

Commuting patterns of secondary school students in the functional urban region of Budapest

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Abstract

Children's regular travel to school is the third most important travel purpose in Hungary. While commuting to school has been studied from several aspects, there has been little research carried out on the differences in demand for and supply of schools in the functional urban region (FUR) of Budapest. The objective of this study is to explore the potential imbalance between demand for secondary education and the supply of schools within the social activity space of education in the functional urban region of Budapest and analyse the regional patterns of the resulting commuting. An expansion of the definition of commuting to daily travel to school is suggested based on