved compared to the national average however, the size of the change is closely linked to the cost of the project. The flow was the most intense in Bük, Hungary, Hévíz, Hajdúszoboszló, Sopron, Debrecen, Szeged and Balatonfüred. Such coherence could not be detected at the economic variables. A sort of threshold value investment launched a multiplicative process with multi-variables that could be seen in the economy. This effect was much longer on the economic variables, however regarding the domestic migration the original relative low value returned at all settlements.

Figure 6

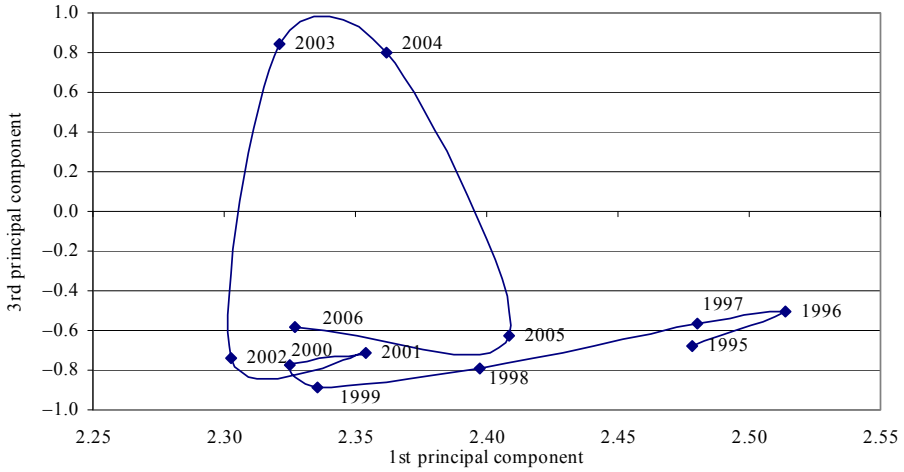
The changes of the third principal component in time according to the average of the subsidised settlements, 1995–2006



The new, three-dimensional construct space allows us to analyse the coherence among the uncorrelational variables. To do this, the principal component values of the averages of the supported settlements are represented on the x and y axes. These values, like previously, are intended relative to the Hungarian average. See Figure 7. We can see the movements of the spa-investment settlements in relation to time, in connection to the principal components, which are responsible for the economic and domestic migration, (there was no detectable change in the demographic components in the case of investments). Between 1996 and 1999, the value of both variables decreased compared to the national average, and then after a transitional period from 2002, the complex economic indicator and the domestic migration difference suddenly started to grow at the same time. We can observe that the volume increase of permanent and temporary migration to the settlements is much more concentrated (the process took place in 1-2 years), while the economic growth took longer on average at the 34 settlements. These results also confirm our hypothesis: compared to the other settlements, such collective and detectable growth can only be caused by a common investment covering all the supported settlements. The only investment, which was exactly at that time and exactly covered the analysed settlements was the Széchenyi Plan spa investment.

Figure 7

The average of supported settlements regarding the 1 and 3 principal components, 1995–2006



Summary

The tourist arrivals of the spa settlements cannot be considered more favourable than the country's average. In more detailed studies, we revealed that from the point of view of tourism, the majority of these settlements cannot be the motive force of their county. The attraction of health tourism in most cases does not mean a comparative advantage compared to other settlements with tourism attractions in the county.

The Széchenyi Plan affected a significant proportion of spa settlements. In the settlements, which implemented the investment projects, positive growth trends can be seen in many cases. However, we cannot generalise because most of the settlements were not able to make a profit regarding tourist turnover in respect of the investments. The reasons may be quite broad in scope, and within the framework of this study we were not able to undertake further exploration.

A relationship can be detected between the involvement of settlements in tourism, income and ability to retain population. Thus, from the issue's perspective it was a relevant issue to see how competitive spa towns are in relation to the country. Regarding most of the settlements with competitive disadvantages, we registered expanding guest turnover, so our opinion is that primarily these are the settlements where in many cases the only catch-up opportunity is health tourism, however their development has significant limitations.

In the second half of the analysis we were looking for answers to the question as to whether the supported spa investments had or have any significant results, which crossing the strictly limited borders of tourism resulted in detectable socio-economic effects. Examining the complex economic variables between 2003 and 2005, we can observe an increase. We assume that the effects of spa thermal investments or the

transformation of these effects can be observed in this three-year-long rising period. This hypothesis is supported by the fact that nearly all the 34 supported towns present a similar pattern, showing a relative improvement compared to the other Hungarian settlements. Since these settlements were not influenced by anything else during the same period, neither in financial support nor in development and there are no close economic ties among them, it is likely that the impact of the support has been identified

It is important to note that the effects of one-time investments began to decrease after the start-up period, showing that a single investment is not enough for the economy, participants of the economy and for settlements to launch a long-term economic development.

The indicator responsible for the domestic migration represents a similar characteristic as the economic variable, but in a much more concentrated form. Regarding the second main component, which includes the demographic trends, the average of the supported settlements compared to the other settlements is very time infirm, thus for this complex variable we cannot clearly present the effect of the support. The socio-space is much rather an investment-variant than the economic space.

The tourist arrivals of the spa settlements and the socio-economic effect in connection to it are not necessarily favourable compared to other tourist settlements of the given region, but from the point of the research programme focusing on the quality of life, it provided basic information. The Széchenyi Plan obviously had a stimulating affect, but to ensure its sustainability was rather problematic, it is also expected that regarding these privileged settlements, we will not show a higher quality of life in any future research.

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The impact of European demographic trends on regional and urban development

This article is based on the publication[1] 'The impact of European demographic trends on regional and urban development' written by the same authors, issued and prepared within the framework of the Hungarian Presidency of the Council of the European Union, commissioned by the Ministry of Interior, Hungary. Since public awareness of demographic changes is relatively low, despite the very serious consequences they can have in a few decades, it was of special political importance to put the issue of urban demographic trends on the agenda of the Hungarian Presidency. The discussion started during the first half of 2011 seems to have been continued and the following presidencies have decided to further elaborate on the issue, focusing on its consequences on the common Cohesion and Immigration Policies. The current article is an extract of a background study whose aim was to investigate the demographic processes and their consequences on decision making within the European Union from an urban perspective. Consequently, the article focuses on the demographic processes and policies inside the European Union (in some cases the study refers to the ESPON area that consists of the EU and Norway, Switzerland, Iceland and Lichtenstein), specialising on urban areas in which not only the towns and cities, but also their urban agglomerations are included.

Europe is facing serious challenges in the forthcoming decades that may thoroughly modify its current economic and social structure as well as its developmental preferences. Besides globalisation, climate change and the need for a secure, sustainable and competitive energy supply, demographic challenges will present one of the main sources of concern for Europe, and they will be of particular relevance for European cities and regions. There are wide variations in demographic dynamics and patterns between and within Member States, regions and cities across the EU. Some regions and cities are particularly exposed to decline with the outward migration of young people, a shrinking working age population and an ageing population that results in a worsening dependency ratio. These areas will face difficulties in financing essential public goods and services, such as health care, long-term care, housing and transport infrastructure in a sustainable manner in order to avoid increasing social polarisation and poverty. Other cities, in particular metropolitan areas, will gain population with a high inward migration. A resulting challenge for these areas will be the integration of migrants into the labour force and society as a whole, as well as the adaptation of infrastructure for high population growth.

In all its complexity, demographic change is likely to reinforce disparities between and within European regions and cities. Demographic dynamics will determine the

1 The report is available at http://www.mri.hu/downloads/publications/Demography.pdf.

economic growth potential of our cities and regions as well as the risk of social polarisation and pressure on the environment. The impact of demographic change will transform the age and employment structure of European societies, raising important issues of both economic efficiency and intergenerational equality. Correspondingly, the most important recent strategic document of the EU, the 'Europe 2020 Strategy for smart, sustainable and inclusive growth' identifies demographic change among the key challenges facing Europe, and calls for specific action to be taken under several of its flagship initiatives.

In the following, we will first give an overview of the main demographic trends affecting Europe, then focus on the territorial differences across European countries and regions. After presenting this broad picture, we will specifically dwell on the demographic issues of urban areas: shrinking, ageing, migratory trends, and integration of migrant ethnic minorities. Lastly, we summarise the main trends on a local level and the possible strategies to mitigate and adapt to the described phenomena.

Demographic change on an EU level: the challenge

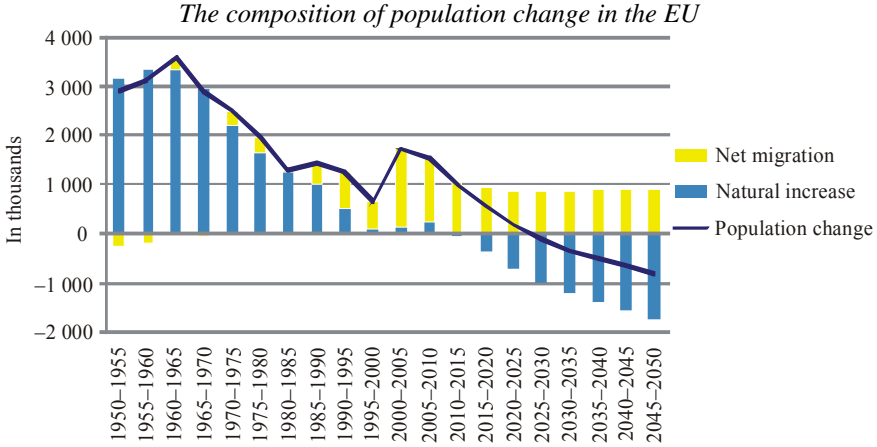
The European Union has a population of approximately 500 million people. The fertility rate of the European Union is 1.6 (2009) which is far below the replacement rate of 2.1. The fertility rate differs significantly from country to country (ranging from 1.31 in Latvia to 2.07 in Ireland) (Demography Report 2010 p. 26.). There are two factors that can mitigate the effects of low fertility levels, and thus postpone the population decrease of the European Union: the first is increasing life expectancy, the second is migration from countries outside the EU. As the figure below shows, according to the predictions by the United Nations – which are more negative concerning the timing of population decline than the forecasts by Eurostat[2]– increasing life expectancy will not be enough to counterbalance low fertility rates, and the positive migration balance can only mitigate this process until approximately 2025. By that point, the population of the EU may reach 520 million, from which level it will begin to decrease.

According to the predictions (Figure 1), the current high level of migration to the EU would be able to counterbalance natural population loss for a considerable time, mainly in the Western, Southern and Northern parts of Europe, but it is doubtful how long this high level of net migration would last. The forecasted decreasing level of net migration may be a reflection of the current debates on the integration capacity of the EU. However, the migration pressure is evident and the high level of illegal migration (about 500 000 people annually) cannot be properly controlled. Moreover, the latest flow of asylum seekers moving from North Africa predicts a possible future when war and climate refugees may not be stopped at the borders of the EU.

2 According to the latest Eurostat forecast, population decline in the present 27 countries of the EU will only start in 2040. This is a modification of their previous prediction, which put this date at 2025, like the UN.

Figure 1

The composition of population change in the EU



Source: United Nations 2008.

Natural population change and the dynamics of migration vary strongly across the years, and there are a number of policies that may influence these phenomena, suggesting that estimates of the future population size of Europe are uncertain. One phenomenon that is clearly becoming more important over time is ageing: the population of the EU will become significantly older. The increasing number of the elderly in the population is a consequence of longer life expectancy, which is definitely a positive phenomenon and characterises the increasing quality of life in the European Union. However, the elderly dependency rate[3] is currently around 20% and it may increase to 45–55% by 2050, which would definitely put pressure on public spending.

Territorial differences across the EU countries

While ageing and its fiscal and social consequences affect all the EU countries (though to a varying extent), massive immigration with all its social and infrastructural consequences can be observed in metropolitan areas of Western Europe. At the same time, low fertility and high emigration affect mainly the new Member States, but mostly not their metropolitan areas. Although, a number of regions in all Member States experience a constant decrease of population at a restrained pace, this fast rate of emigration together with a dropping fertility rate is specific to most new Member States and the eastern part of Germany.

According to the 5th Cohesion Report (EC, 2010) the new Member States are catching up to the EU average in GDP per capita, although more slowly than expected. However, regional disparities are growing within the new Member States: capital cities and western regions of the new Member States are developing faster, while other regions are increasingly lagging behind. These regions – suffering the most from huge outmigration – are in economic and demographic decline, which may become even more dramatic in the forthcoming decades.

3 Rate of elderly above 65 divided by the share of population aged 15–64.

The case of the Southern European countries (having faced serious migration outflows in the 1960s and 1970s, while currently experiencing vast immigration) shows that economic development might change migration tendencies – although this positive tendency does not necessarily affect all remote regions of Southern Europe. Accordingly, the new Member States could also become capable of attracting migrants in case economic convergence continues. The question is, however, whether this convergence will occur fast enough to prevent the regional and micro-regional disparities to reach the 'point of no return', from which they can no longer catch up.

Population dynamics in European regions

As described above, the European Union as a whole is characterised by a modest population increase with significant differences between the North/Western, Eastern and Southern regions. These differences are experienced not only in connection with macro-regions, but also between regions on NUTS 2 level.

During the last years of the 1990s, 60% of the regions experienced a population increase, as a consequence of natural population growth and positive net-migration.

In the years 2000–2006, the percentage of regions experiencing population decline increased from 27 to 30, and the percentage of regions with a high share of elderly people (aged 65 or over) also grew. Analysing the population dynamics data from a broader, territorial point of view, the variations in the direction and dynamics of development across Europe can be illustrated by the following table.

Table 1

Typology of NUTS 2 regions according to their population change

Total population change, NUTS 2 regions, 2000–04	Natural population change	Net migration	Total population in 2004, thousand	% of EU population
Population growth	Positive	Positive	174 056	36
	Negative	Positive	129 123	26
	Positive	Negative	49 585	10
Population decline	Negative	Positive	39 673	8
	Positive	Negative	23 074	5
	Negative	Negative	73 113	15

Source: Eurostat, DG Regio calculations (EC 2007. p. 47) http://ec.europa.eu/regional_policy/sources/docoffic/official/reports/cohesion4/pdf/4cr_en.pdf.

Nowadays, the most unfavourable case of depopulation – when natural population decline is combined with migration loss – characterises 17% of the regions, where 73 million Europeans live. The most active part of the population is leaving these areas, emigrating either to larger cities or to other countries. In general, the peripheral sparsely populated and rural areas are losing, while metropolitan regions and regional centres are gaining population.

Since the 1990s, net migration has been the main source of population growth; 72% of the regions have had positive net migration, while natural population increase was positive in 59% of regions in the 1990s (ESPON DEMIFER 2009 p. 29.). From 2000 on, net migration has characteristically been high in mostly Southern regions of Europe,

especially in the South-Eastern regions of Spain, and Northern Italy. Moreover, Ireland has had high positive net migration. At the same time, many regions in Eastern Europe, as well as several French regions, the Southern regions of Italy and the Northern regions of Norway, Sweden and Finland have experienced negative migration rates.

Internal migration within countries has remained stable during the whole period: metropolitan areas have been the most favourable targets for migrants, while older industrial areas with outdated production structures have been less attractive than they were before the crisis of the 1970s.

Ageing is reinforced by the increase in life expectancy. Since 2000, the number of the oldest age (persons over 75) has risen in almost every European region without any specific geographic concentration. Average life expectancy is 80 years or over in 21% of the European regions. By contrast, life expectancy is 76 or less in 17% of the regions, mainly in Eastern Europe (ESPON DEMIFER 2009 p. 23.). The percentage of people aged 65 or over is high in several Northern regions (mainly in Sweden), in central regions (mainly in Germany), and in Southern regions (in Italy, especially in Tuscany and Liguria, where the share of the elderly population was more than 25% of total population in 2008). The rate of ageing is relatively low in Poland, Ireland and Iceland.

Projections for the future

Among the ongoing ESPON projects, DEMIFER (Demographic and migratory flows affecting European regions and cities) deals with the analysis and projection of demographic processes in Europe. For the changes in the population and labour force, a projection has been prepared (in three versions), covering a period of 45 years from 2005 until 2050.

To summarise the main findings of DEMIFER:

- Although migration is not sufficient to compensate for the decline in the labour force, it may lead to an increase in regional disparities and it affects the age structure of population and labour force resources.
- In the basic (Status Quo) scenario – this works with constant demographic events and labour force participation – the population declines by 40 million by 2050. Over 75% of the regions are winners of migration, but losers are mainly concentrated in the EU-12.
- If migration from outside the EU were to drop suddenly, the labour force of 90% of the regions would decline by 2050.
- Ageing is the most important challenge, with an increasing old age dependency ratio.

The ESPON DEMIFER projection shows that ‘migration, both extra-Europe and migration in general, would have a significant impact on demographic and labour force development of the regions. Migration-induced population changes are not uniform across the regions. Importantly, they would benefit the most affluent regions, whereas poor regions would lose population due to migration. Similarly, migration would reduce ageing in affluent regions and increase it in poor and remote ones. Therefore, we may expect that migration would be a strong factor in increasing regional disparities. This aspect of regional policies is not disputed much yet, but will perhaps become quite

crucial in the future. The only way to prevent the demography-related growth of regional disparities is to implement policies reducing incentives to emigrate from poor to wealthy regions together with policies allowing poor regions to attract more extra-Europe migrants' (ESPON DEMIFER 2010 p. 21–22.).

Population dynamics in European urban areas

The majority of the European population (71%) lives in cities. The largest urban zones in Europe are traditionally in the Western part of the continent: mainly on the Atlantic Arc, and in the so-called Pentagon area, where 40% of European citizens live, mostly in cities and towns. It is a core area in a wider sense, characterised by high population density, good accessibility and numerous cities of a global socio-economic importance (e.g. London, Paris). In addition to the individual cities situated here, there are many large metropolitan areas, for instance the Ruhr-area, the Southern-England metropolitan area, the North-Italian (Milano–Torino–Genova) metropolitan area, and the cities in the Benelux-countries (e.g. Randstad).

Methodology

Urban data came from the Urban Audit database, which provides European urban statistics for more than 300 cities from nearly all European countries. The initiative of the Urban Audit was conducted by the Directorate-General for Regional Policy at the European Commission, in cooperation with Eurostat and the national statistical offices of the 27 current Member States and three additional countries. Urban Audit collects data on three territorial levels: the core city, the larger urban zone (LUZ) and the sub-city district (SCD). In the current article, we use the larger urban zone level: the city and its surroundings (agglomeration).

It is a common problem in urban research to define the precise area of a city. Since there is no generally accepted approach to define urban areas, and due to the manifold cultural differences affecting the layout of cities, it is hardly possible to find a universal definition even within Europe. It is one of the achievements of the Urban Audit to derive a standardised approach to defining Functional Urban Areas, which follows a widely accepted method based on measuring commuter zones. The Urban Audit also works with the national administrative agglomeration boundaries. For some of the smaller cities where a LUZ could not be created, the city boundaries equal that of the larger urban zone.

The time periods of data collection have been so far: 1989–1993, 1994–1998, 1999–2002 and 2003–2006. In the analysis, we refer to a period by the end date of data collection. If – as it is planned – data collection will be repeated every 3 years in every city, there will be enough data for comparative purposes. However, so far the data collection system has been changing so rapidly that only relatively limited data exists for each city. The data set is incomplete for about 100 cities. There are however, a number of key indicators with a higher response rate (demographic indicators in particular).

Because of the technical problems with the Urban Audit data, it is hard to define precisely which urban areas are losing population and which are not. However, since

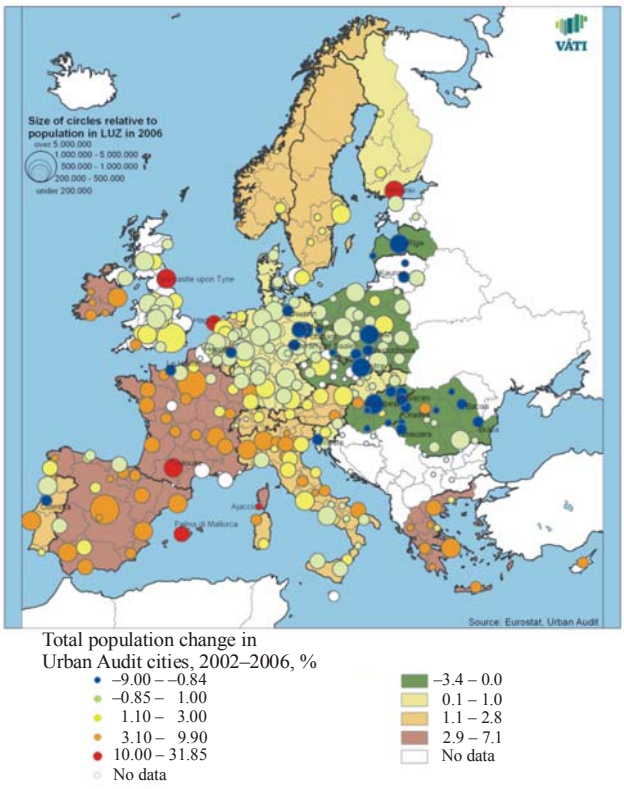
there is no other relatively up to date dataset that also contains medium sized cities, researchers mostly rely on the data provided by the Urban Audit.

According to the 2007 State of European Cities Report (EC DG REGIO 2007 p. 13.), based on data from 1996–2001, one third of the Urban Audit cities are in the urbanisation phase (both the city and the urban zone are growing); another third are in the phase of overall urban decline (both the city and the urban zone are losing population); one quarter are dominated by suburbanisation (the city is declining while the urban zone is growing), and 5% of the cities are experiencing re-urbanisation (the city is growing while the urban zone is not). Thus, a large variation in urban dynamics exists across Europe, which is the composite result of natural population change and migration. The shrinking urban areas are concentrated in the East-Central European new Member States, while most cities in the EU-15 countries are growing.

Figure 2 presents population change in Urban Audit cities between the last two dates of data collection (1999–2002 to 2003–2006).

Figure 2

Population dynamics in Urban Audit cities 2002–2006[4]



Source: VÁTI, based on Urban Audit data.

4 The data collection happened between, 1999 and 2002, and 2003 and 2006; in the analysis, we refer to a period by the end date of the data collection.

The city networks of Europe generally show similar demographic trends as the regions and countries where they are situated. With some exceptions, most Western European cities registered population increase at the beginning of the 2000s (2002 to 2006).

Growth also characterises the Nordic and Mediterranean urban zones. The population of cities in the Nordic countries has increased; the 'winner' is the Helsinki urban zone with the second highest value in Europe (more than 25%). In recent years, the number of inhabitants of all the analysed larger Scandinavian cities has grown, but the average increase remains between 1 and 3 per cent. However, the population of small and medium-sized towns and cities in remote Scandinavian regions tend to decline according to the Urban Audit.

In Italy, there is a strong North-South dichotomy, which is also present in population dynamics. Northern Italian cities have grown, while cities in the South just stagnated or decreased.

The picture is mixed in the Benelux and Central European urban zones. For instance, in the Hague, population growth is in the top five on the European scale, but most of the Benelux cities have just stagnated or even decreased. The situation is similar in Switzerland, Austria and in Germany, but here the decrease is even more significant in several cities (one of the fastest shrinking cities, Frankfurt an der Oder, is also in Germany, close to the Polish border.

Cities in Eastern Europe (the New Member States) and in the eastern part of Germany suffered population decline (in most cases 1–4% between 2002 and 2006); within the EU, most of the decreasing cities are situated in these countries, and there are just a few cities – mostly capital cities or metropolises – with significant population increase.

Urban shrinkage

Most shrinking cities in the last 50 years have been situated in Western industrial countries. According to the Urban Audit, out of 220 large and medium-sized European cities, 125 (57%) lost part of their population in the period between 1996 and 2001 (EC DG Regio 2007). 22 German cities (14 from the western and 8 from the eastern part of Germany), 19 Italian cities, 11 British cities, and 5 Spanish cities are included in this list. In the Central and Eastern European accession countries, 53 out of a total of 67 cities shrank. The ten cities with the highest relative population loss of more than 1.75% annually were: Halle an der Saale, Frankfurt an der Oder, Schwerin, Magdeburg (all in the Eastern part of Germany), Bacau, Cluj-Napoca, Piatra-Neamt, Tirgu Mures (all in Romania), Lisbon (Portugal), and Venice (Italy). This urban shrinkage in Europe was not predominantly caused by suburbanisation, as both the core and the suburban ring lost population during the last decades. Out of 98 larger urban zones around the city cores included in the database, 53 (54%) were shrinking.

However, these declining tendencies seem to have slowed down in the 2000s, when the new migration wave and the reducing intensity of suburbanisation created a new dynamism of growth, mostly in the bigger cities and metropolitan areas of Europe.

There are some categorisation schemes concerning the causes of shrinkage (e.g. those developed in the CIRES project). The current study created the categories presented below[5]:

- The classical form of shrinkage was a result of the economic downturn in industrialised cities like the North-Eastern cities in Great Britain, the Ruhr-area in Germany, and the North-Western cities of Spain. The cities, which had a monocentric industrial structure that became outdated, were extremely sensitive to decline.
- Smaller cities in remote regions have been characterised by emigration from the countryside to bigger urban centres both in the second half of the 20th century and the 21st century. This was mainly the result of the growing importance of skilled work and higher education, with bigger cities offering more opportunities for work.
- Most Central-Eastern European cities and towns where the economic transition, outmigration to more developed Western countries and the low fertility rate are experienced simultaneously. Bigger scale urban regions of Central-Eastern Europe have experienced a modest decline or stagnation if we add up the core city and its suburbs. Shrinkage is more relevant in the case of smaller cities and their surrounding areas. According to the research of Vlad Mykhnenko and Ivan Turok, 3/4 of the urban areas above 200 000 residents in post-socialist countries are shrinking (Mykhnenko 2007). Most of these areas are in the former Soviet Union and Yugoslavia. (Urban shrinkage, ageing and emigration are more likely to be dramatic east of the EU than in the EU.)
- In the late 1990s and 2000s, shrinkage became typical of the eastern part of Germany. It was characterised by de-industrialisation, suburbanisation, low fertility rates, and the dynamic enlargement of the urban infrastructure and housing stock (Großmann 2008). (One may think that the radical population loss is strongly connected to the outmigration to the western part of Germany. However, the net migration balance between the two parts of Germany was not at all as negative.)

Currently, the phrase of shrinking is commonly used all over Europe, as all countries are affected. Shrinking seems to be a long-term process, which is also caused by further factors, like permanently low fertility rates. (Although one must be careful with fertility rates, as the tempo effect[6] might partially change the population dynamics.)

Central-Eastern European cities are losing their population rapidly. However, the picture becomes increasingly mixed if we use the extended meaning of shrinkage: 'When a city loses population it does not necessarily represent the actual loss sustained. But if a city is in 'complex-shrinking' (including a declining population via migration and less births, less jobs, more unemployment, a smaller gross domestic product and a declining income), this implies that help is very urgent.' (Wolf 2010). A vicious circle can develop

5 In several studies, suburbanisation is considered as one of the main causes of urban shrinkage. However, the current study does not intend to address this issue, as our unit of analysis is the urban area and not the core city, which already includes the suburbanisation process.

6 Tempo effect means the effect of the postponement of childbearing, which suggests that the low fertility rates could increase in several Member States as woman step into their 30s.

when the population decline coincides with a decline in economic performance and substantially less demand for public services and housing. Complex indicators prove that shrinking cities are somewhat different from 'complex shrinking cities'. The main cities of Central-Eastern Europe are not in such a bad position as it seemed at first, but small and medium sized towns all around Europe (mostly in Central and Eastern Europe and in the Mediterranean Area) occupy a worse position.

Natural population change in urban areas

The values of natural population change are similar to that of the total population change, with the territorial differences being a bit sharper. The highest natural increase is observed in global metropolitan areas (London, Paris) and in Irish cities (Dublin, Galway, Waterford). Natural decline characterises German urban areas and most of the cities in the new Member States, especially in the Baltic States. The highest decrease appears to be in Latvia (Riga, Liepaja). Northern Italian cities also suffer from natural decrease (Genoa and Trieste are among the bottom five cities which have the highest natural population loss).

Ageing

Ageing and the increase of the dependency ratio (because of low fertility rates and growing expected lifetime) are among the most important challenges for European cities. If this demographic deficit is not balanced by international immigration, the natural decrease may result in total population shrinkage. However, most cities have a younger composition of residents than the Member States themselves. This fact may be explained by more intense immigration to cities and the economic dynamism of urban areas that attracts students to study, and active age people to work there.

Regarding the 'future generation', the highest proportion of 0–14 year-old children are to be found in Norwegian and Irish cities (Stavanger, Tromso, Kristiansand, Bergen (21–22%); Waterford, Limerick, Galway, Cork, Dublin (20–22%)) and in some French cities like Lille, Paris, Le Havre and Nantes (19–20%). The highest increases in the proportion of children between 2002 and 2006 were registered in Dutch cities; however, cities in the UK, Spain and Greece also showed an increase in the share of children.

The highest decreases in the proportion of children were in East Germany (Schwerin, Frankfurt an der Oder) and Romania (Bacau, Braila, Calarasi).

The share of the elderly (65+) and the oldest old (75+) is the highest in several Italian cities, for instance in Trieste, Genoa, Bologna, Firenze, Cremona, Ancona, Campobasso, Perugia etc, and in some French and Spanish cities (e.g. Gijón, Oviedo, Toulon). In these cities, the proportion of the population aged 65 years and over is above 20%, of which the oldest section is above 10%.

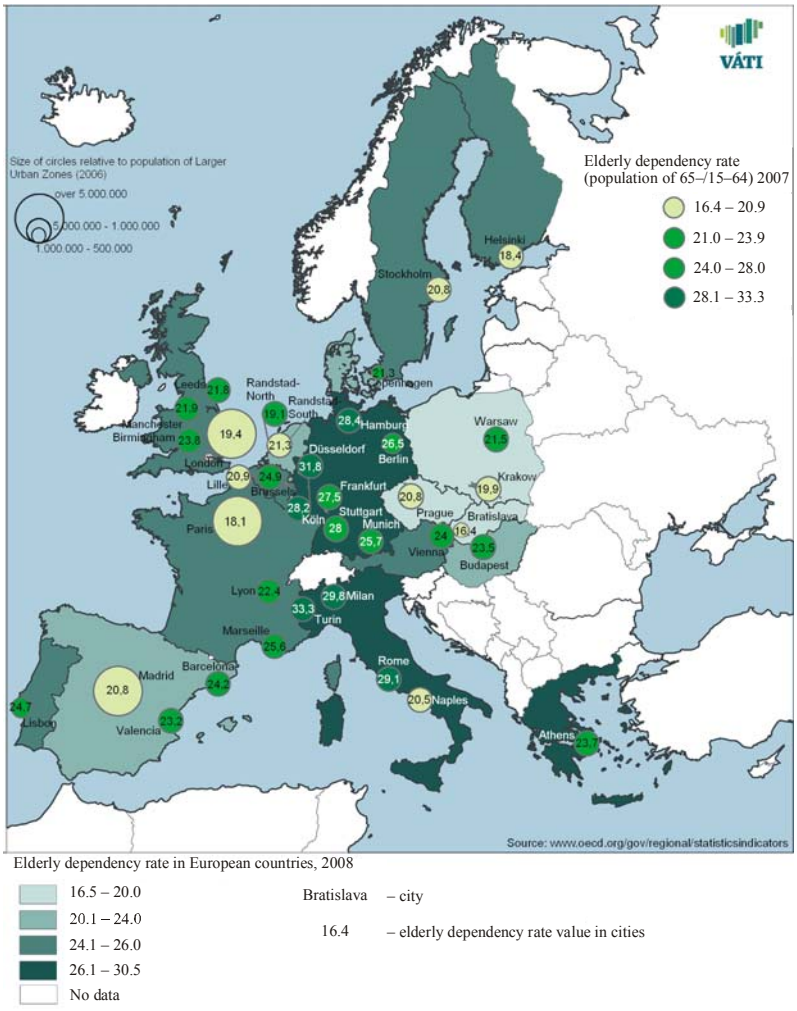
The share of retired people is the highest in Western and Central Western European cities, in Eastern Germany and Southern Italy, while the New Member States, the Eastern European cities are in a relatively more favourable position. However, as a result of the intra-European migratory flows caused by the unequal economic positions, and allowed by the enlargement of the EU, this asset may dissolve in 10–15 years. According to the

projections for 2050, the Mediterranean countries (Spain, Greece, Italy, Portugal) will be joined by many Eastern European countries such as the Czech Republic, Slovakia and Poland in having a higher proportion of elderly than the EU-25 average, as the fertility rates are mostly lower than that of Western Europe and life expectancy is growing rapidly. (Romania and Bulgaria were not included in this projection, although they are also considered to be heavily affected).

Currently, the old age dependency rate[7] of European cities is around 20–25, which is predicted to double by 2050.

Figure 3

Elderly dependency rates of selected European Metropolitan Regions, 2008



Source: VÁTI, based on OECD regional statistical indicators.

7 The proportion of the active, working age group (15–64) compared to the old.

The current elderly are much more active, mobile and affluent when deciding on their preferences concerning location, housing, services and activities, which in turn generates the improvement of the silver economy. Several thousands of retirees move from bigger cities to specific parts of the European Union to make their life more comfortable (e.g. to coastal zones in the south of Europe). This movement is quite typical at the age of 55–74, but ageing citizens tend to return to the cities after turning 75 or 80 when they need special health care services.

Migratory trends

It is important to distinguish three categories of migrants: the 'nationals' (coming to the city from other parts of the same country), 'other EU nationals' and the 'third country nationals'. These categories differ substantially in all aspects, from the regulations that influence their numbers to the way they can/want to integrate themselves into the labour and housing market of the city. It is not easy to get reliable data at city level on the magnitude of migrants and especially on the share of the three categories. The most recent Europe-wide comparable data are based on the Urban Audit survey of 2004. It is clear that the 2004 data should be regarded as somewhat outdated in many aspects, as they still show the pre-enlargement situation, before the mass East-West migration started, and was collected well before the financial crisis. It is also problematic that some countries (notably the UK) did not supply data.

The 2004 data allow us to make the following observations:

- Migration targets mainly the cities of the north-western countries, including France, Germany and Austria. There are differences between these countries in the share of non-EU nationals (and it is clear that this difference increased dramatically in the second half of the decade).
- Cities of the Central and Eastern European countries had low numbers of newcomers and even these were almost exclusively nationals.
- A few southern regions and cities, mostly located in Spain, experienced dramatic increases in migration between 2000 and 2005. The majority of immigrants who came to the cities of the Southern European countries are non-EU migrants.

After the two waves of EU enlargement in 2004 and 2007, internal migration from the eastern to the western parts of Europe strengthened. For instance, Poland has lost 2 million people in recent years, as a consequence of the 'export of the baby-boomer generation to the UK' (WS 2010, Potrykowska); and there are 3 million long-term migrants (staying at least 12 months in the last three years) from Romania to other EU countries and cities, many of whom chose Spain, Italy or France (WS 2010, Alexe).

There is a huge variety of estimates regarding the number of migrants living in different European cities. According to the very rough estimations by CLIP, in 2008 the highest share was around 63% (in Luxembourg), followed by 49% (in Amsterdam) and 38% (in Frankfurt am Main).[8] The lowest, one-digit figures were reported from Central European, post-socialist cities.

8 There is no unified definition of migrant population across the cities: in some case foreign born, in other cases foreign nationality persons are counted as migrants. In some cities migration background is used, deriving from the migration status of the mother or father (as foreigners, or foreign born).

According to recent trends, the number of immigrants has increased in countries where immigration was not traditionally present, e.g. in Finland. In Helsinki, the immigrant share of the population is about 9%, which is not a high value, but it has increased from less than 2% in the last two decades. (Dhalmann & Vilkama 2009) The high level of immigration is a distinctive characteristic of the largest European cities, but the immigrant population in medium size cities has also been on the increase since the 1980s (Reeve & Robinson 2007).

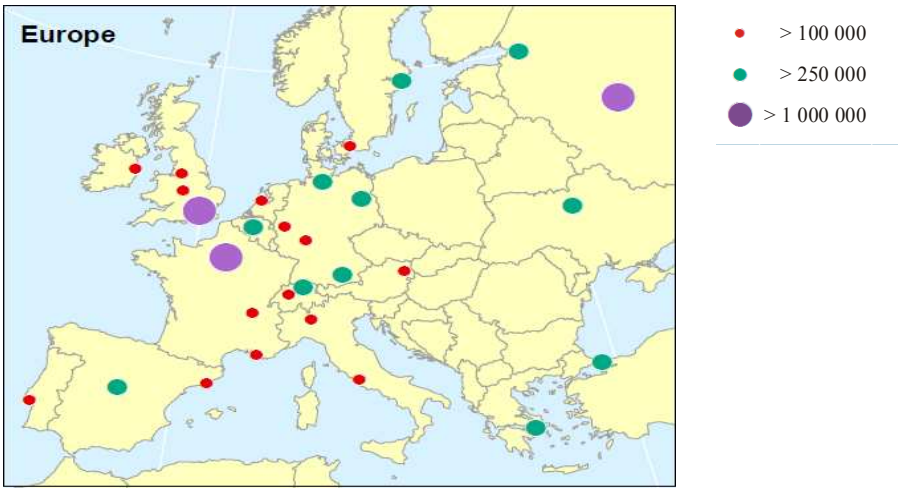
New migrants prefer the developing big cities, although the importance of the ethnic minorities is relevant in secondary cities as well. Across Europe, migration has had the most significant impact on large cities. An interesting observation in the UK is that, not least because of new transport links and cheap airlines, the immigration of EU citizens is spread more evenly across the UK's urban areas than expected, beyond the typical destinations for migrants, including previously less popular cities.

While third-country nationals are still the most important migrant group for most EU cities, citizens from the EU-8 (the countries that joined the EU in 2004, except for Cyprus and Malta) have dominated the net migration inflow in some, and have formed important new migrant communities. This trend is most significant in the United Kingdom and in Ireland, but is also important in the Netherlands (IPPR 2008).

All Western European countries have at least one major immigrant city, while some of them, such as Germany, France, and the United Kingdom have several (see Figure 4). In fact, 29 European cities have over 100 000 foreign born inhabitants. Since European metropolitan areas tend to be smaller than North American ones, the 100 000-person threshold often accounts for 10 per cent or more of a city's total population (Price & Benton-Short 2007).

Figure 4

Cities with at least 100 000 foreign born inhabitants



1 000 000 < London, Paris, Moscow; 250 000 < Madrid, Brussels, Zurich, Munich, Hamburg, Berlin, Stockholm, St. Petersburg, Kyiv, Istanbul, Athens; 100 000 < Dublin, Manchester, Birmingham, Lisbon, Barcelona, Marseille, Lyon, Bern, Milan, Rome, Wien, Frankfurt, Düsseldorf, Amsterdam, Copenhagen.

Data are from different dates/city between 2000 and 2005.

Source: Price, Benton-Short, 2007. http://www.migrationinformation.org/Feature/display.cfm?ID=567.

Emigration statistics are even more uncertain than immigration statistics, as leaving the country does not have to be announced anywhere, and not even labour statistics can supply estimates, as many of the emigrants were unemployed before leaving the country.

Romania – one of the countries having the largest supply of emigrants – has gone through interesting changes. In the first period, outmigration eased the tensions of the job market (high unemployment). Around 2007, when an economic boom started, labour shortages developed quickly in the construction and textile industries, in health care and in the education sector. Although immigration quotas were increased for eastern countries (e.g. for Turkish, Chinese and Moldovan firms working in Romania), this could not even closely replace outmigration: compared to the 3 million long-term (at least 12 months in the last 3 years) emigrants from Romania to EU countries, the total number of immigrants in Romania is only around 60 thousand (WS 2010, Alexe).

Ethnic minorities in urban areas

Ethnic groups – according to the mainstream definition – are people who share a common identity that arises from a collective sense of distinctive history, and people who possess their own culture, norms, tradition and, usually, common language. The 'boundaries between the ethnic groups are defined through social processes of exclusion and incorporation; that is, ethnic group members identify themselves in terms of ethnic categories and are in turn recognised as members by outsiders' (D. Jary & J. Jary 1991 p. 151). Ethnicity and ethnic minorities represent a very complex problem, so we should be very careful with any generalisation. Even though the article is on the ethnic minority issues related to immigration as a permanent factor in the future demographic process, we should not forget the existing territorial or borderline minorities, which raise severe conflict in European society and impact on urban policies.

There are cases when the territory of an ethnic group is clearly defined as a consequence of the historical past, and members of the group are treated as long term residents (indigenous people). However, there are ethnic minorities that gained the status of minorities because of the shifting borders of states. As the borders shifted, a part of an ethnic group found itself in the territory of another state, which then gave rise to racial, ethnic or civic discrimination against them from the majority groups (e.g. Russian minorities in the Baltic states). Because of the dominance of politics of nation states, multi-ethnic regions and countries were created such as Belgium, or Bosnia.

In Europe, Muslim minorities pose special challenges to the national governments and cities with respect to integration. The Muslim population in Europe is estimated to be around 16 million. In Western Europe, they have settled in largely urban areas. The Muslim population in selected European cities is estimated to be as high as 25% in Rotterdam, 24% in Amsterdam, 20% in Marseilles, 17% in Brussels, 16% in Bradford (UK), while in others, like Paris, London and Copenhagen, the figure is approximately 10%.[9] However, it must be clarified that there are no exact data available on the share of the Muslim population, as there are no official statistics on this matter in most countries.

There are also ethnic minority issues (besides the problem of borderline minorities) in the eastern part of Europe, but here the main topic is the share of the Roma population.

[9] http://islamineurope.blogspot.com, 2007.

This group represents a relatively low proportion of the population in the new Member States, especially in Bulgaria, Romania, Slovakia (above 9%), Hungary (around 7%), and the Czech Republic (5%) – however, we have to emphasise that there are no reliable data collection methods available to define exactly the attributes of being Roma or their share in the population. The Roma have historically been marginalised in every European country where they have settled. The social conditions of the Roma population in each of these countries are critical; their income, housing and employment positions have in most cases deteriorated. The high share of Roma population is a social phenomenon in rural areas in most of the new Member States, while in some cases – such as in the Czech Republic – the concentration of Roma households is more an urban issue.

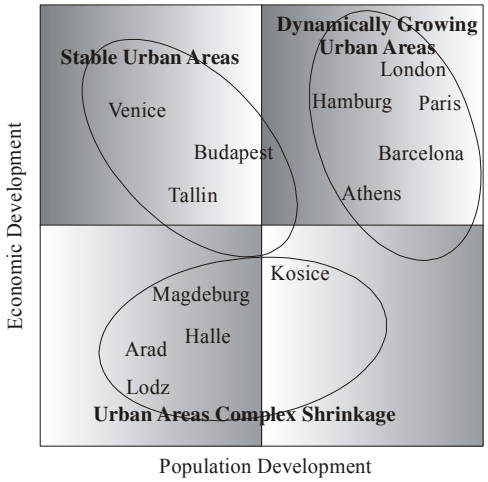
The Roma population is estimated to be between 9 and 12 million (Council of Europe 2010). Roma migration to western countries, and especially to big metropolitan cities, has become one of the most critical ethnic conflicts of urban development recently in France, Italy and Spain. The wave of expulsion of Roma people from France (according to estimates, 15 000–20 000 Roma live in France, in 300 hundred shantytowns) called attention to this problem, and made it clear that the problem of the Roma minority is a European level problem.

Demographic change on the local level and the possible strategies

In the long run, many European regions and cities will face shrinking and the ageing of the population both on the national and the urban[10] level. However, these processes will not be of similar intensity all over Europe. Moreover, the tendency of the demographic processes may not coincide with those of the economic processes.

Figure 5

Position of selected urban areas according to their demographic and economic performance



Source: based on the idea of Eric van Marissing and Thorsten Wiechmann, developed in a Budapest workshopon 15–16 November 2010.

10 The local level is understood in the study as a functional (metropolitan) area, i.e. cities are considered together with their surrounding areas of influence.

The inclusion of economic parameters in the demographic analysis is essential, *because the real challenges for the future are the economic and social causes and consequences of demographic change, not demographic change itself.* In fact, similar demographic processes may occur together with very different socio-economic structures. That is why our analysis has put great emphasis on typologies of urban areas not only according to demographic characteristics but also based on a complex approach covering demographic and economic parameters at once.

Based on these considerations, three[11] main types can be distinguished[12]:

1. *Dynamically growing cities:* Even in the long run there will be cities that experience a strong population increase caused mainly by their large economic power. These cities are mostly bigger cities in Western Europe with local economies connected closely to the world economy. As economy is the most relevant factor in attracting migrants (who are usually younger and have a higher fertility rate), these cities may also remain hosts to migrants in the long run. Migration is generally regulated on a national level in the EU, but the local level has a lot to do to foster the integration of migrants. There are many European cities that have worked out efficient integration strategies, based on offering high level local services (registration, education, health and housing) and ensuring the most important requirements for integration (studying, working, knowing the language), thus enabling the migrants to join European society. In addition to integration policies, these cities face the challenge of pressing additional demand for infrastructure and public services. Dynamic population growth may result in the further increasing density of the built environment or in the uncontrolled sprawl of the urban area. In order to avoid the spatial and social tensions because of growth and increasing heterogeneity, *dynamically growing cities should concentrate on retaining the territorial and social cohesion of the urban area.*
2. *Cities and towns with stable populations:* Cities with a strong economic background and a gradually shrinking – sometimes slightly increasing – or stable population. Population shrinkage in itself cannot be considered a serious problem unless it has a dramatic effect on the local economy and infrastructure. Gradual population loss in a city may even be advantageous: as the density of the urban environment decreases, the economic output will be divided among fewer residents (resulting in higher GDP per capita). The main task of cities with a more or less stable demographic and strong economic background is to create flexible urban strategies. Population decline, or slight growth can quickly turn around – as

11 We could define a fourth type of city, characterised by economic decline or stagnation despite population growth. This type of city is mostly found in Eastern Europe, in rural areas. The source of population growth is typically the high birth rate of Roma families who are crowded out to (or stuck in) remote regions struggling with economic difficulties. The favourable demographic situation of these cities is vastly eroded by the economic problems, resulting in high inactivity and unemployment rate of the population. Due to the differences in the migration patterns of the Roma (in some countries they move to urban, while in others to rural areas) this type of urban area could not be identified clearly and needs more research in the future.

12 We must note that data available to measure demographic and economic performance on the urban level are not totally reliable. The current study generally uses the data of the Urban Audit, which are still somewhat incomplete in spite of the very innovative efforts. The important question about the exact share of growing or declining urban areas cannot be answered properly and evaluations sometimes have to be based on approximations. Thus the Urban Audit dataset needs to be further developed for monitoring and policy making purposes.

economic and population dynamics are not stable in the long run – changing the age and ethnic composition of the residents, leading to new requirements for public services. Flexibility means the improvement of urban infrastructure and environment in such a way that it can serve different purposes (e.g. new housing that can be both for the youth and the elderly, low density housing inside the urban borders). Besides flexibility, these cities should definitely prepare themselves for the consequences of ageing, by redesigning the urban environment, transportation and services according to the new type of needs.

3. *Rapidly shrinking cities and towns:* Urban areas of complex shrinkage experience both demographic and economic decline.[13] These urban areas are mostly located in the Central and Eastern part of the EU (in the Eastern part of Germany, the Eastern regions of Poland, Hungary, Slovakia, Romania, and Bulgaria), but some peripheral areas of Western Europe are also affected (like the Southern part of Italy, the Eastern part of Portugal, the Northern part of England, the Northern part of Scandinavia, etc.). The decline of a region does not necessarily mean the decline of the city as well; there are vital cities to be found in declining regions. The main cause of complex shrinkage is economic restructuring: the city region starts to lose its population when it is no longer able to provide enough jobs compared to other urban regions. Thus, the strategy to mitigate complex shrinkage should concentrate on the redefinition of the economic basis. It is an important question whether all urban areas of complex shrinkage could become capable of revitalising their economic base. Several examples (e.g. the German reunification, the Italian efforts to diminish the development gap between the Southern and Northern part of Italy and the Scandinavian policy to integrate the Northern part) show the difficulties of achieving full economic recovery in the less developed regions, despite the often enormous amounts of money invested. Another question is whether the development of the economy automatically results in the increase of population in shrinking countries. In many cases 'jobless growth' is the outcome, when economic development means that the urban area recovers its economic basis but does not require more workforce, thus population increase may not be the consequence or only at a modest rate. Thus, besides concentrating on the economic recovery policy, these cities should adapt to the partial collapse of the overdeveloped infrastructure, housing and public services. Cities may aim at downsizing the urban infrastructure with fewer residents, thus they can reach a new equilibrium on a smaller scale. For already smaller shrinking cities, the establishment of proper territorial connectivity to large urban centres in order to strengthen the access to high quality services may be of high importance.

The previous paragraphs indicated the special measures on which urban areas of different economic-demographic types should concentrate. In addition, there are certain measures that are advisable for all urban areas no matter which category from those mentioned they belong to:

13 Economic decline in this sense does not necessarily mean a decline of output in net terms, rather economic stagnation, or slower development than the national average.

- implementing local employment programmes in order to activate the hidden reserves of the resident population and reduce the effect of the shrinking workforce due to ageing or outmigration;
- creating a family friendly environment and strengthening the social context, supporting family oriented measures in order to support those wishing to have larger families and to stay in urban areas;
- strengthening local child-care services to create better conditions for child-bearing and to encourage the participation of parents in the labour market;
- implementing approaches in housing, urban and spatial planning to encourage the design of mixed residential areas, regarding age, family structure and social composition;
- providing new and improved local services for the ageing generations (social, health care, culture, transportation, barrier-free environment etc.);
- implementing cultural and social activities and programmes that can strengthen social cohesion and community development, while promoting the respect for cultural diversity and reducing possible social tensions;
- providing a secure and safe urban environment in order to lower spatial segregation and increase the quality of life of all inhabitants.

National and European level tasks to address demographic challenges

The European Union has a limited role in influencing the demographic processes. The EU does not have a strict common immigration policy or a common social policy.

Even so, the EU can, through indirect tools, encourage (or press) national governments to develop policies with a direct relevance to demographic processes in the following directions:

- family-responsible social systems that give mothers the possibility to bear all the children they would like to have;
- increased retirement age in order to handle the shrinkage of the work force and lessen the burden on pension funds;
- sustainable pension systems that are based on pre-savings of the currently active generation;
- flexible labour markets without age, sex and ethnic discrimination that would enable the high-inactivity layers of society (youngsters, ethnic minorities, elderly, mothers, people with physical or mental disabilities) to enter the labour market;
- migration policies that make it easier (or even support) for those types of migrants to enter the EU, whose qualifications are needed for the economy, or for whom there is a seasonal demand;
- national and local integration strategies that aim at providing social inclusion not only for the first but for the second and third generation of migrants;
- multi-level regional development systems based on polycentric urban development to mitigate the micro-regional disparities strengthened by demographic factors.

As demographic processes may deepen the already existing development gap between the more and less developed regions of Europe, special efforts have to be taken – in the framework of national regional policies, the Cohesion Policy and also the Rural

Development Policy of the European Union – to reverse this process. This is not only a value based necessity but it also brings economic benefits, as there is considerable potential for development in lagging areas.

To tackle the loss of the working age population it is extremely important to increase labour market activity rates. There are many tools available from the provision of flexible working conditions to the training and social inclusion of inactive people, partly supported by EU measures.

To address the demographic challenges, Europe needs to establish a new solidarity across generations. The potential of third country migration should be used in a more active way, and national governments should take into account their sub-national levels (regions, urban areas) when shaping their migration policies.

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Keywords: Demographic change, regional and urban level, ageing, shrinking cities, migration, integration.

GYÖRGYI BARTA – HAJNALKA LŐCSEI

The effect of the recent economic crisis on the spatial structure of Hungarian industry

Spatial division of industrial performance in Hungary

A characteristic economic spatial structure has evolved in Hungary following the change of the political system in 1989, with industry developing more rapidly only in parts of the country. The urban agglomeration of Budapest and the Northern Transdanubian region are currently the economically developed areas, while the rest of the country is lagging behind. The regional disparities of industrial production and partially therefore economic development within Hungary (Figure 1) increased continuously until 2008. The causes of these regional differences were obvious. Economic dynamism was primarily a result of foreign direct investment (FDI), and the structure of FDI resulted in a distinct regional configuration: Significant foreign investment was concentrated in Northern Transdanubia, while foreign investment in the tertiary sector was mainly directed towards the capital, Budapest, and its agglomeration. After the slowdown of the world economy in 2001, a moderate sectoral and regional transformation took place and foreign industrial investors also became active in the Northern Hungarian region, namely in Borsod-Abaúj-Zemplén county. (See details about structural and regional change in Hungarian industry: Kiss 2001, Barta 2002, Rédei & Jakobi & Jeney 2002, Kukely 2004, 2008.)

In other parts of the country, the economy developed much less rapidly, resulting in an unresolved dual economy. In other words, two loosely linked economic spheres evolved that are also manifest geographically: one established by means of foreign investment, modern and growing dynamically, and the other, mostly consisting of Hungarian-owned small and medium-sized enterprises, gradually breaking away (Barta 2002, Barabás et al. 2008, Kukely 2008). (This represents the regional average, both sectors comprise "islands", business organisations, corporate groups and district and municipal economies, which demonstrate quite the opposite, or at least different characteristics.)

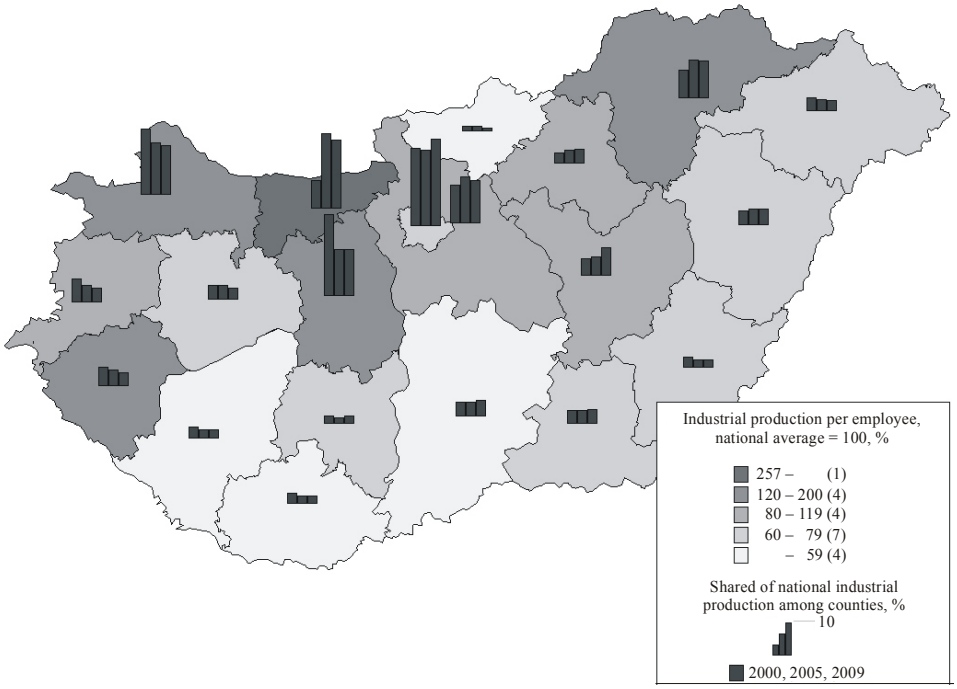
In summary, until 2008, the areas of Northern Transdanubia and Budapest and its agglomeration, i.e. hardly a quarter of the country represent the developed part of the Hungarian economy, which extended to a certain extent towards the north-east, gradually creating a north-south divide.

This was the situation when the economic crisis hit Hungary. Day after day, more mass redundancies in our largest foreign-owned factories were announced. After a few months, the first regional analyses were prepared, partly based on newspaper articles and partly on Hungarian Central Statistical Office reports (KSH 2011), indicating a deep decline in production, exports and the number of employees in precisely those regions, that had been most developed and dynamic until the crisis (Barta 2009, Lőcsei 2010,

2011, Fazekas & Ozsvald 2010). Measures to foster intra-regional convergence were adopted. However, this resulted in weakening the stronger regions rather than benefiting the economically backward ones.

Figure 1

Distribution of industrial production and regional differences in productivity after the change of the millennium



Source of data: HCSO Dissemination database, data of enterprises with more than five employees, by residence. Comment: Productivity (Product value/employee) refers to 2005.

Questions regarding recent geographical processes

Cautious forecasts indicated in summer 2011, that the crisis had calmed, at least in significant areas, and that the Hungarian economy as a whole also seemed to be working its way out; it was primarily industry that had demonstrated some spectacular dynamism since the autumn of 2010. (Now, in autumn 2011, the downturn is returning, but we presume that the new recovery will take place with similar characteristics.) Therefore, we were eagerly awaiting answers to several questions regarding geographical processes:

– Did the crisis continue to have the same early characteristics as during the second half of 2009 and in 2010? Did the large foreign-owned companies lose further production capacity? What happened to the rest of industry? Moreover, did the intra-regional convergence programmes have an effect, or in other words, was there a continued decrease in regional differences?

– Has a new and lasting spatial structure evolved in Hungarian industry? Could the crisis thus be seen in a positive way, as some sort of "creative destruction"?

We must emphasise that at the time of writing, we are not able to offer reliable answers to these questions as the crisis is far from ending, and also due to a lack of information, especially regarding a comprehensive and detailed database. Data regarding the national economy pertaining to production, export and personnel shifts by the industrial sector is available only after a delay of about two or three months. Furthermore, the subsector breakdown of regional data is not available at all. Corporate data – owing to its uniqueness and consolidation by company headquarters – has to be processed with caution and a critical approach when used in regional analysis.

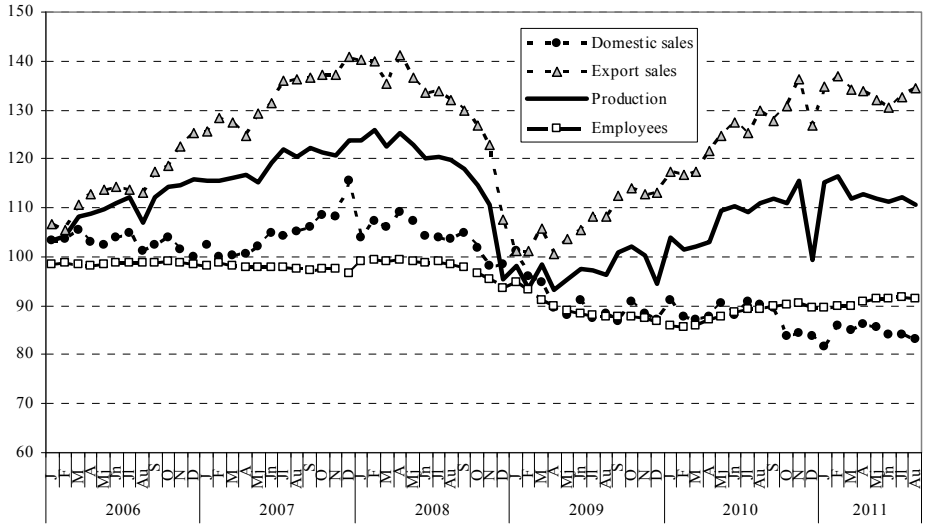
Consequently, this study includes call assessments, based on informational mosaics and assumptions deduced from our previous research. They will be confirmed, or perhaps refuted, by studies published within the next one or two years.

Short summary of the industrial macro-processes of the crisis

According to the monthly breakdown of data, the hitherto continuously growing industrial production began to decline in May 2008, and the largest downturn was recorded in December 2008. Production then dropped below levels reported at the same period in 2005. However, this low level was not followed by rapid recovery. Only as late as May 2010, were the first signs of significant growth observable, owing to the restocking of inventories and a prospering German economy.

Figure 2

Change in industrial production, sales and number of industrial employees (monthly average of 2005 = 100)



Source of data: HCSO Dissemination database, downloaded on March 4 2011. Regarding production and sales, data are seasonally and by working-day adjusted and relevant to all industrial corporations. The number of employees pertains to corporations with more than four employees (completing at least 60 working hours a month if not full-time employees).

Industrial performance differs significantly depending on the markets for which products are intended. *Industrial exports* already began to expand again in the spring of 2009, following the downturn in 2008. *Domestic sales*, however, had not demonstrated any significant growth even before the crisis, since domestic consumption had already been reduced by the government, owing to domestic financial problems. Their decline also began in May 2008, persisting for a much longer period until the end of 2009, without demonstrating any signs of recovery even at present. In other words, the crisis particularly hit companies producing for export; however, the contraction of the domestic market has had a much longer lasting effect. This is clearly related to the existing problems of the dual Hungarian economy, so it depends not only on the worldwide economic crisis.

The number of *industrial employees* declined steadily and now stagnates. The employment situation – already stagnant previously – was briefly and negatively affected by the outbreak of the crisis, and from then on reflected the same absence of growth as the domestic market. The decrease in employment was primarily caused by rising labour costs. The crisis only accelerated this already unfavourable development. In the spring of 2008, approximately 770 000 people were employed in the industrial sectors. By the low point, in February of 2010 this number had decreased by 115 000, which meant a total reduction of 15%. Based on international experience, fluctuations in the number of employees generally occur with a characteristic time lag after economic changes. Research shows that the Hungarian labour market was less elastic at the time of the crisis than those of more developed countries (Köllő 2011). Hungarian companies responded to the crisis by introducing tough adjustment measures, in other words, dismissals and limiting new recruitment, as opposed to softer measures adopted by more developed Western European economies, such as decreasing working hours or reducing salaries. Government policy softened the severe reaction of companies to some degree: Government aid was offered to support job retention, the effect of which should not be overlooked. (According to rough estimates, 80–90 000 Hungarian jobs were preserved partly, or entirely by government assistance; Köllő 2011.)

Regarding the situation of *particular sectors of industry* during the crisis, the segments more strongly connected to the global economy, i.e. predominantly those selling abroad, suffered more. The global financial crisis ended several years of dynamic development of the manufacturing industry, the most important sector of industry and the economy itself (Kukely 2004). The products of automotive and electronics industries are mainly exported and play an important role in the manufacturing industry. Both sectors suffered a serious (40–50%) plunge during 2008–2009. The production of vehicles declined first and most sharply. Of the 115 000 industrial workers that were made redundant between May 2008 and February 2010, most worked in vehicle production in a highly specialised form. Regarding the primary production sector, there was no significant improvement until May 2010. Cutbacks however were not typical in the repair and maintenance subsectors.

– *Light industry* had expanded at less than the average rate in the years before the crisis, and the crisis itself caused only a smooth drop in production. (However, the 2008 crisis, hit the ailing textile industry yet another hard blow.)

- The *food industry* proved to be less sensitive to the economic crisis, partly because of domestic sales and partly because of the inelastic character of its market.
- As part of the *chemical sector*, the Hungarian pharmaceutical industry was not affected, although three-quarters of its production is exported. On the other hand, tyre manufacturing, which had considerably expanded in recent years, being dependent on the vehicle industry suffered serious losses because of the global economic crisis.

A general economic recovery began in the summer of 2010, starting with most of the subsectors of the manufacturing industry (9 out of 13), including the two most significant segments: vehicles and the electronics industries.

Regional processes in industry during the crisis

The crisis tore into the Hungarian economy at a dramatic rate, and statistical data collection and evaluation were not able to keep track with it. Due to the scarcity of available data, we turned to a method rarely used until now: media-watch, mostly with reference to crisis-handling strategies employed by industrial enterprises.[1] Most of the media coverage regarding the economic downturn appeared between October 2008 and February 2009. Afterwards, the number of articles on this subject decreased, and from the spring of 2010 onwards, newspapers reported numerous news about corporate growth and new recruitment. Companies announcing group redundancies (meaning at least 50 employees) were mostly large, foreign-owned companies in the automotive and electronics industries. The majority of them were located in the most developed and most dynamic regions, mainly in Northern Transdanubia. It came as highly shocking news when Nokia suppliers laid off 2 300 employees in Komárom with 2 000 people also losing their jobs at the Suzuki Company located in Esztergom. Other towns of the region for example Tatabánya, Székesfehérvár, Szombathely, Sárvár, Győr, Ajka and Veszprém, also lost an appalling number of jobs (Figure 3, Table 1).

From February 2009 onwards, industrial enterprises of the Northern Transdanubian region featured less frequently in the media. However, news of redundancies proliferated – albeit with a much lower intensity – from the eastern part of the country, Northern Hungary and industrial enterprises in the Great Plain region. Those regions did not feature in this news collection where industrial capacity was low and especially where there were no large companies.

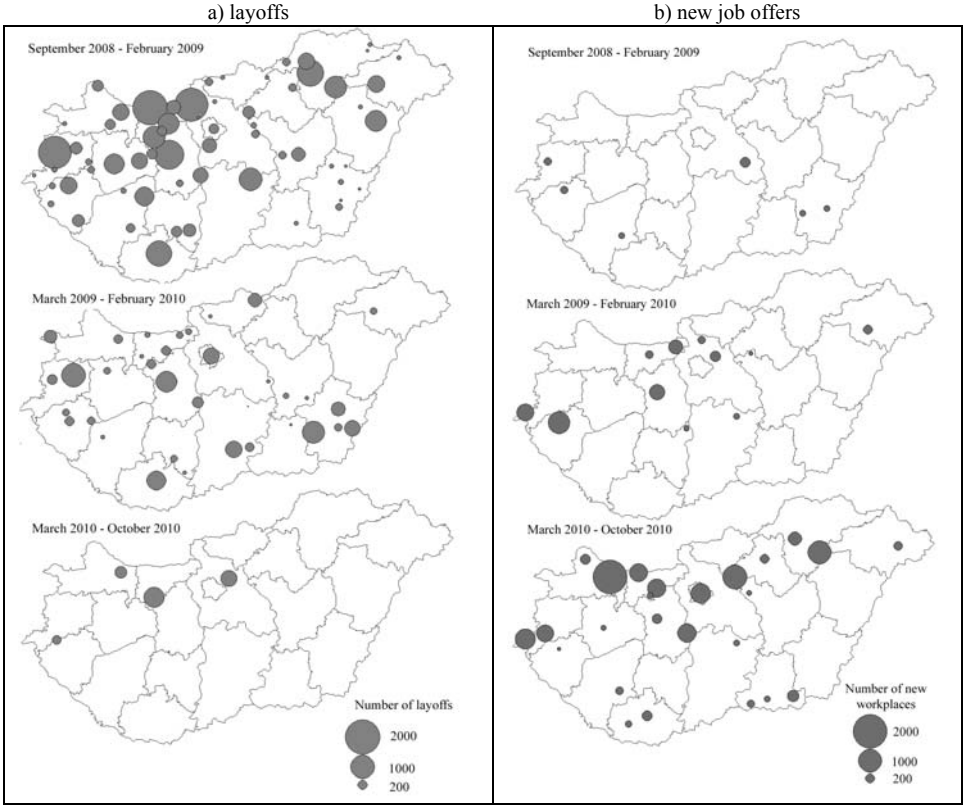
Finally, the articles collected suggest that the economy in and around Budapest was hardly affected by the crisis. The reason is that the tertiary sector is dominant in the diversified economy of Budapest and its agglomeration; there are no large manufacturing enterprises in the area. It is rather head offices of large enterprises, modern business services supporting industrial companies and a dense network of small and medium size enterprises that are characteristic of the Budapest region (Lőcsei 2010).

1 H. Lőcsei collected media coverage on 204 industrial enterprises between 2008 and 2010; 173 announced redundancies amounted to approximately 400 000 jobs lost.

Figure 3

Company news referring to redundancies and new job offers (2008–2010)

a) layoffs b) new job offers



Source of data: based on media content analysis by H. Lőcsei.

Diligent media observers could have gained the impression that the crisis mostly affected foreign-owned large manufacturing companies (at the same time reinforcing some ill feelings towards foreign investment in Hungary), and among them, industries of towns in Northern Transdanubia and there again vehicle electronics industries. Based on the articles published, the public could conclude that the situation looked worse than it actually was in the Northern Transdanubia, since there was hardly any reporting about intended closures, or relocation of factories. This demonstrates that the media coverage did not depict the dimensions and the magnitude of the crisis correctly.

Table 1

*Companies announcing the top 10 redundancies (in 2008 and 2009)**

Company	Town affected	Redundancy plan, number of employees	Industry	Comment
Foxconn Hungary Gyártó Kft.	Komárom, Debrecen	1 500	electronics	Nokia supplier
Magyar Suzuki Zrt.	Esztergom	1 500	vehicle production	
Elcoteq	Pécs	1 150	electronics	Nokia supplier
Flextronics	Zalaegerszeg, Tab	1 100	electronics	
Jabil Circuit Magyarország Kft.	Tiszaújváros	900	electronics	
DAM 2004.Kft.	Miskolc	878	metallurgy	
Denso Gyártó Magyarország Kft.	Székesfehérvár	800	mechanical industry	automotive supplier
Perlos Precíziós Műanyagipari Kft.	Komárom	750	other	Nokia supplier (they were planning to close down the factory)
Alcoa-Köfém	Mór, Székesfehérvár	735	mechanical industry, metallurgy	
Laird Technologies Kft..	Szombathely	700	electronics	Nokia supplier (they were planning to close down the factory)
Linamar Hungary Nyrt.	Orosháza	700	mechanical industry	automotive supplier

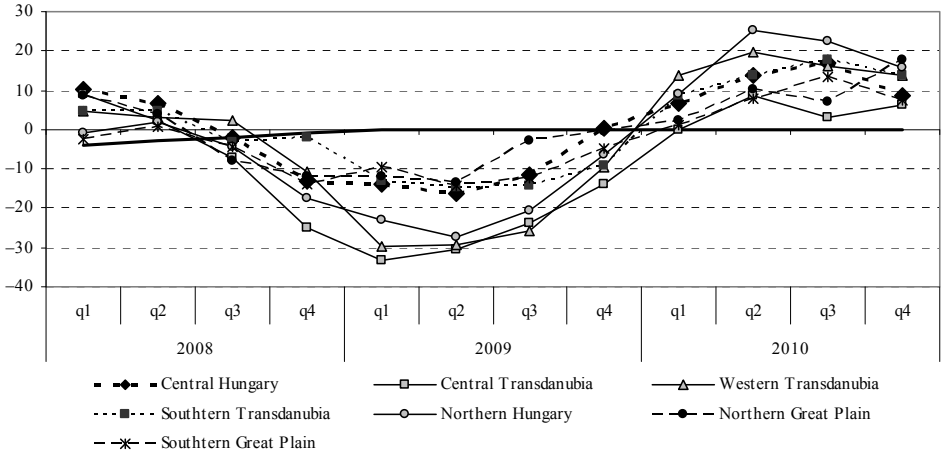
* The Nokia factory in Komárom should also be included, but the management refused any media contact.
Source of data: based on media watch by H. Lőcsei.

Today we are in the position to test the method of media observation: How sound was the information extracted from the masses of published media articles with reference to the regional processes of downturn and growth of the manufacturing industry?

We can obtain an overview of the regional effects of the recession that began in 2008 by analysing the quarterly regional data of industrial production published by the Central Statistical Office (HCSO) (Figure 4). HCSO data shows that the decline in production in six of the seven regions of the country began in the third quarter of 2008 and in Western Transdanubia a quarter later. There are no significant deviations between the regions regarding the dates of crisis outbreak, its deepening, or the beginning of the recovery. It is a general characteristic of this crisis that it affected all sectors and all regions.

Figure 4

Regional inequalities in the decline of industrial production – quarterly breakdown (compared to the same period of the previous year)



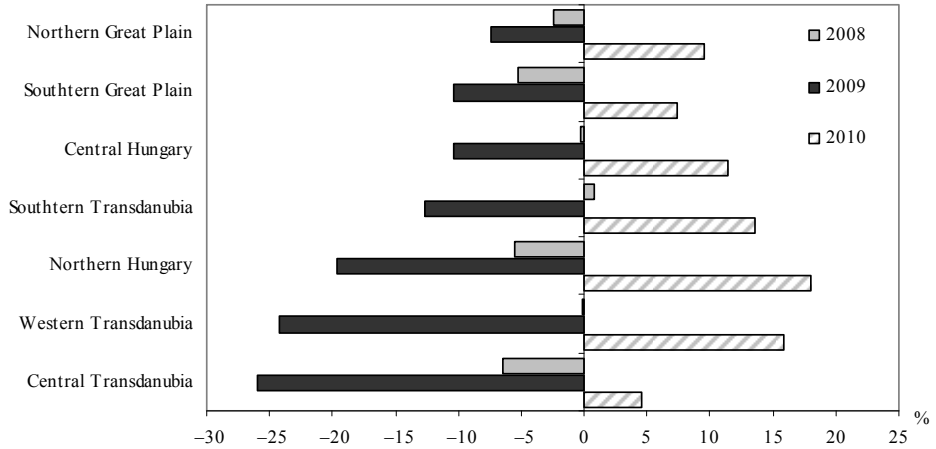
Source of data: HCSO Dissemination database, data of companies with a minimum of 5 employees, by location.

This analysis reveals that to some degree the HCSO statistics contradict the information that derived from the media. According to the HCSO, the most distressing figures regarding manufacturing companies arrived from those regions where the crisis allegedly emerged somewhat later, namely from Western Transdanubia and Central Transdanubia. In reality – and this is an even more important finding – the economic recession hit the manufacturing industry of practically every region almost simultaneously, the difference concerns the degree of downturn. Therefore, the impression that the crisis began in Northern Transdanubia and progressed to the east of the Danube seems not to be supported by the facts. Regarding the intensity of the crisis, the media more or less correctly informed the public: The greatest cutbacks and the most dynamic recovery occurred in Western Transdanubia and the regions of Northern Hungary. The Central Transdanubian region differs in this respect, since the decline was the deepest in this region, and according to HCSO data, recovery is slowest and least intensive. However, it would be worth considering more in depth research into this topic.

The evaluation of annual data (Figure 5) also confirms the difference between media observation and official comprehensive statistical data. In 2008, there was a significant downturn in the manufacturing industry of Northern Hungary and the Southern Great Plain, in addition to that of the Central Transdanubian region and to a similar degree. By 2009, Western Transdanubia had "fallen into line", however the situation did not deteriorate further in the Southern Great Plain. Data from 2010 showed a recovery in all the regions, with Northern Hungary, Western Transdanubia and Southern Transdanubia leading (the latter was never in a leading position regarding either recession or recovery). Economic expansion was thus experienced simultaneously in the manufacturing industry among the regions, except for the manufacturing industry in the Central Transdanubian region. However, there were not many articles published regarding this "exception", or its underlying causes.

Figure 5

Change in industrial production, yearly comparison, 2008–2010



Data source: HCSO Dissemination database. Data of companies with a minimum of 5 employees by location.

Is the spatial structure of the manufacturing industry changing? We cannot offer a conclusive answer to this question. It is obvious that the substantial foreign participants in the manufacturing industry have not changed, did not shut down their factories, or pull out of the country, and maintained their locations. However, we do not know enough about Hungarian participants: who were the ones able to maintain their supplier status, their market share in Hungary and abroad? It seems as if the sectoral and regional structure of the manufacturing industry has retained its pre-crisis characteristics. However, we do not have a reliable overview of its internal components and anticipated dynamism (prospective investments).

Table 2

Regional inequalities in industrial production, 2000–2010*

Year	Capital and counties (n=20)		Regions (n=7)	
	Relative deviation, %	Concentration index	Relative deviation, %	Concentration index
2000	79.7	0.088	61.8	0.182
2001	72.4	0.084	58.2	0.180
2002	66.1	0.081	54.8	0.178
2003	67.6	0.081	54.7	0.180
2004	70.0	0.081	54.9	0.180
2005	81.2	0.086	59.6	0.186
2006	85.9	0.087	64.7	0.188
2007	87.6	0.088	65.3	0.189
2008	81.2	0.088	58.6	0.186
2009	75.5	0.088	52.1	0.183
2010	70.1	0.086	48.9	0.180

Source: Calculations by H. Lőcsei based on data regarding industrial production and population. (Data of companies with a minimum of 5 employees, by location.)

* With reference to regional inequality indicators applied, relative (standard) deviation indicates average (squared) deviation of industrial production value projected onto population compared to the national average, while the concentration index specifies the concentration of the production value.

The regional development patterns prevailing earlier were interrupted, but the spatial structure of industry that had established itself by the change of the millennium has not changed fundamentally as a result of the crisis. Concentration and regional inequalities of production have levelled out to some degree (Table 2), however they will probably reappear as a consequence of economic recovery.

Concluding remarks

The initial crisis has by now ended, at least with regard to the manufacturing industry. According to the HCSO report published in March of 2011, GDP has been increasing since 2010. Industry, and above all the manufacturing industry on the production side and exports on the consumer side play substantial roles in this growth process. The Hungarian manufacturing industry is linked to the German economic recovery. Sectors closely connected to export – production of information technology, electronic and optical products – achieved 20.3% and vehicle production 18.3% of annual growth in 2010. Conversely, the food industry, chiefly producing for domestic markets, experienced a slight downturn; consumption is stagnating at an extremely low level. This suggests that those industries producing for exports will remain the main engine of the economy. This implies a reliance on the primarily foreign-owned companies in Hungary (Kriván 2011).

During the second half of 2010, there were more and more articles published on enterprises implementing new recruitment and new investments (Table 3). It is clearly observable, that vehicle production and electronics are again the dominating factors in towns that had registered growth earlier on; German companies are by far the leading investors.

Table 3

Manufacturing companies announcing largest new recruitment campaigns, September 2009 – October 2010

Companies	Towns	Projected number of positions	Industry
Mercedes	Kecskemét	2 000	vehicle production
Audi	Győr	1 800	vehicle production
Bosch group	Miskolc, Hatvan, Budapest	1 700	electronics
Jabil Circuit Hungary	Tiszaújváros	1 000	electronics
Flextronics	Zalaegerszeg	900	electronics
General Motors Powertrain	Szentgotthárd	800	vehicle production
Hankook Tire Hungary	Rácalmás	700	rubber industry
Eybl Alpokalja Kft (Car-Inside)	Körmend	600	vehicle production
Ketrax Hungary	Szentgotthárd	600	electronics
Becton Dickinson	Tatabánya	500	pharmaceuticals
Denso Magyarország Kft.	Székesfehérvár	500	mechanical industry
Huawei Technologies Hungary	Pécs, Komárom	500	electronics

Source: based on media watch by H. Lőcsei from September 2009 to October 2010.

The economic policy of the present government is full of uncertainties. In the beginning, there seemed to be a focus on industry, but these efforts were not sustained.

The most dynamic large enterprises – especially foreign-owned companies – have been, and still are, subject to extra taxes. However, manufacturing companies were spared (with the exception of the pharmaceutical industry). Hungarian-owned enterprises were promised significant growth opportunities, although up to now we have observed only strong rhetoric and hardly any real actions. Plans have positioned job creation as a priority of economic policy. Despite this, so far only redundancies have risen by a magnitude of hundreds of thousands. Initially, the government emphasised the importance of economic growth, meanwhile, the objective is merely economic stability. Risky economic policy obviously disheartens investors, too. Reduced government funding to support large (and essentially foreign) investments was announced, yet these resources are necessary to generate higher production, to allow the payment of extra taxes, although those sources would be required for investment. At present, we cannot determine to what extent government policy will support or hinder the growth of the manufacturing industry and the continuation or modification of preceding developments.

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Who lives in forgotten places?

Age structure and socio-economic development in Hungary

Introduction

Socioeconomic development and the age structure of a population are often linked together in the public discourse. It is generally accepted that in industrial societies the populations of more developed regions have both younger age structures and higher levels of education. Consequently, less developed regions or places have older age structures. In this study, we examine the evidence behind this general perception, and discuss the links between age structure and socioeconomic development. There are not very many studies devoted to this particular subject, and while regional development inequalities have a substantial literature, its relation to age structure is less extensively studied (Brunow & Hirte 2006, Voss 2007). One particular example is the case of Scotland (Lisenkova et al. 2010) where the authors examined the impact of age structure on economic development. Their conclusion was that positive net migration is needed to counterbalance the negative economic impact of an older age structure.

Scholars from various disciplines, such as sociology, regional economics, political science and anthropology often argue that regional inequalities do not decline, rather increase over time (Spéder 2002, Kulcsár 2009, Bódi 2010). In many countries, including Hungary, a significant portion of the population lives in lagging, or so called "forgotten" places (Lyson & Falk 1993, Ritter 2010). The age structures of these places, however, are not uniform. Some do experience aging in place and negative net migration, while others do not. Therefore, it is not entirely true that in less developed regions and places we can only find aging populations, while in more developed places the populations are always young and increasing due to migration.

Age structure, development and migration

Regional development and population

Most of the literature discussing the links between socioeconomic development and age structure argue that more developed regions or places have younger age structures, which in turn has a positive impact on human capital and the economic competitiveness of the location. It is also true that the migration destinations of younger age groups are usually the more developed regions (Lichter 1993, Brown 1993, Campbell et al. 1993). It has also been noted in the literature that smaller settlements in unfavourable geographic locations lose population. Since migration is age selective, it is the younger generations that leave to find better opportunities elsewhere further exacerbating the development

challenges of these places (Schwarzweller & Lean 1993, Beluszky & Sikos 2007). Some scholars called this the vicious cycle of decline (Cantrell 2005, Ritter 2010).

Lichter (1993) asked why the less skilled, unemployed, disadvantaged or minority populations are not more mobile. The answer is fairly complicated and includes various reasons. One is that the advantages of the move are not substantial enough compared to the effort and resources invested in it. Another reason is that the income differences between an old and a new job, as well as between a new job and social welfare are not that large. Therefore, poor and unskilled people could fall into the trap of selectively diminishing labour markets (Brown 1993). These segmented labour markets keep poor people in place and contribute to the increasing spatial concentration of poverty (Spéder 2002).

Contrary to the literature that sees a clear relation between economic potential, growth and age structure, some point out that development disparities are not fully explained by age structure (Nemes Nagy & Németh 2003). Brunow and Hirte (2006) arrived at the same conclusion. They argue that the impact of different age groups on economic development varies, and the most important predictor is in fact the combination of age structure and migration indicators. These findings challenge the common perception about the direct and clear link between development and age structure.

Regional development and migration

Migration is one of the most important indicators of regional socioeconomic inequalities. The most basic understanding of migration uses the push and pull factors to describe why people move (Lee 1966). This, however, is strongly contingent on various contextual factors determined by space (location) and the time period. For example, the mass urban immigration during the Industrial Revolution played out differently from the migration triggered by the industrial restructuring in the 20th century (Siddle 2000). The general perception dominated by the neoclassical economic explanations of migration behaviour is that the direction of mobility points from the less developed to the more developed regions based on labour market differences. However, this perception was challenged by several authors, describing various other motives and migration streams (Teaford 2008, Brown & Glasgow 2008).

Network theory and analysis focuses on social networks as key actors in migration streams (Kritz et al. 1992). These networks are linkages between origin and destination places, and not only help to overcome the intervening obstacles by diminishing risks, but also increase the volume of migration over time, by providing positive feedback for further migrants (Massey 1990). Migrants do not necessarily make their decision based on information about wage differences, but rather rely on informants and intermediate agents in the network to minimise risks associated with migration (Massey et al. 1993). Such networks also help the migrants to gain social capital, which is considered a key factor in migration decision-making (Donato et al. 1992). Eventually Philip Martin (1992) concluded that migration networks add a fundamental component to the understanding of migration, and that complementing the pull (demand) and push (supply) factors, networks serve as magnets and shelters.

In countries undergoing rapid economic transformation, rural to urban migration is the dominant stream during which regional inequalities increase as skilled migrants move to places that provide better opportunities for them. This has been demonstrated by examples from China (Pingzhong 2008) and Hungary (Spéder 2002). However, in many cases not only skilled and educated people participate in this migration stream. This mobility can also mean economic survival for some with fewer skills but still with some resources (Fassmann et al. 2009, Hatziprokopiou 2006). After the eastern enlargement of the European Union, some scholars have noted that both major motives are present in the migration streams from Eastern to Western Europe (Black et al. 2010).

The way in which scholars think about socioeconomic development is partly determined by their value orientation, which results in significant variations in empirical approaches. Moreover, the conceptualisation and operationalisation of development is also influenced by disciplinary vocabularies and practices. In some cases, economic indicators are used exclusively, while in others these are elaborated by infrastructural or human resource indicators. Additional challenges are created when these indicators are sometimes used as independent while at other times as dependent variables. Such examples include many of the demographic indicators that are both causes and consequences of socioeconomic changes (Faluvégi & Tipold 2007, Nagy 2011). Finally, the chosen indicators are open to political games, as the measurement of regional inequalities can be used to access development resources or making places ineligible for central development support.[1]

One particular method to measure development is to use composite indices that combine various aspects of social, economic and political conditions (Antony & Visweswara 2007, Elgar et al. 2011, Higgins & Campanera 2011, Mack & Grubesic 2012). However, the application of such indices, such as the Human Development Index (HDI) and Human Poverty Index (HPI) create some methodological problems. For example, Booysen (2002) argues that these can only be used as supplemental measures as they do not provide additional explanation beyond the original indicators, while at the same time are more exposed to political or ideological manipulations and the legitimisation of development agendas. This latter warning should be particularly important in the transforming societies of Eastern Europe.

Based on the literature, we can say that the age structure of a population relates to development or economic potential, but this association varies across historical periods or geographic locations that have different cultural characteristics. It is quite difficult to create a realistic assessment in the midst of simplifying stereotypes and significant methodological challenges. In this study, we examine this relationship using the example of Hungary. We will use indicators that are clear and accepted methods for analysing age structure and economic performance. Our goal was to create a typology that shows the dynamic linkages between age structure and economic development.

1 We would like to thank the comment of József Nemes Nagy who pointed this out.

Data and methods

In the analysis, we used the T-star database of the Hungarian Central Statistical Office (HCSO). The unit of analysis was the micro-region, which corresponds with the NUTS4/LAU1 level in the EU classification system. We used 173 micro-regions in the analysis, and excluded Budapest to minimize the bias related to the very different demographic and development indicators of the capital. To avoid the potential false conclusions from the bias of a snapshot, we used data from three years of observation points (2004, 2007, 2009).

The regional measurement of socioeconomic development is a complex task. The methodology of regional classification in Hungary has changed several times over the past years (Nagy 2011). The number of indicators fluctuated between 15 (1996) and 31 (2007), which shows considerable uncertainty. Among these indicators we can also find demographic, infrastructural and economic (level of services, density of entrepreneurship, unemployment etc.) ones. The increasing number of indicators however has not improved the reliability or validity of measurement, rather made it possible to introduce subjective factors in the classification system. The results of Nagy (2011) also demonstrated that it was the income per capita that had the strongest positive correlation with the complex development index. This opened up the possibility to use income per capita in our analysis as a single indicator of development. However, we felt that this would simplify the examined relationships. In addition, we decided not to employ any of the indicators of the constantly changing official methodology. Instead, we developed our own indicators that correspond with the literature while at the same time match our study goals better (the relation between age structure and economic development). The first step was to choose the basic variables we wanted to use (Table 1). All the selected variables have direct and clear connection to analysed indicators and there are no variables with unclear and indirect connection.

Table 1

Micro-regional indicators used in the analysis

Indicators	Variables
Age structure	Proportion of the population under 14 – 2004, 2007, 2009 Birth rates – 2004, 2007, 2009 Young dependency ratio – 2004, 2007, 2009
Regional economic development[a)]	Income per capita (In thousands HUF) – 2009 Number of enterprises per 1000 population – 2009 Unemployment ratio (number of unemployed/population aged 18–65) – 2009

a) Due to the changes in the data collection system, direct comparison across the time points is not possible. Therefore we only used the 2009 data.

In the next step, we used dimension reduction by principal component analysis to create the two fundamental indicators. The two components separated the variables while keeping the individual characteristics. The two factors explained 91.2 percent of the variance. The rotated component matrix is shown in Table 2.

Table 2

Rotated Component Matrix

Variables	Components	
	youth indicator	negative economic development
Population under 14, 2009	**0.971**	0.196
Population under 14, 2007	**0.950**	0.269
Birth rates, 2004	**0.933**	0.006
Young dependency ratio, 2009	**0.921**	0.350
Birth rates, 2007	**0.916**	–0.090
Population under 14, 2004	**0.916**	0.348
Birth rates, 2009	**0.897**	–0.104
Young dependency ratio, 2007	**0.890**	0.429
Young dependency ratio, 2004	**0.837**	0.515
Income per capita (1000 HUF), 2009	–0.109	**–0.938**
Number of enterprises per 1000 population, 2009	0.042	**–0.926**
Unemployment ratio (number of unemployed/population aged 18–65), 2009	0.332	**0.851**
Explained variance, %	*70.8*	*20.3*

The two components are clearly separated allowing a straightforward interpretation[2]. We took the quintiles of the principal components of each factor scores, and then we employed two additional analytical steps. First, we were looking for associations between the factor types and the various socioeconomic indicators. Second, using cluster analysis for the factor scores, we developed a micro-regional typology that indicates the association between age structure and economic development.

Results

Micro-regions with young populations

The results indicate that the micro-regions with the youngest populations are in four distinct regions in Hungary (Figure 1). The two largest contiguous areas are in the northeast part of the country, mostly in Borsod-Abaúj-Zemplén and Szabolcs-Szatmár-Bereg counties, as well as in the Budapest agglomeration area. Two other regions have typically young populations: one is in Baranya County by the River Dráva, and the other is in the central part of the northern Great Plains.

Underdeveloped micro-regions

The economic underdevelopment is the most profound in the north-eastern and south-Transdanubian parts of Hungary (Figure 2). This is not a surprise, as this fact is well known in the literature, but this validates our instrument and methodology. The interesting finding here is the overlap, or its lack thereof, between the two maps.

2 The KMO value was 0.888, while the Bartlett-test was significant at the 0.000 level.

Apparently, age structure and economic development are related positively in some cases and negatively in others.

Figure 1

Geographic distribution of micro-regions with young populations

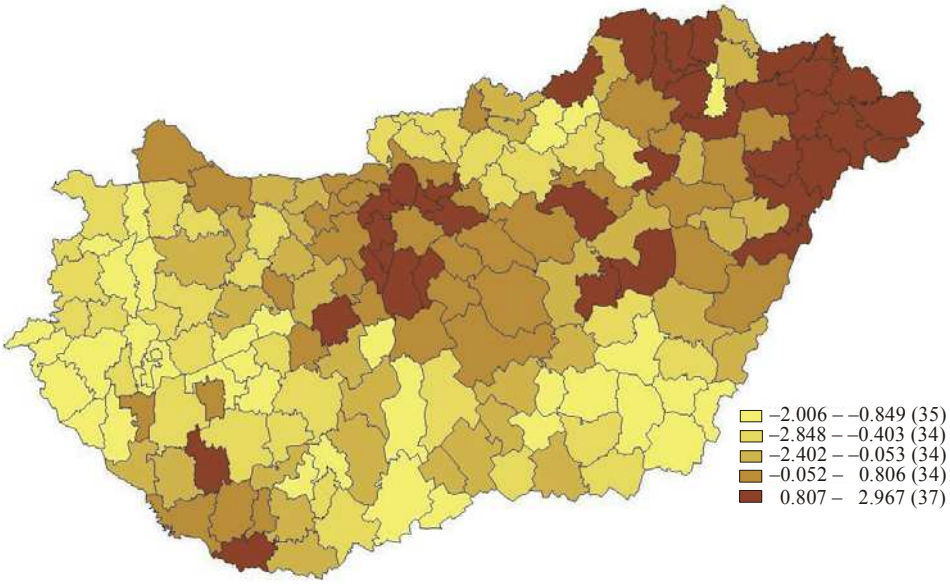
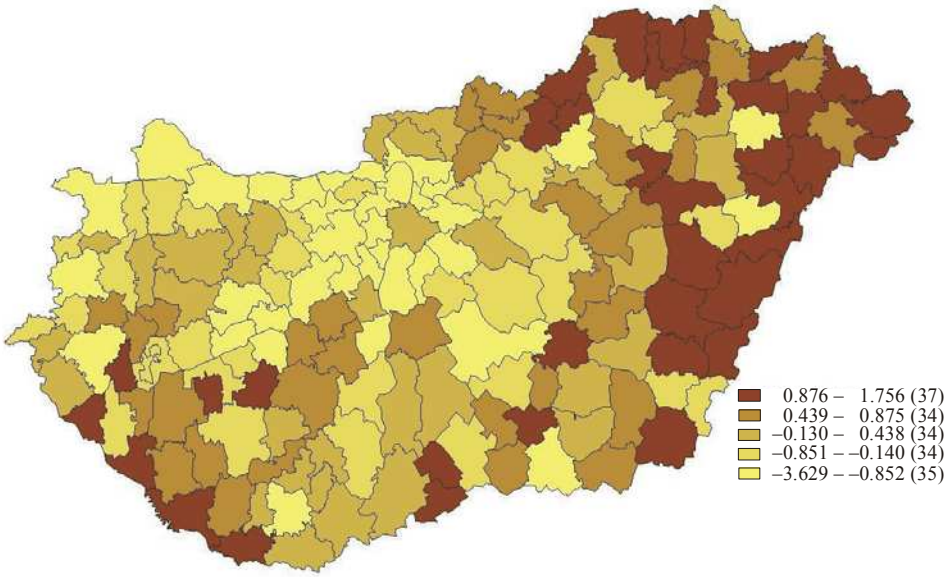


Figure 2

Geographic distribution of underdeveloped micro-regions

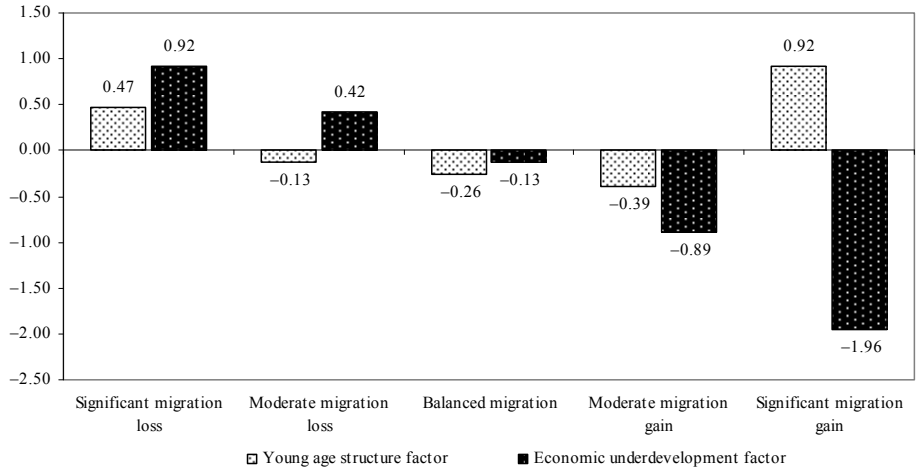


Age structure and migration

The question is whether there is any association between the age structure of the population and the migration dynamics, in other words whether areas with positive net migration indicators have younger populations. Generally, it can be said that less developed regions tend to lose populations, and these populations are disproportionately young given the age sensitivity of migration. Developed regions on the other hand experience positive net migration, however the local dynamics vary considerably. Figure 3 shows the association between migration and our two main factors.

Figure 3

Factor score means in micro regions with different migration balance



The results show that economic underdevelopment has a stronger association with migration than with the age structure. The economic underdevelopment factor's relation to migration is linear and changes to a negative direction (indicating economic development) as the migration loss turns into migration gain. The particularly interesting result, however, is that in the two extreme categories of migration (significant in- and significant outmigration) we can see the same young age structure. We need to note though that there is a large relative variance in the young population factor for those micro-regions that show significant migration loss (271.5%). while this variance is much smaller for those micro-regions that have significant migration gain (48.2%). This shows that micro-regions with substantial migration loss can have young and old age structures. Thus the analysis confirmed the lack of overlap in Figure 1 and 2.

Economic development and age structure: An experimental typology

Table 3 shows the association between age structure and economic development for the Hungarian micro-regions. About one-third of the micro regions (38.7%) do not show any characteristic feature in either dimension. in other words their age structure and economic development can be considered close to the average.

Table 3

The distribution of micro-regions based on the indicators in the two factors
N=173

(%)

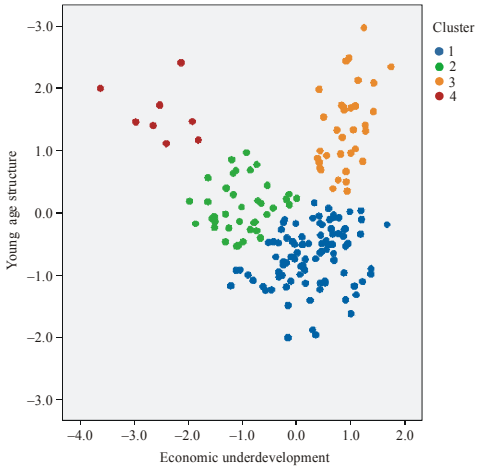
Economic underdevelopment	Young age structure			Total
	lowest, least young quintile	middle group	highest, youngest quintile	
Lowest, least underdeveloped quintile	2.3	12.7	5.8	20.8
Middle group	13.9	38.7	6.4	58.9
Highest, most underdeveloped quintile	4.0	7.5	8.7	20.2
Total	*20.2*	*59.0*	*20.8*	*100.0*

The 36 micro-regions that have the youngest age structures are quite different in terms of their economic development. Similar to this is the situation for those micro-regions (35) that are the least developed. Of these, only seven have old age structures. At the same time, 43 percent of the least developed micro-regions have relatively young age structures.

Table 3 shows that there are characteristic groups of micro-regions based on their age structure and economic development. However, such contingency tables are not suitable for creating typologies. To develop the typology of micro-regions based on these two factors, we used cluster analysis.[3] Based on this analysis, we can differentiate between four groups. Table 4 shows the scores of the cluster centres for the two factors, while Figure 4 shows the distribution of micro-regions along the two dimensions. As we can see on Figure 4, most of the micro-regions can be found by an axis indicating negative association between young age structure and economic underdevelopment. However, for a group of micro-regions (shown in yellow) this is not true.

Figure 4

The distribution of micro-regions in the space defined by the two factors



3 We chose the K-means cluster analysis which we ran for 3, 4 and 5 clusters. After interpreting the results, we decided to keep the 4 cluster variant.

Table 4

Final Cluster Centres

Factors	Cluster centres			
	1. ageing. average development	2. average age structure and developed	3. young and underdeveloped regions	4. young and developed regions
Young age structure	–0.695	0.096	1.359	1.593
Economic underdevelopment	0.281	–0.996	0.915	–2.508
Number of micro-regions in the cluster	92	38	35	8

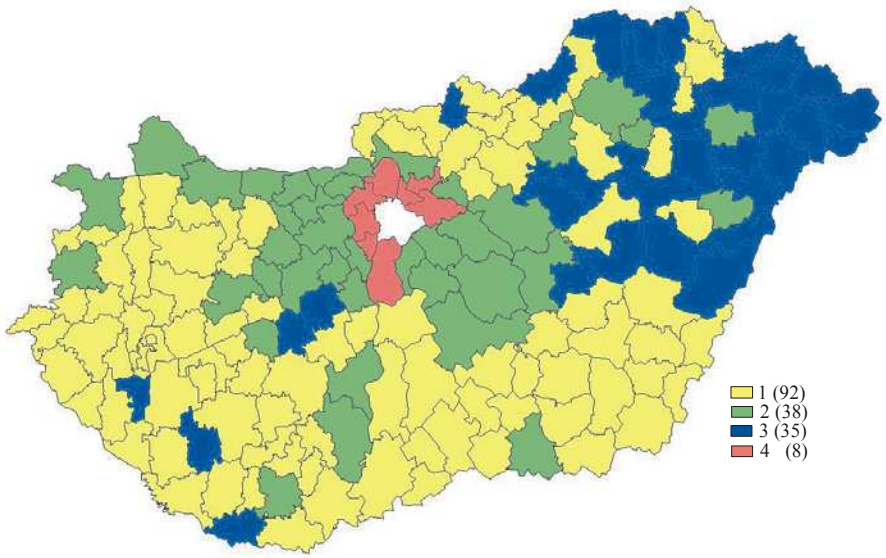
For our research purposes, the interesting cases are clusters 3 and 4. Those in the first and second clusters are typical in only one aspect. The first cluster has the ageing micro-regions that otherwise have average development indicators, while the second cluster includes micro-regions that have average age structures but are more developed than others.

According to our analysis, there are only eight micro-regions that have young age structures and at the same time are more developed than the rest. There are many more that have young age structures but could be considered underdeveloped. The latter do not fit to the general perceptions that we can find in the literature or the public discourse.

Figure 5 shows the geographic location of the four types of micro-regions. Those in cluster 4 are all located around Budapest. The young but underdeveloped micro-regions (cluster 3) are mostly in the northeast region of the country, where young age structure is not related to good economic conditions. The micro-regions with average age structure but higher than average economic development (cluster 2) are in the northern and western parts of Transdanubia, as well as in the outer rim of Budapest. The rest of the micro-regions (cluster 1) are the most common and are found in various regions of Hungary, especially in the south.

Figure 5

The geographic distribution of micro-regions in the four clusters



Age structure and ethnic composition

One important question to discuss is the extent of the impact of ethnic composition on the regional typology we developed. The ethnic component in such research has been suggested by Askins (2009), arguing that ethnic minority status can explain observed regional inequalities in social deprivation, poverty of economic disadvantages. Bajmóczy & Balogh (2002), and Ritter (2010) have also noted the association between demographic composition and ethnic status. The impact of ethnicity on economic underdevelopment was demonstrated by Bottlik (2008) who used the case of Bulgaria.

When discussing the ethnic composition in Hungary. most studies focus on the situation of the Roma. Unfortunately, there is relatively little reliable information about the social characteristics of the Roma, and some of the data are exposed to political subtexts as well. This lack of reliable information is particularly unfortunate given the significance of social problems, including poverty, discrimination and unemployment. The data we used for the Roma population comes from the 2001 census.[4] Table 5 shows the Roma population in the micro-region groups in the context of the two major study dimensions.

Table 5

Proportion of Roma population, 2001

(per thousand)

Factor score quintiles	Not typical 1. quintile	2. quintile	3. quintile	4. quintile	Very typical 5. quintile
Young age structure	12.4	18.0	17.3	20.0	45.4
Economic underdevelopment	8.9	19.0	20.8	43.0	52.5

Based on the results we can say that the proportion of Roma population is positively associated with both economic underdevelopment (from 9 to 52 per thousand) and young age structure (from 12 to 45 per thousand). There are considerable differences between the four clusters we identified earlier in the study. In the micro-regions around Budapest that have young age structure and developed local economies, the proportion of Roma population was 9.4‰ in 2001. In those two clusters that have micro-regions with average indicators, this proportion was around 20‰. However, in the micro-regions with young age structure but significant economic underdevelopment, the proportion of Roma in 2001 was 60.8‰. This ethnic composition is not a coincidence and provides considerable challenge for policy makers.

Conclusions

Age structure and economic development are clearly related. However, this association is often portrayed as a simple link between young age structure and good economic performance determined by positive net migration and the accumulation of human capital. As our research showed, the picture is more complex. Young age structure is not always equal with economic development.

4 The 2001 census underestimated the Roma population because of the census questionnaire methodology. According to the 2001 census data the Roma population is less than 200 thousand in Hungary. Almost all scholars estimated the Roma population more than 500 thousand. See Kemény (2005).

Young age structure can be a result of positive net migration. since migration is age-selective, or high fertility. In post-industrial societies fertility is generally low and does not vary much across sub-national regions, therefore migration is thought to be behind the age structure differences. The only exception is if a minority group with markedly different fertility dynamics is dominant in a given location. Since minority status is often associated with various indicators of disadvantages, young age structure in a dominant minority location can correlate with economic underdevelopment.

The Hungarian case was an example for this more complex relation, mediated by minority presence. The cluster analysis defined a set of micro-regions in the north-eastern part of the country that have young age structures while still considered economically disadvantaged. In these micro-regions, the percentage of the Roma population, the traditionally disadvantaged minority in Hungary, is higher than average. While association may or may not refer to causation, it seems that the two are causally related, which calls for additional research on the subject.

So what is the importance of all this for policy makers? All governments want to address regional economic inequalities. However, the ways in which these are defined vary and are exposed to political manipulation. It is important to revise and publicly discuss the indicators, and sometimes the most basic perceptions also have to be challenged. Understanding the local context of a seemingly universal association is the first step towards policies that can successfully address regional inequalities.

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Keywords: Age structure, economic development, migration, Roma, regional inequalities.

ZSÓFIA FÁBIÁN

The role of neighbourhood in the regional distribution of Europe

Introduction

The role of geographical space in social and economic research has gained more importance, resulting in the increasing significance of mathematical-statistical methods. In order to determine the cause and effect relationship more thoroughly, factors representing territories have also been taken into account. These numerical factors are called geographical parameters, and with their assistance the importance of proximity in the spatial division of society and economy is revealed.

It is important to mention that thematic maps are used to visually present the distribution, implying a connection between the geographical space and certain phenomenon. In comparison spatial inequality indicators are used to measure the level of and change in distribution, but neither of them provides information on the role of spatiality. In order to gain information on these factors we need more complex methods and geographical parameters.

The most common spatial variables are distance, neighbourhood, borders, and geographical latitude and longitude. From the above mentioned factors I am going to be concerned primarily with neighbourhood. The analysis of neighbouring relationships is one of the major issues today, as more and more cases have shown that the influence of neighbours should also be taken into consideration. Waldo Tobler's statement made in 1970 "everything is related to everything else, but closer things are more closely related" is considered to be the first law of geography (Tobler 1970).

Previous studies on the same subject also testify to the importance of the influence of neighbours on the differences in development in Europe (Ertur & Le Gallo 2000, Tóth 2003, Szabó 2006).

In my study I examine the extent to which neighbouring regions in Europe are similar to each other regarding their economic development; how the high and low values are distributed in a given region, and whether they are clustered or random. Both European and regional processes are examined, which allows the findings of the whole process to be interpreted more clearly.

Spatial autocorrelation

In order to define the role of neighbourhoods, different mathematical-statistical methods are applied (for example autocorrelation, autoregression), spatial autocorrelation being the most prevalent among these.

Spatial autocorrelation differs from basic autocorrelation, which seeks to find connections between two different variables regarding the "connection" itself, whereas the influence of the variable on the region including its surrounding areas is measured by spatial autocorrelation. Thus the possibility of finding a connection between the data of neighbours and the data of a region is investigated.

There are different methods for measuring spatial autocorrelation (Pearson's correlation, Moran's I, Geary's C). The most frequently used method is Moran's I. Moran's I (Moran 1950) tests for global spatial autocorrelation of continuous data. The main reason for its frequent use is that it makes calculation easier and provides information about individual regions with the assistance of a local variation of Moran's I, Local Moran I (Eff 2004).

The process of calculation is the following:

$$I = \frac{n}{\sum_{i=1}^{n}\sum_{j=1}^{n} W_{ij}} * \frac{\sum_{i=1}^{n}\sum_{j=1}^{n} W_{ij}(x_i - \bar{x})(x_j - \bar{x})}{\sum_{i=1}^{n}(x_i - \bar{x})^2},$$

where x_i and x_j are the data of regions, $\bar{x}$ is the mean of data, $(x_i - \bar{x})$ is the value of the region subtracted from the average of the data, W_{ij} is the element of the weight matrix, and N is the number of regions (Nemes Nagy 2005).

In this method the effect of proximity is represented with a weight matrix. A weight matrix is a matrix which contains the values 0 and 1 in the basic case. The value is 0 if there is no neighbourhood between two regions, and 1 if there is neighbourhood. The relationships among regions can be described in many different dimensions. The basic case is that adjacent regions are considered as a neighbourhood, while regions which are only connected with their vertex are disregarded. The neighbourhood could also be defined by considering its distance from something (Nemes Nagy 2009).

Depending on which factors are to be focused on, there is a possibility of weighting based on the different features of the neighbours. Weighting the distance is one of the approaches most widely used in order to emphasise the greater importance of nearer neighbours.

In a weight matrix there is a possibility to take neighbours with higher weight into consideration. This means weighting with distance. This distance is primarily defined between the centres of regions based on the assumption that if the centres of regions are located nearer each other, this induces closer interaction. Furthermore, there is also a possibility to weight the neighbourhood according to the length of the borders.

The value of Moran's I differs from the value of correlation (–1, +1) because it does not reach, only approaches these terminal values based on the number of the observation units. It could equal 0 if the number of regions was infinite.

$I > -1/(n-1)$, positive spatial autocorrelation,

$I = -1/(n-1)$, without spatial autocorrelation,

$I < -1/(n-1)$, negative spatial autocorrelation (Nemes Nagy 2005).

Positive spatial autocorrelation means that regions with similar values are more spatially clustered than could be caused by chance. Negative spatial autocorrelation is

when the neighbours have no similar values. Perfect negative spatial correlation is characterised by a chequerboard pattern of high and low values. If Moran's I approaches the value 0, this represents a lack of autocorrelation.

In this scenario, the distribution of data is random, which means that there is an equal likelihood of finding a territory with a lower or higher value next to a certain region.

Local Moran I enables accurate information to be obtained from the similarity or difference between regions and their neighbours.

The process of calculation is the following:

$$I_i = Z_i \sum_{j=1}^{n} W_{ij} Z_j,$$

where Z_i and Z_j are the standardised values of the observed areas (Nemes Nagy 2005).

By analysing Local Moran I it may be a problem that it does not have any definite values, and therefore the result cannot be compared to the terminal values. However, it can show where the neighbouring contacts are stronger and the similarity is more apparent as the higher the value is, the stronger the connection is. It should also be taken into consideration that Local Moran I values only provide information on the connection of adjacent geographical areas but not on real values. Therefore, it cannot be determined whether the similarity of neighbourhood is caused by low or high original values (Mészáros 2008).

Interpretation of the results in their original forms is not simple since it is complicated to reveal the coherence of the results. However, presenting them on a map contributes to an easier understanding as the map clearly shows both the homogeneous and the differing regions, while also allowing analysis based on their real location.

Furthermore, depicting the basic values on a map enables hot and cold spots to be distinguished. Hot spots mean geographical areas where strong neighbouring connections derive from high real values, while cold spots are areas where the strong neighbouring correlation is caused by low basic values (Mészáros 2008).

In addition, there is also a possibility to examine whether certain regions and their surroundings exceed average. To analyse this, a Moran scatter plot is used in order to compensate for the deficiencies of Local Moran I. The Moran scatter plot also allows the examination of whether the values clustering in space are high or low. Each point in the scatter plot represents a geographical area. The horizontal axis (x) shows the values of the observed areas, while on the vertical axis (y) there are the average values of the neighbouring areas observed; in other words the spatially lagged equivalent of the x variable.

Another significant requirement is that the scatter plot figure can only be created with a row-standardised matrix. The vertical axis should present the mean of the neighbours irrespective of the method of weighting geographical areas (Ertur & Le Gallo 2000).

According to the four quarters of the Moran scatter plot the following four groups can be determined, which describe the connection between the geographical areas and their surroundings.

– High–high (HH), the values of both the given geographical area and its neighbours are above average;

- High–low (HL), the value of the given geographical area is above average, while the value of its neighbours is below;
- Low–low (LL), the values of both the given geographical area and its neighbours are below average;
- Low–high (LH), the value of the given geographical area is below average, while the value of its neighbours is above.

The first and third quarters represent positive spatial autocorrelation, whereas the second and fourth quarters represent negative spatial autocorrelation.

The depiction of groups based on the Moran scatter plot is the easiest way of interpreting the phenomenon. The examination of the maps showing these groups helps determine the ways in which the geographical areas and their surroundings differ from average. On the other hand, they provide no information about the strength of similarity compared to the Local Moran I maps (Lim 2003).

Moreover, making a time-based comparison examines change, meaning whether the value of the given geographical areas and their surroundings differ from average. Accordingly, four types may be distinguished.

- Type 0: neither the given geographical area nor its neighbours change
- Type 1: only the given geographical area changes, its neighbours do not
- Type 2: the given geographical area does not change, only its neighbours do
- Type 3: both the given geographical area and its neighbours change

Therefore, the Moran's I variable is suitable to measure "global" spatial auto-correlation and Local Moran I shows the strength of spatial autocorrelation at a local level, while with the assistance of the Moran scatter plot the similarity of the given geographical areas and their neighbours can be examined and whether the similarity is caused by their low or high values.

The role of neighbourhood in the regional distribution of Europe

Previous research on economic development has shown the significance of neighbouring connections, whereas considering this at a European level the connection loosens (Ertur & Le Gallo 2000, Tóth 2003, Szabó 2006). Therefore, the question of how this has changed over recent years arises.

In this study, the spatial frame is Europe, and in particular the members of the European Union and certain other European countries – Norway, Switzerland and Croatia. The basic geographical areas are the NUTS 2 regions, which mean 277 regions in this case. The examined variable is GDP per capita by PPS. The period frame is 1995–2007. As regards the spatial frame, this is something new because the frame is broader than before. It includes all the member states after the last EU enlargement in 2007 as well as three other European countries which are significant for their neighbours. The change or the continuation of previously discovered processes can be examined with the help of the latest available data. The area analysed is henceforth referred to as Europe.

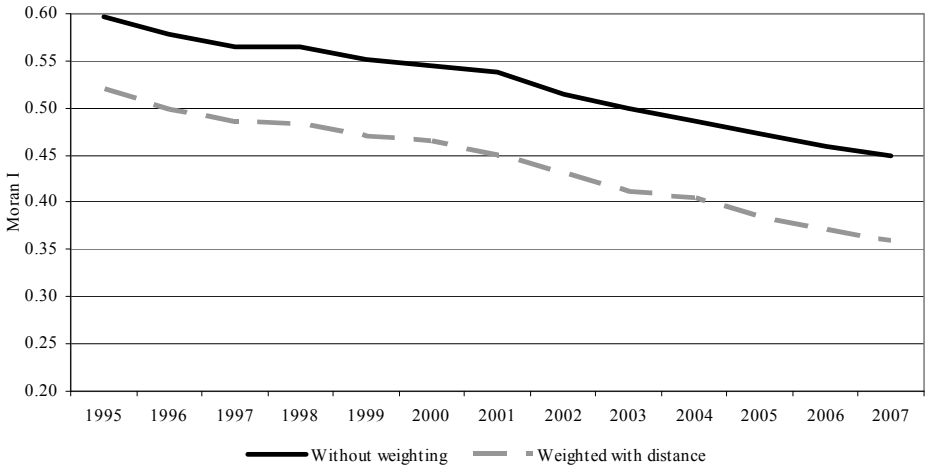
When establishing neighbouring connections, I considered geographical areas with any type of connection to be neighbours. To determine Moran's I values, I made calculations with a "basic" and distance-weighted matrix. For the Local Moran I

calculation, I used a row-standardised neighbourhood matrix in order to depict the Moran scatter plot.

After the calculations, I examined the results of Moran's I. The findings showed that the neighbouring connections are significant with regard to GDP per capita; neighbours have a stronger influence on each other and the values of the neighbouring geographical areas are more likely to be similar to each other than they are to geographical areas further away (Figure 1).

Figure 1

Local Moran I values regarding GDP per capita



Source: author's calculations.

My second observation is that the strength of neighbouring connections constantly degraded as regards the examined variable. This tendency is due to the prominent development of the central large city regions as these regions have better facilities and opportunities (a larger highly qualified workforce, good infrastructure, favourable investment opportunities), which enable them to improve faster than their surroundings. In this way their similarity to their neighbourhood is decreasing, a tendency which can be perceived throughout Europe (EC 2007).

Moran's I values and changes concerning GDP per capita confirmed that this previously revealed process is continuing (the strength of neighbouring connections is decreasing in Europe). However, this is in harmony with the result of certain studies which assert that at a European level the decrease of spatial inequality is determinative (Novák & Papdi 2007, Szabó 2008) as the spatial differentiation can be observed in several countries (Szabó 2008).

Comparing the results of the calculations made by the weight matrix, the two curves are almost parallel, and the Moran's I values are lower when weighted by distance (Figure 1). This differs slightly from the previous hypothesis which stated that the values should be higher when weighted by distance, supposing that proximity encourages similarity. In the case of Europe it is not surprising that this does not apply because much longer distances are involved here than is the case when considering a single country.

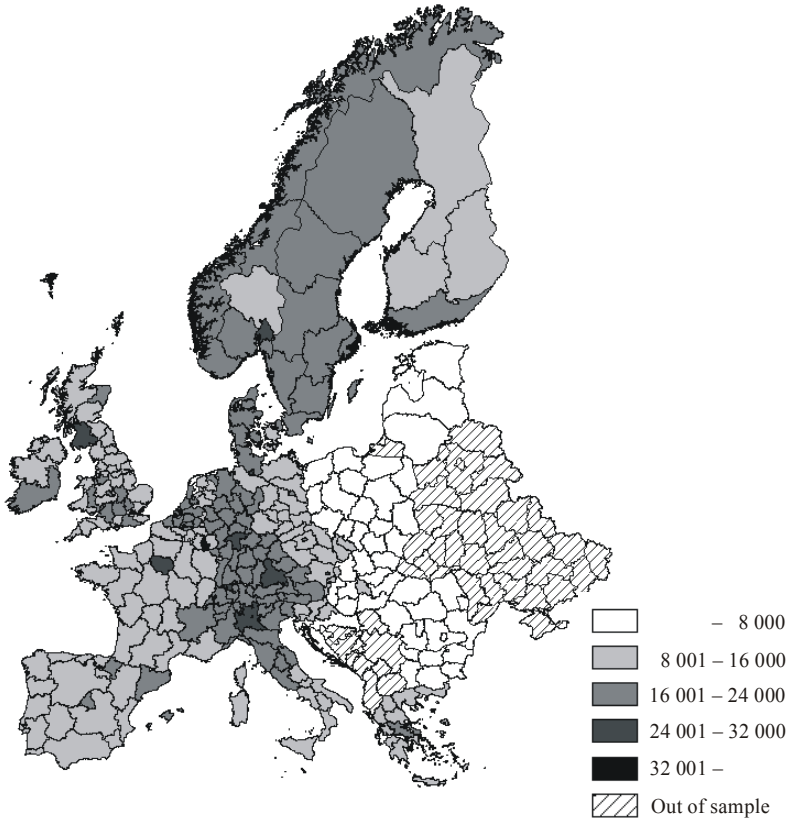
Due to the extent of the territory, its complexity and the variety of the relief, as well as representing the significance of the proximal regions on the basis of the distance between centres, it is possible for connections which are not important to be emphasised.

Turning to the analysis of Local Moran I, this can be best interpreted by depiction on a map, but in order to establish whether the similarity is caused by low or high basic values, we need to start with the depiction of GDP per capita values.

The regions located in the centre of Europe (the zone from Southern Germany to Northern Italy) had the most favourable values in 1995. In this respect, the regions of the countries which joined the EU in 2004 and 2007 were in the most unfavourable situation, except for Slovenia and the Czech Republic. In addition, it should be emphasised that the value of certain capital and urban regions exceeded that of their neighbours (Figure 2). Based on the Local Moran I values, the almost continuous area of Northern Italy, Switzerland and Southern Germany may be identified as a hot spot, and the zone extending from the Baltic countries to Bulgaria, as well as Portugal and Southern Spain may be considered as cold spots (Figure 3), meaning that between the regions situated in the centre of Europe there are strong neighbouring connections.

Figure 2

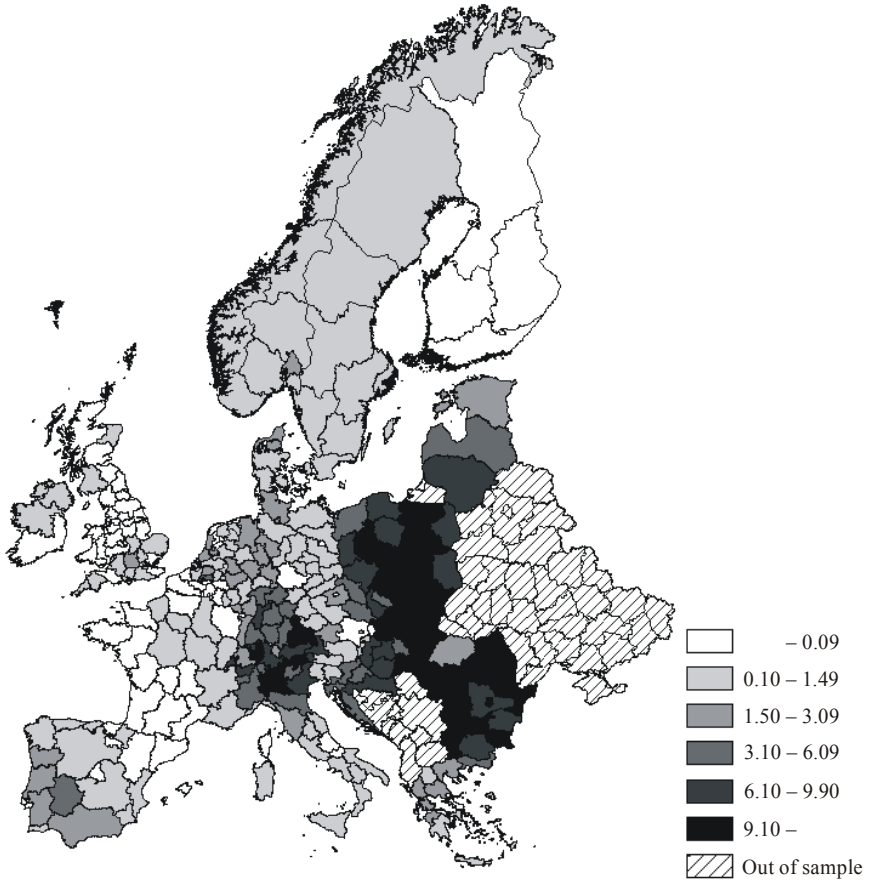
GDP per capita (PPS) in European regions in 1995



Source: author's calculations.

Figure 3

Local autocorrelation of GDP per capita in 1995 (Local Moran I values)



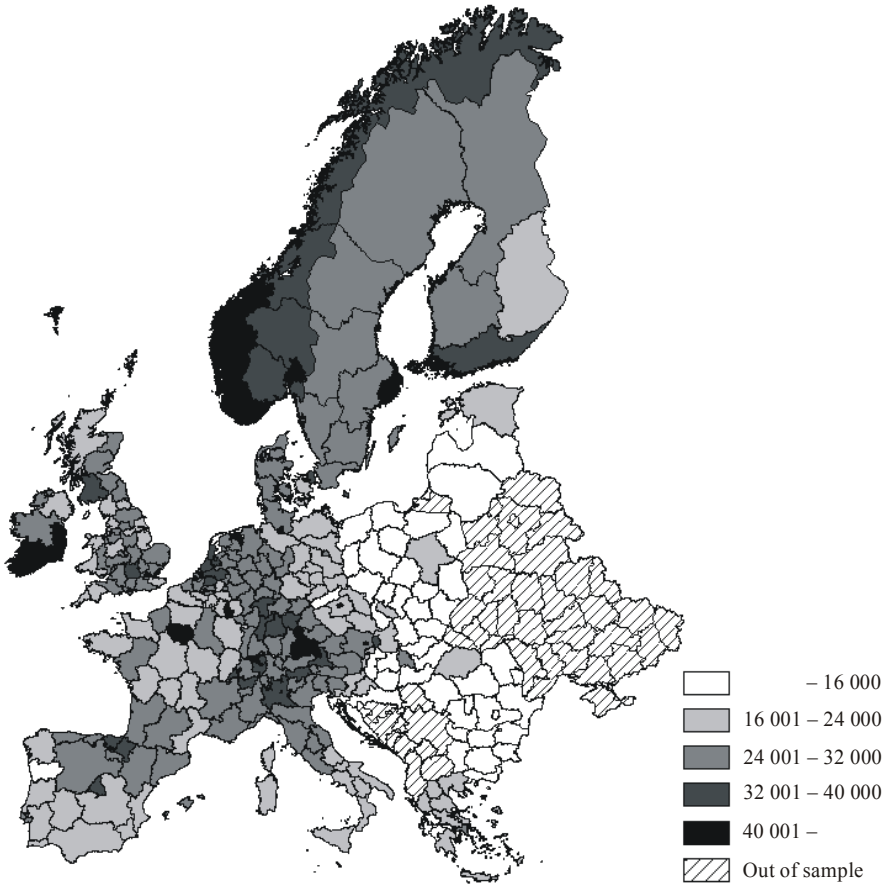
Source: author's calculations.

Similarly, the underdeveloped "East" represented strong neighbouring connections. Moreover, the zone extending from the Baltic countries to Bulgaria is the largest with the highest Local Moran I values along with the lowest GDP per capita values. The Portuguese and Southern Spanish spot is not so significant. In their case the neighbouring similarity is not so strong compared to the other two territories.

Turning to 2007, first it could be stated that polarised development took place compared to the initial year. According to GDP per capita in 2007, the Scandinavian values – among which primarily the Finnish region moved into a more favourable position – and the values of the Northern Spanish region were observed to have increased to a significant level. In a couple of regions in the newly acceded countries a remarkable development is noticeable. Divided development took place in the United Kingdom and France. In some regions of Greece there was a relapse (Figure 4).

Figure 4

GDP per capita (PPS) in European regions in 2007

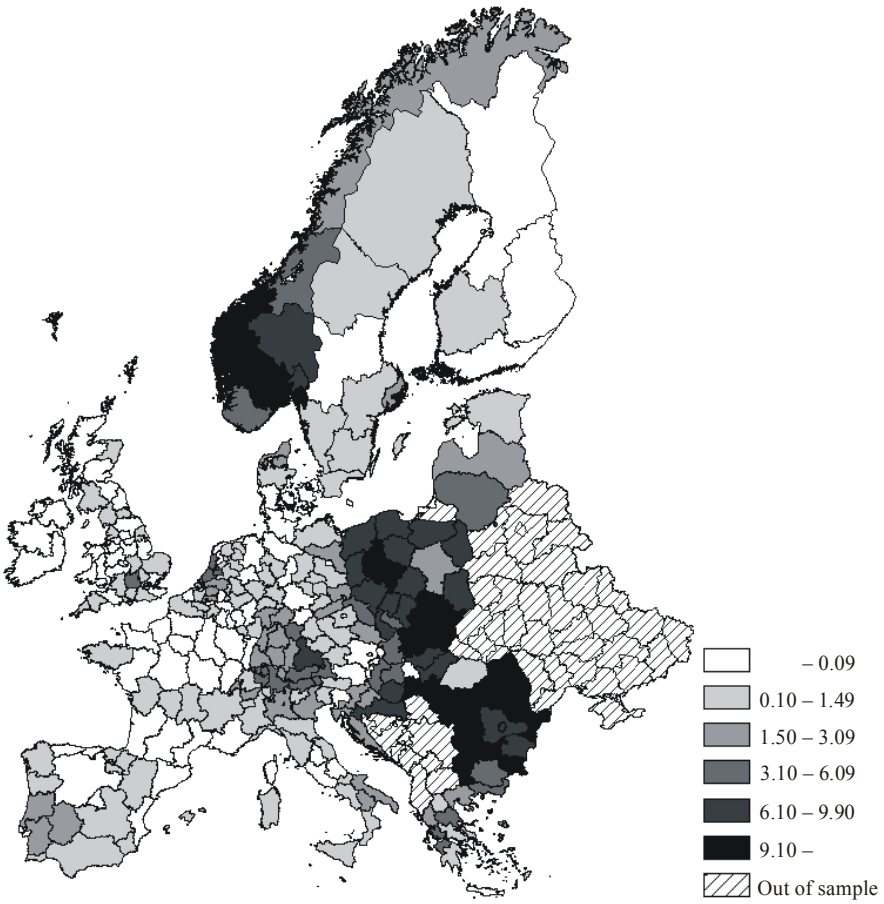


Source: author's calculations.

In terms of the Local Moran I, the picture has changed somewhat between 1995 and 2007 as Norway has appeared as a hot spot, while the German-Swiss-Italian spot has diminished. The Spanish-Portuguese cold spot faded, and similarities lost strength in the zone extending from the Baltic countries to Bulgaria (Figure 5). Due to the polarised development, the central regions of Europe proved to be less similar than in the early stages. In addition, the Southern Spanish and Portuguese zone cannot be referred to as a highly autocorrelated zone.

Figure 5

Local autocorrelation of GDP per capita in 2007 (Local Moran I values)



Source: author's calculations.

The decrease of spatial autocorrelation can be observed in the regions extending from the Baltic countries to Bulgaria. The main reason for this is the change of political system. With stable economic conditions, new ways emerged for the regions of Eastern and Central Europe to develop, which some regions were able to take advantage of.

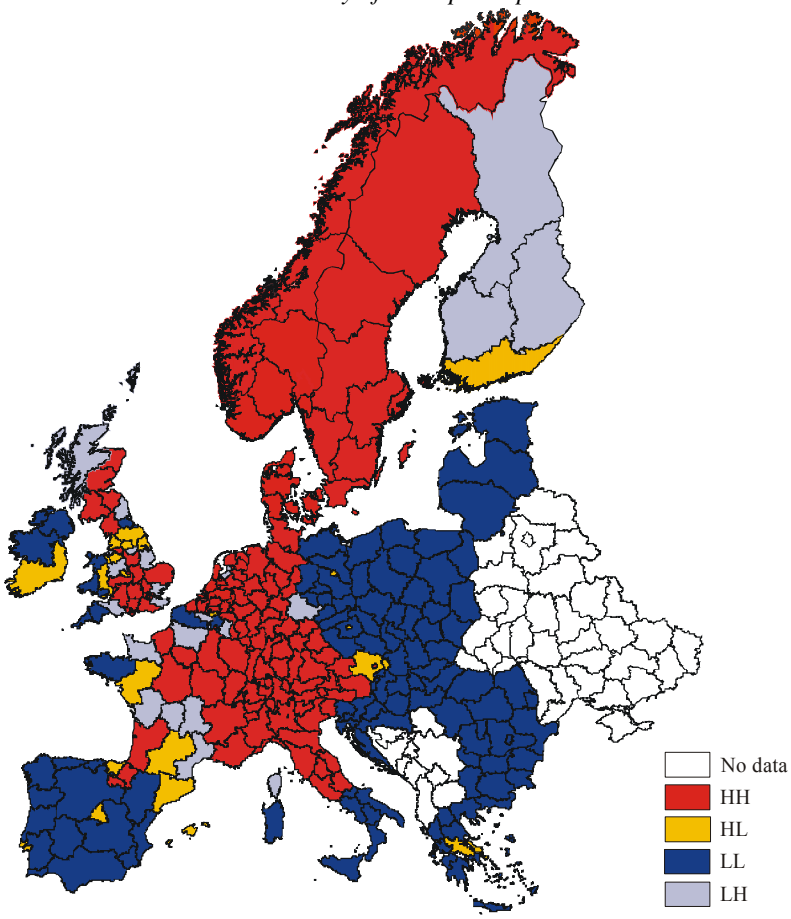
It is also worth mentioning that apart from one or two cases, the central regions had very low Local Moran I values since these territories exceed their neighbourhood in terms of GDP per capita value. Based on Local Moran I it is notable that in certain parts of Europe there were significant territorial differences in the mid 2000s.

After depicting the groups created by the Moran scatter plot, the following conclusions can be drawn. In 1995 the Southern European (Spanish, Portuguese, Southern Italian and Greek) regions were in an unfavourable situation (LL) in terms of GDP per capita as both the geographical area and its neighbours proved to be lower than average (Figure 6). Moreover, a broad continuous zone in an unfavourable position

extends through Eastern and Central Europe. Furthermore, this zone is far more extensive than is the case when examining the strength of neighbouring relations. This is because not only the regions extending from the Baltic countries to Bulgaria but also certain regions in Eastern Germany, the Czech Republic, Eastern Austria and Slovenia can be considered to have lower than average values. Areas where both the given geographical areas and their neighbours have above average values (HH) are Scandinavia (except for Finland), most of Germany, the Benelux countries, Northern Italy, Central and Eastern France, and large parts of Britain. All other areas have differing values in either direction (LH, HL).

Figure 6

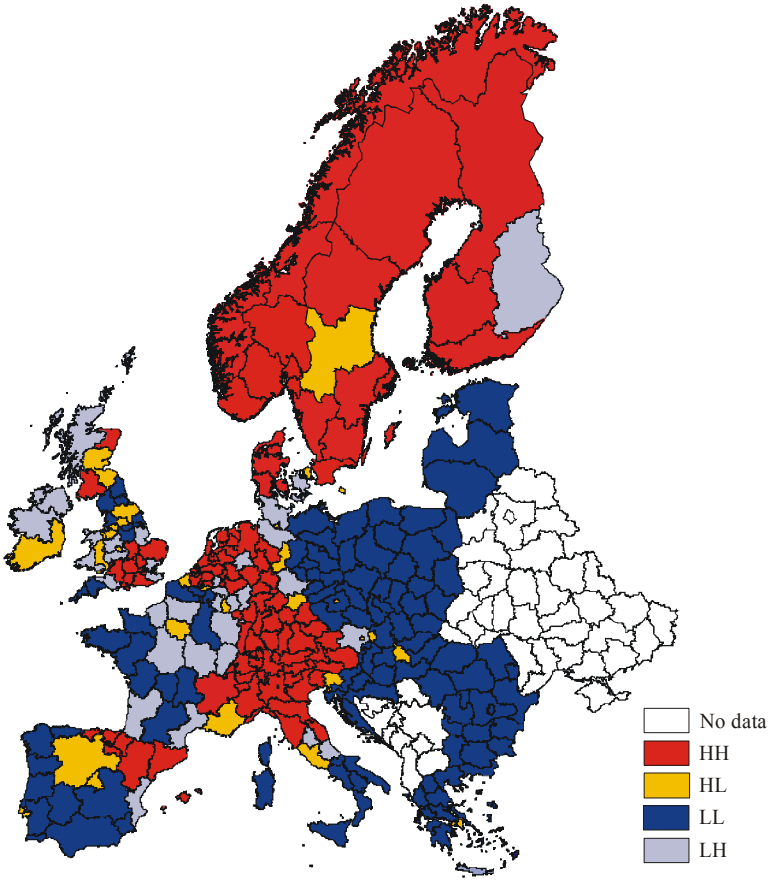
The local similarity of GDP per capita in 1995



Source: author's calculations.

Figure 7

The local similarity of GDP per capita in 2007



Source: author's calculations.

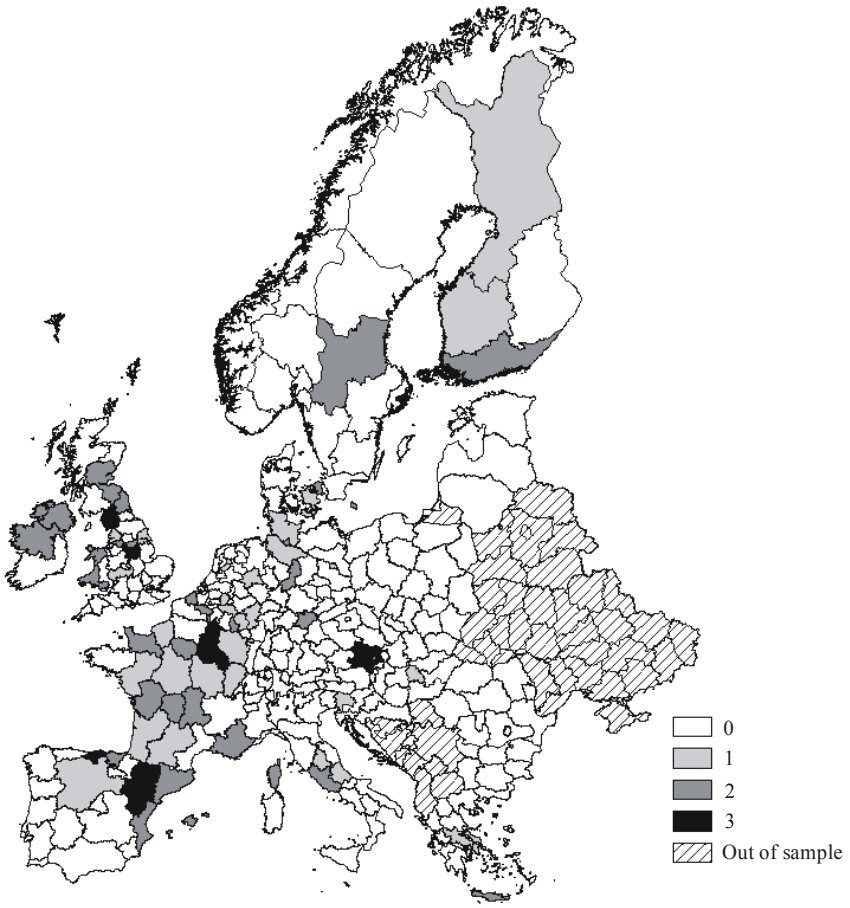
By 2007, the picture had become polarised (Figure 7) as far fewer continuous unicolour zones are represented. Only the unfavourable zone in Eastern and Central Europe remained at the same low level, while a decrease in continuous favourable and unfavourable regions is depicted everywhere else. Regarding the central regions of Europe, certain zones at a distance from the centre (Switzerland, Northern Italy) were exposed to a more unfavourable position and as a result now belong to the fourth group instead of the first. The value of the region is below average, while that of the neighbourhood exceeds average. A remarkable positive change can only be observed in the Northern Spanish and Finnish regions since they reached the level of their neighbourhood.

Comparing the results regarding time, a different classification method may be used to examine whether the values of the given geographical areas and their neighbours have changed compared to the average. Looking at the map depicting the change (Figure 8), it can be concluded that most of the regions included in the survey appear in the same

group of similarities as they belonged to in the initial year. In figures, only about one fourth of the 277 regions (67) were put into a different group. As regards spatial aspects, this change only characterises certain French, British, Irish, Northern Spanish, Finnish and German regions.

Figure 8

Change in local similarity concerning GDP per capita between 1995 and 2007



Source: author's calculations.

The result of categorisation based on the Moran scatter plot showed that the local similarity of GDP per capita decreased over the period examined.

Conclusions

Firstly, considering the process taking place in the whole continent, significant neighbouring connections can be observed according to GDP per capita based on the Moran scatter plot values. Between 1995 and 2007 spatial autocorrelation decreased

continuously. The reason for this was the remarkable development of the capital and urban regions.

Based on the results of the categorisation according to Local Moran I and the Moran scatter plot, in the period between the initial and final years of the survey it may be concluded that the extent of the great continuous areas and the interconnecting zones was reduced in the spatial structure of Europe. All in all, there was a shift towards a mosaic pattern.

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Keywords: Neighbourhood, spatial autocorrelation, European spatial inequalities.

GÉZA NOVÁK – TAMÁS VARSÁNYI

The transport situation in the Great Plain

Introduction

Today transport plays a crucial role in our socio-economic life. In the two regions which comprise the Great Plain transport as a sector constitutes a significant share of overall GDP (5%). Transport affects the competitiveness of regions and therefore the quality of life. Good transport stimulates company activities, attracts direct investment, improves purchasing and distribution, and enables the realisation of extra income through international trade. Good transportation infrastructure supports the development of rural areas and promotes the convergence of regions.

As a result of travelling between settlements or commuting, public transport fosters the mobility of the workforce. The quality of public transport affects employment and schooling in different geographical areas, and access to services which are limited in a given area.

This study analyses the transport situation in the Northern Great Plain and Southern Great Plain regions. (The two regions are referred to hereafter as the Great Plain.) The paper presents the structure and quality of the road system, and the accessibility by road of Hungarian settlements. Furthermore, we highlight the features of rail, air and waterway transport.

Road transport

The role of road transport is salient both in passenger and freight traffic. In Hungary road transport accounts for two thirds of total freight transport and 46% of interurban passenger traffic, and it is the main form of local transport as well.

The structure and density of the road network

Hungary's road network has a radial structure with Budapest as its centre, and this structure affects the road system in the Great Plain as well. The major axis of the road transport in the Great Plain consists of express roads and main roads that start in Budapest. Main Road 5 runs in parallel with the M5 motorway in the North-South direction, while the M3 motorway and Main Road 4 both cater for increasing volumes of traffic in the West-East direction. These express roads, motorways and main roads pass all the county seats of the Great Plain except one, Békéscsaba, which is connected to the regional road traffic by Main Roads 44 and 47.

The western border of the Great Plain is the river Danube and the shortage of river bridges limits the transport connections of the region. In 2000 there were only two bridges, and since 2008 four bridges (three road bridges, and one rail and road bridge)

have provided road connections between Bács-Kiskun county and Transdanubia. The opening of Szent László Bridge in Szekszárd in 2003 and Pentele Bridge in Dunaújváros in 2007 (as part of the planned M8 and M9 motorways) was principally intended to improve the quality of Hungary's transversal connections.

The river Tisza – as well as several watercourses – is a natural impediment to road traffic in the Great Plain. In 2008 ten bridges crossed the river Tisza in the Northern Great Plain region and seven bridges in the Southern Great Plain region. These bridges over the river Tisza are close to interconnection points near the county seats and in consequence cater for significant volumes of traffic.

One third of the 31 000 km long national road network lies in the Great Plain. The two regions of this area are ranked in first and second place in terms of the length of road network. The density of the road network is 28 km/100 km^2, which is below the national average (34 km/100 km^2). The relatively low level of this index is due to the specific structure of the settlements because there are relatively few extensive towns in the area.

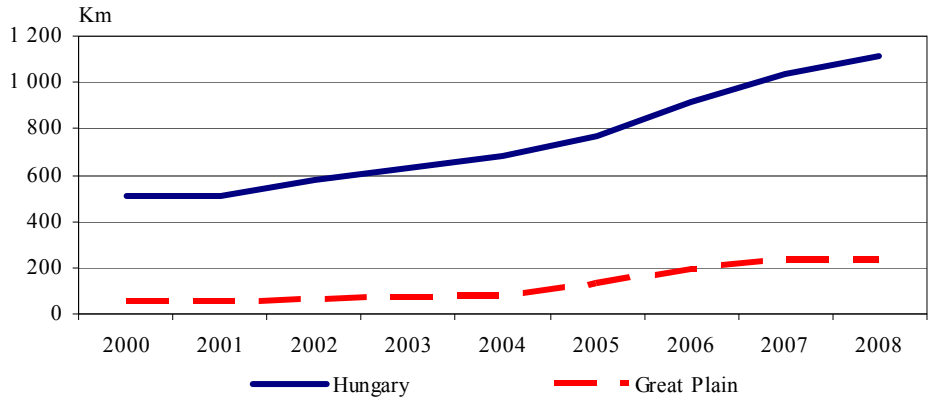
Between 2000 and 2008 the national road network underwent significant modernisation: total infrastructure was extended by 4% and the length of express roads was quadrupled. Despite the development of the area, the share of motorways and express roads in the Great Plain (2%) is 1 to 2 percentage points below the national average. The share of trunk and secondary main roads is 23% of the total road network. The remaining 75% of the network consists of other national public roads such as through-roads, access roads, roads to stations and slip roads.

In 2008, 235 km of Hungary's 1 116 km long express road network lay in the two regions of the Great Plain. The M5 motorway heading south-eastward from Budapest links the Southern Great Plain to the capital, and this road has been one of the most important connections of Western Europe to the Balkans since it was extended to reach the border crossing point at Röszke in 2006. In addition to Main Road 4, the Northern Great Plain is linked to Budapest by the M3 motorway. Between 2000 and 2008 a total of 617 km of express roads were opened to traffic in Hungary. 29% of these sections (179 km) are in the Great Plain, thus making Csongrád, Hajdú-Bihar and Szabolcs-Szatmár-Bereg counties accessible by motorway in addition to Bács-Kiskun county. The central position of Jász-Nagykun-Szolnok county and its proximity to the capital reduces the negative effect of the lack of motorways in this county. Among the counties of the Great Plain, Békés county's position can be considered the worst in terms of road transport.

The faster transit traffic of the settlements is restricted not only by the low proportion of express roads, but also by the shortage of ring roads around the primary cities. 17% of the main roads run within settlements, where the speed limit is usually lower and the traffic on these stretches generates more environmental pollution than in the interurban sections. The national public roads of the Great Plain are generally paved. The pavement of the surface of 91% of the network is asphalt, but in the Southern Great Plain the share of macadamized sections is significant (13%). The length of unmetalled roads was reduced by 22 km between 2000 and 2008, but 146 km remain unpaved. (Half of all unmetalled roads in Hungary lie in the Great Plain and a quarter of them can be found in Bács-Kiskun county.)

Figure 1

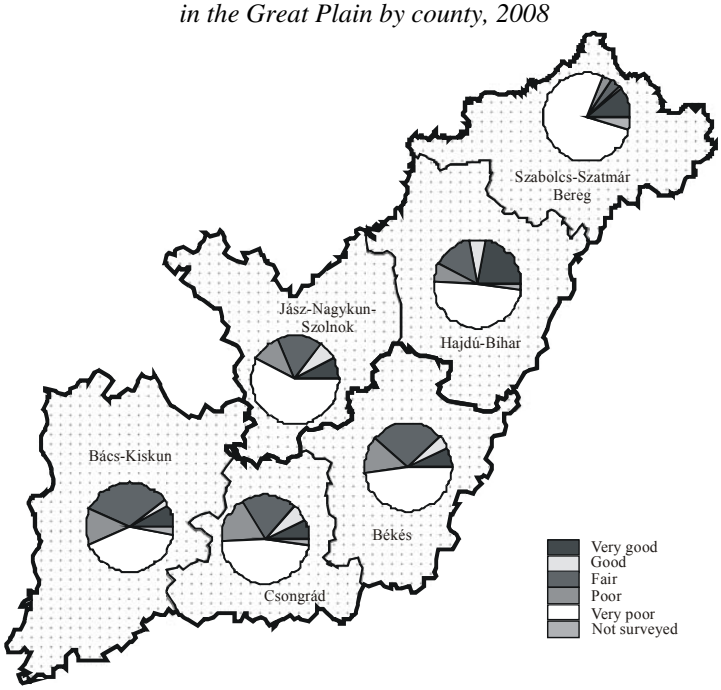
Length of express roads



The condition of national public roads is surveyed by the Hungarian Roads Management Company, and data on the main surface defects are collected from the following points of view: the condition of the pavement, the evenness of the surface and the load-bearing capacity of the road.

Figure 2

The condition of the pavement of national public roads in the Great Plain by county, 2008



Source: Hungarian Roads Management Company.

As regards the condition of the pavement (including potholes and other depressions in the road surface) in 2008, 64% (almost 6 500 km) of the Great Plain's road network did not meet specified requirements. A further 19% (2 000 km) was considered fair on the five-grade scale, while the proportion of good or very good units was 15% (1 500 km). (The remaining 2% was not surveyed.) These proportions vary considerably in the different counties of the Great Plain. The percentage of top-quality roads was the highest in Hajdú-Bihar at 22%, while in Szabolcs-Szatmár-Bereg the rate of very poor sections (76%) is well above average.

Evenness reflects the rutting of the road surface caused by the wheels of vehicles. In this respect 47% of the roads, about 3 100 km, were classified as better than fair, 13% belonged to the middle category and 37% of the network was poor or very poor in 2008.

In terms of load-bearing capacity, half of the area's national public roads are at least good, 10% are fair and 35% are below the acceptable level. (The survey did not cover 6% of the network.)

Within the whole network the main roads are in a better state of preservation as regards each of the aspects mentioned than the secondary roads, and over recent years the condition of the Great Plain's national public roads has not changed significantly.

Accessibility index

Among other factors, the retention of population and the economic development of a certain region or settlement can be influenced by its accessibility by road. Better accessibility contributes to competitiveness and attracts direct investments, thereby creating jobs. This accessibility is mostly determined by the distance between the settlements and the central towns of an area, as well as by the proximity of express roads.

At micro-regional level, the average accessibility time between a settlement and its micro-regional centre is expressed by the indicator of accessibility on weekdays. (The accessibility indices are based on time and not distance.) Because of the low number of crossing points, the Danube is a sharp dividing line in both a social and economic sense. Moreover, Bács-Kiskun county, which is bordered by the river, has a special settlement structure with scattered farmsteads, thus the western part of the county can be regarded as an especially isolated area in terms of the indicator of accessibility on weekdays. On the other hand, the north-eastern frontier corner of Szabolcs-Szatmár-Bereg county is also difficult to reach in consequence of the lack of transport infrastructure and the unsuitable standards of the existing roads. Within these two areas of the Great Plain the accessibility circumstances are especially unfavourable in the Bácsalmás and the Fehérgyarmat micro-regions, where the index is the highest not only in the Great Plain but nationwide. At the same time, among the micro-regions with a county seat the Debrecen, Békéscsaba, Nyíregyháza and Szeged micro-regions are ranked in the first ten in Hungary. Furthermore, the average accessibility time in the Szolnok and Kecskemét micro-regions is also less than 10 minutes.

Figure 3

Indicator of accessibility on weekdays, 2007

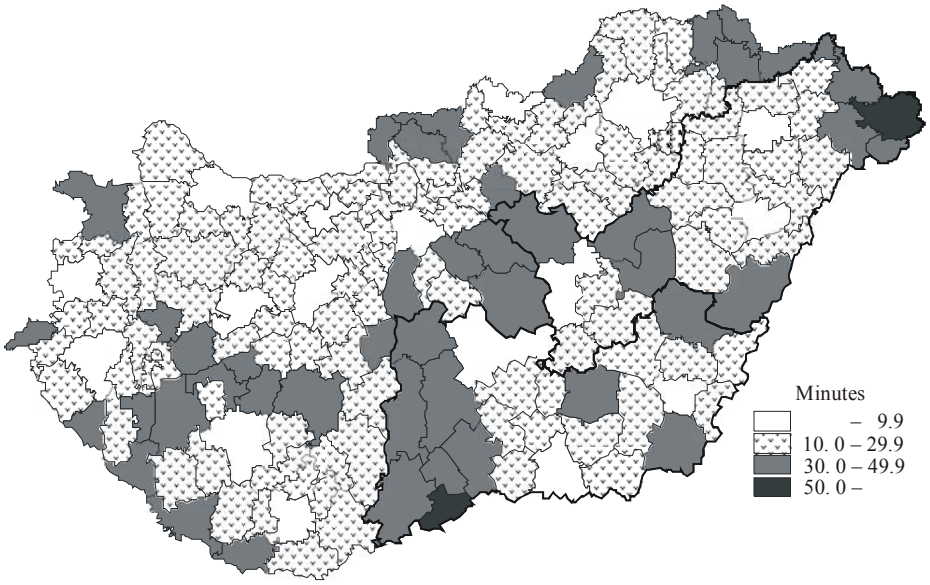
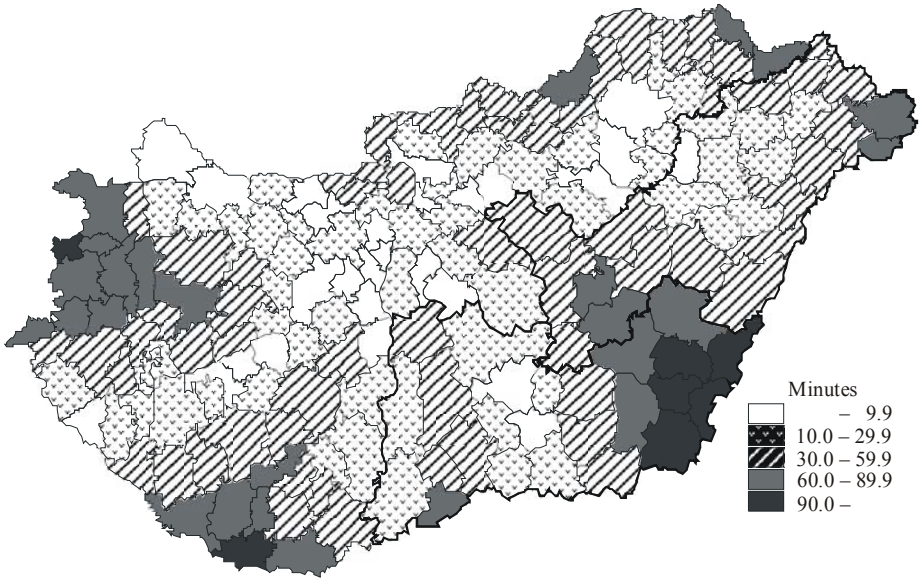


Figure 4

Indicator of accessibility to express road junction, 2007



Concerning the indicator of accessibility to express road junctions, the situation of the micro-regions lying along the motorways is the most favourable. From the settlements of

the micro-regions of Polgár, Kiskunfélegyháza and Kistelek it takes less than 10 minutes on average to reach the closest motorway. Furthermore, seven other micro-regions (Kecskemét, Debrecen, Szeged, Nyíregyháza, Hajdúböszörmény, Nagykálló and Hajdúszoboszló) are situated within 15 minutes of the high-speed road network.

On the other hand, it takes more than one and a half hours to get onto an express road from five micro-regions which have no motorways in Békés county.

Bus and coach transport

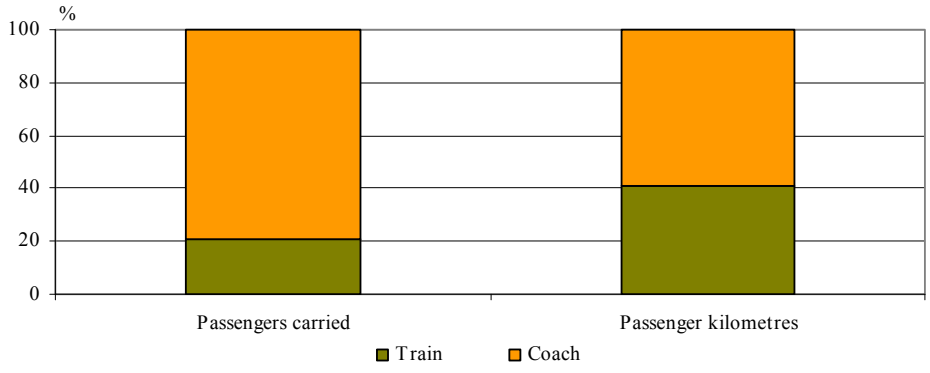
In Hungary the role of public transport in travel is more important than in the EU generally. The average of the 27 member states in 2007 shows that cars had a huge share (83%) in passenger transport, while the proportions of rail and scheduled road transport were much lower at 7% and 10% respectively. In Hungary the share of cars is 62%, and the importance of trains and coaches is higher than the community average (13% and 25%). We have analysed the features of bus and coach services on the basis of data provided by enterprises with 50 or more employees.

In Hungary most of the passengers who used scheduled interurban transport preferred coach travel to other forms of public transport. (In 2008 eight-tenths of passengers chose to go by coach.) In the breakdown of interurban passenger transport – expressed in passenger kilometres[1] – buses are relatively more important in short-distance travel, while over longer distances rail transport comes to the fore. The average distance travelled by bus was 22 km in 2008 compared to an average distance travelled by train of 57 km.

In 2008 the scheduled internal passenger transport of the Great Plain was operated by 7 Volán coach transport companies, and their long-distance coach lines reached every settlement in the area. A decade ago the service was incomplete as some villages in the Northern Great Plain – namely Fényeslitke, Komoró, Tiszagyulaháza and Újtikos – did not have a bus station.

Figure 5

Breakdown of interurban passenger transport by main service providers in Hungary, 2008

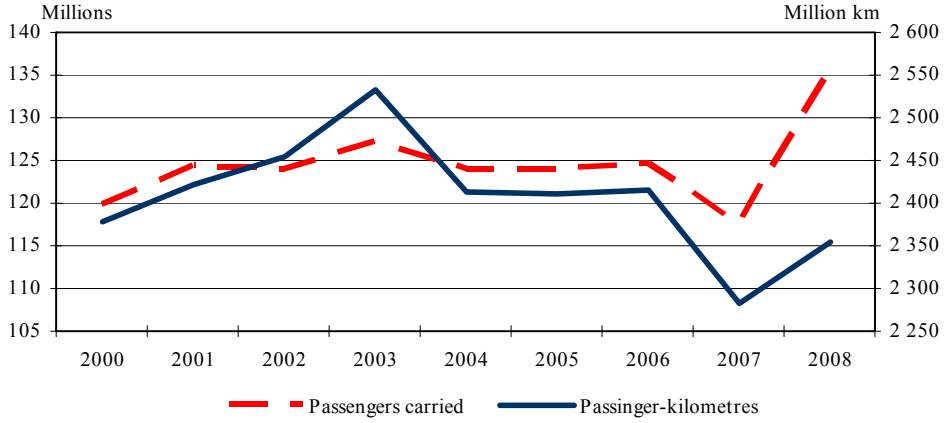


1 One passenger kilometre: the carriage of one passenger over a distance of one kilometre.

Among the main towns of the Great Plain counties, Kecskemét, which is closest to Budapest, has the most return coach services to the capital, 39 per day. Szeged is connected to the capital city by 8 return coach services each day, Szolnok and Békéscsaba by 2 each, and Nyíregyháza by only one. Scheduled coach services are becoming less and less important or are not available in towns served by train, which is faster and more comfortable. Such a town is, for instance, Nyíregyháza, mentioned above, or Debrecen, situated on the same train line with considerable international traffic. The latter does not have a through coach service connection to Budapest.

Figure 6

Trends of interurban coach transport in the Great Plain



In 2008, 135.6 million passengers were carried by long-distance coaches in the two regions of the Great Plain. This represents a considerable increase (13%) compared to 2000, which can be attributed to the performance of only two counties in the area. In Csongrád county and in Hajdú-Bihar county the number of passengers carried was 70% and 15% higher than eight years beforehand respectively. In parallel with the rising number of passengers, passenger kilometres also increased until 2003, but then fell almost continuously until 2007. In 2008 scheduled interurban passenger transport showed a slight year-on-year increase of 2% in passenger kilometres and a rise of 15% in the number of passengers, thus mostly passengers travelling shorter distances returned to coach services.

As regards international passenger traffic, trains are preferred to coaches because they are more comfortable and less tiring over long distances. For this reason international services by the coach lines of the Great Plain are very rare, even to neighbouring countries. The county seats of the Great Plain are connected by regular coach lines to only a few larger towns in Romania and Serbia. This means that only 1 or 2 coaches run on some days of the week. Szeged has the most “external connections”, followed by Kecskemét with far fewer external coach lines, whereas the other county seats (Szolnok, Debrecen, Nyíregyháza and Békéscsaba) are located along international railway lines. This explains why their external coach transport is insignificant, especially in view of the number of international railway services connecting these cities.

Bus services play a dominant role in local public transport. In the two regions of the Great Plain tram and trolleybus lines can only be found in Debrecen and Szeged. Excluding these cities local public transport is provided entirely by bus. In 2008 just over one third of all towns in the country had a local bus transport network. The rate was higher than average in the Southern Great Plain and lower than average in the Northern Great Plain. Of the 112 towns of the Great Plain, 32 municipalities ran local buses, 14 in the Northern Great Plain and the other 18 in the Southern Great Plain. Since 2000 the number of settlements with a local bus transport network has risen significantly. Huge differences can be observed between the counties. In 2008 in most of the counties more settlements had a local public transport network than 8 years earlier, but 3 settlements in Szabolcs-Szatmár-Bereg county stopped providing local public transport during this period, thus in 2008 passengers in this county were served by local buses only in the county seat.

The importance of public transport within settlements has been forced into the background in parallel with the growing number of cars and increasing transport fares. Accordingly, the number of passengers using local bus transport in the Great Plain fell by one fifth in the period examined. (In the whole country the decrease was smaller, 17%.) The total of 260 million passengers transported in 2008 was down almost 63 million compared to 2000.

Figure 7

Settlements with a local public bus network in the Great Plain, 2008

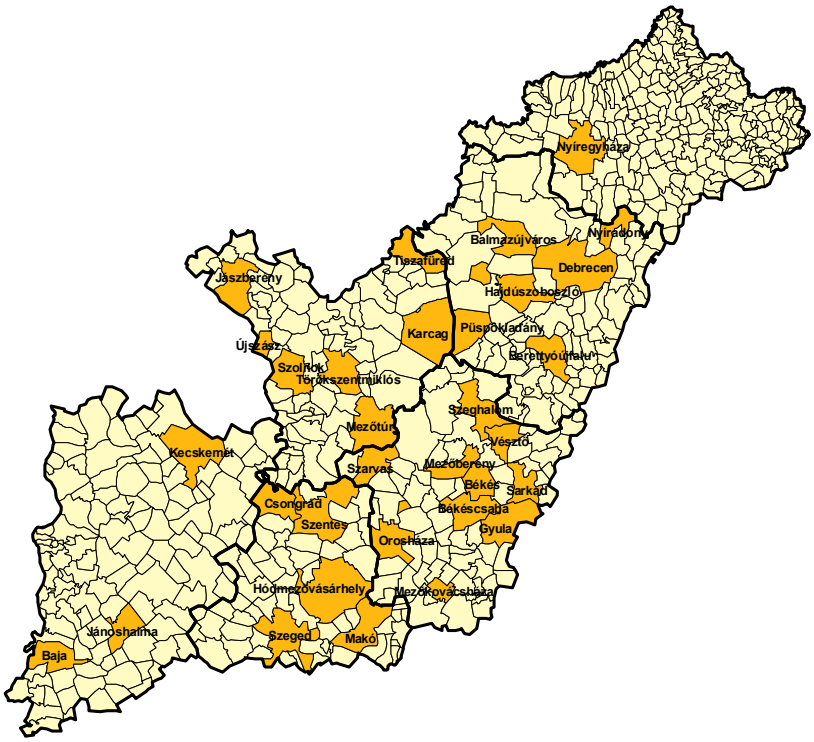
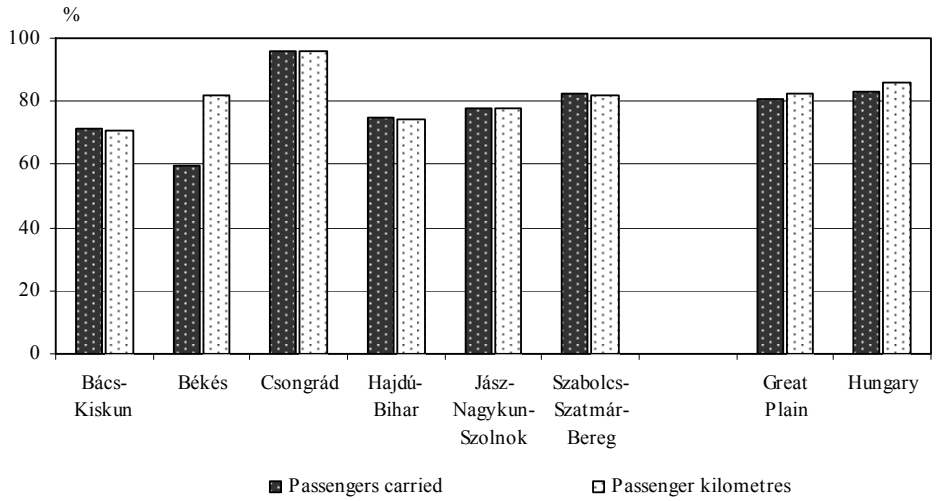


Figure 8

Passengers and passenger kilometres of the local bus networks, 2008 (2000=100%)



The decrease in the number of passengers was larger in every county (except for Csongrád) than in the whole country. In 2008 in the Great Plain 711 000 passengers travelled by local bus each day on average, Csongrád county having the highest average (230 000 passengers/day) and Békés county the lowest (34 000 passengers/day).

Between 2000 and 2008 the output of the local bus transport in the Great Plain measured in passenger kilometres fell by more than the national average, by nearly 18% to 978 million passenger kilometres. Similarly to the number of passengers, this decrease was higher in every county of the Great Plain (except Csongrád) than the national average.

In 2008 local bus services in the Great Plain covered a total distance of 1 140 km, more than the quarter of the whole country's network. This represents an increase in the area of almost one tenth compared to 2000. This growth did not occur in every county. In Hajdú-Bihar and Bács-Kiskun counties the length of the network was extended significantly (by four tenths and more than one quarter respectively), while in Szabolcs-Szatmár-Bereg and Jász-Nagykun-Szolnok counties the network was shortened considerably.

594 vehicles were used to provide local bus services in the Great Plain in 2008, up by just 2% compared to 2000. Local buses ran on 306 urban routes with a total length of 2 400 km. During the period examined, the number of the routes decreased slightly, but their length increased by almost 120 km. While some route modifications and discontinuations aimed to eliminate parallelism, in most cases they resulted in more restricted services. Szabolcs-Szatmár-Bereg and Jász-Nagykun-Szolnok counties, where both the number of urban routes and their length decreased significantly, were particularly affected.

Local fixed track transport

In Hungary, the inhabitants of more than 100 settlements can travel by local public bus, but tramlines run in only four cities and trolleybus transport operates in only three cities. Two of these cities are regional centres of the Great Plain, Debrecen and Szeged. In both cities the tram network was completed in the early 1960s. The closure of tramlines started in Debrecen in the first half of the 1970s and even earlier in Szeged, in the second half of the 1960s. The last closures were made in Debrecen in 1975 and in Szeged in 1977. The role of the closed tramlines was taken over by buses and later some were replaced by trolleybuses. The reconstruction of tram transport started two decades later, essentially after the millennium. Today there is only one 8.8 km long line in Debrecen. In Szeged, where there were fewer cuts, there are four lines with a total length of 24.5 km.

Neither the tram network nor the rolling stock was developed for a long time. The reconstruction of the tram network only started a few years ago, when rails were updated, the old tramcars were changed and the Szeged network was enlarged, the length of lines increasing by 7 km and the length of urban routes[2] expanding by 16% compared to 2000.

Table 1

Lines and urban routes of fixed track transport, 2008

Length and routes	Debrecen		Szeged	
	tram	trolleybus	tram	trolleybus
Length of lines (constructed length), kilometre	5.6	12.2	16.3	26.7
Length of rails, kilometre	10.5	–	24.8	–
Number of urban routes	1	3	4	4
Length of urban route, kilometre	8.8	27.5	24.5	22.5

Trolleybuses have been running in Szeged since 1979 and in Debrecen since 1985. Since then, many modifications have been made to local trolleybus transport as well. In 2008 there were 3 trolleybus routes connecting different parts of the cities in Debrecen and 4 routes in Szeged with respective lengths of 27.5 and 22.5 km. Trolleybus transport was expanded in both cities compared to 2000. The level of development was greater in Debrecen in terms of urban routes (about 70%) and in Szeged in terms of lines (over 100%). In Debrecen the renewal of the trolleybus stock saw the introduction of 2-axled, partly or totally low-floor Ganz Transelektro vehicles. In Szeged articulated Ikarus vehicles and Soviet trolleybuses in service since the first half of the 1990s are gradually being replaced by used Czechoslovakian Skoda trolleybuses. Today most of the trolleybuses are of that type, but a few of the older vehicles can still be seen on the streets of the city.

2 The length of urban routes differs from the length of lines if a section of line is used by more than one route. Such sections are multiplied by the number of routes using it.

Table 2

Stock of trams and trolleybuses, 2008

Stock of vehicles	Debrecen		Szeged	
	vehicles			
	number	capacity, person	number	capacity, person
Tram total	21	3 259	43	5 467
Of which: railcar	2	203	16	1 732
articulated car	19	3 056	25	3 535
trailer	–	–	2	200
Trolleybus total	33	2 827	42	4 477
Of which: articulated	4	452	22	2 892

Experience and passenger counts both confirm that demand for local public transport services have decreased in recent years. This is particularly true of tram transport. In 2008 nearly 19 million passengers travelled by tram in Debrecen and 14 million in Szeged, 25% and 11% less than at the beginning of the decade respectively.

Table 3

Output of local tram and trolleybus transport, 2008

Number	Debrecen		Szeged	
	absolute value, thousand	2000=100.0	absolute value, thousand	2000=100.0
	Tram			
Number of passengers	18 903	74.7	13 948	89.1
Passenger kilometre	43 480	74.8	33 399	100.1
	Trolleybus			
Number of passengers	13 125	89.7	17 552	114.7
Passenger kilometre	39 111	89.7	42 712	119.6

There was not such a pronounced decline in trolleybus transport and indeed in Szeged there was quite an appreciable rise due to network development, with the output calculated in passenger kilometres showing a marked increase. Nonetheless, the changes in tram and trolleybus transport did not cause any substantial realignment in the use of public transport types (including buses) between 2000 and 2008. The respective rates of use of tram, trolleybus and bus services among the average number of passengers per day calculated over 9 years were 17%, 11% and 72% in Debrecen (376 000 passengers per day), and 12%, 16% and 72% in Szeged (324 000 passengers per day).

Trams are used for short journeys, which explains the smaller share of trams in terms of passenger kilometres, i.e. 12% in Debrecen and 8% in Szeged.

Until recently, local public transport in both cities was organised by two companies, a municipally owned transport company overseeing tram and trolleybus transport (DKV in Debrecen and SZKT in Szeged), and Hajdú Volán in Debrecen and Tisza Volán in Szeged providing bus transport. This remains the situation in Szeged, but in Debrecen the DKV took over all types of local public transport in July 2009.

The local transport companies of both cities have decided to make major developments in tram transport. After the renovation of the existing line in Debrecen, a totally new second line is going to be constructed, and in Szeged line 2 will be extended by a new section.

Railway transport

In 2008, 18% of goods and 32% of interurban passengers in Hungary were transported by train. This means that the role of railway transport was around the EU-27 average for freight and above average for passenger transport.

Hungary's main railway lines, like its public road network, connect the capital city with county seats. Four main lines provide the frame of the railway network of the Great Plain. These are the Budapest–Szolnok–Debrecen–Nyíregyháza–Záhony, the Budapest–Szolnok–Békéscsaba–Lőkösháza, the Budapest–Kunszentmiklós–Kelebia and the Cegléd –Kecskemét–Szeged international lines.

In 2008 the length of operating railway lines in the Great Plain was 2 900 km, and the density rate of the network (80 km/1 000 km²) marginally exceeded the national average (78 km/1 000 km²). In this region the density of the network was the highest in Szabolcs-Szatmár-Bereg county (96 km/1 000 km²) and the lowest in Bács-Kiskun county (70 km/1 000 km²).

The rate of electric railway lines (27%) is lower than the national average (36%). 57% of the electrified sections are concentrated in areas neighbouring on Central Hungary, in Jász-Nagykun-Szolnok and Bács-Kiskun counties. These areas have longer stretches of main line tracks.

Table 4

Length of operating railway lines, 2008

(kilometre)

County, region	Length of lines	Of which		
		electrified	simple track	double or multiple track
Bács-Kiskun	591	204	564	27
Békés	437	79	399	38
Csongrád	310	48	310	–
Southern Great Plain	*1 338*	*331*	*1 273*	*65*
Hajdú-Bihar	460	76	384	76
Jász-Nagykun-Szolnok	502	243	307	196
Szabolcs-Szatmár-Bereg	568	134	486	83
Northern Great Plain	*1 530*	*453*	*1 176*	*354*
Great Plain	*2 868*	*784*	*2 449*	*419*
Country total	*7 269*	*2 628*	*5 935*	*1 334*

The rate of double or multiple track railway lines was 15% in the Great Plain and 18% in the whole country in 2008. In this case a significant difference can be observed between the two regions of the Great Plain. The Northern Great Plain is ranked the highest among rural regions of Hungary in terms of both track length (354 km) and the

proportion of double and multiple tracks (23%), while the Southern Great Plain is only in sixth place in the ranking in both regards (65 km and 5%).

The state of main railway lines is more favourable than that of branch lines for electrified and multiple tracks as well. On some branch lines there are permanent speed limits due to worn rails.

Air transport

Air transport in the Great Plain is served by several smaller airports with different classifications. The most important of them is the Debrecen Airport, which has operated as an international commercial airport and permanent border crossing since 2003. At present there are no continuous scheduled flights, and most passengers are tourists of international charters. In 2008 the number of passengers was 43 000, a slight fall year-on-year, but an increase of 29% compared to 2005. While the number of passengers rose between 2005 and 2008, the number of flights decreased significantly, by 46% to be precise, which suggests growth in flights with larger passenger capacity.

Water transport

The geographic conditions of the Great Plain are highly favourable for waterways because the area is flat, but different sections of the rivers vary in size. The total length of the Great Plain's rivers navigable by large vessels is 601 km, of which the river Tisza accounts for 360 km. The unnavigable stretches are frequently used for tourism and water sports.

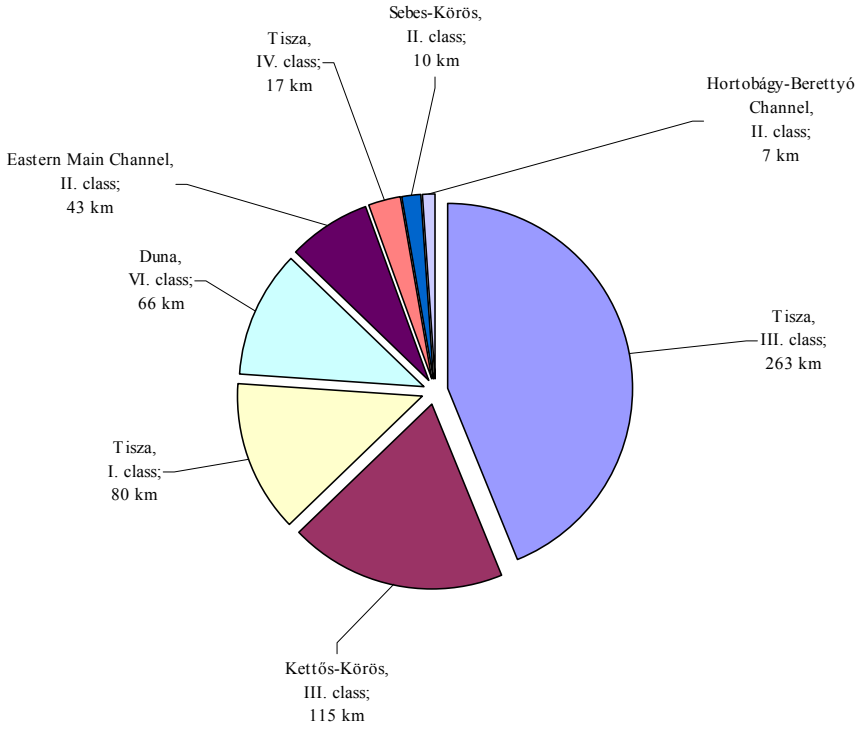
The classification of navigable waterways is based on the internationally accepted standard of the UN Economic Commission for Europe. Classes I to III are for regional waterways, and classes IV to VI indicate international inland waterways. Of the Great Plain's rivers, almost the full length of the Danube crossing the region (with the exception of one bottleneck) complies with the watercourse parameters established in the recommendation of the Danube Commission, and is a class VI (international) waterway.

A 419 km stretch of the 584 km section of the river Tisza in Hungary flows through the Great Plain. The navigability of the river is limited by freezing weather in winter and low water in summer, thus the shipping period of the Tisza fluctuates between 265 and 295 days. The river Tisza is navigable from Vásárosnamény, and the other sections are suitable only for water tourism. The section of the Tisza with the best classification (class IV[3]) is the wider part at the southern border. The other sections of the river are mainly class III due to narrow and shallow parts and one section, between Vásárosnamény and Dombrád, is in class I.

3 Class IV: two-way traffic for 1 350 ton vessels.

Figure 9

Breakdown of navigable rivers of the Great Plain



Source: Veres, 2001

Of the influents of the Tisza, the Körös has class II and III sections and a part of the Eastern Main Channel is class II.

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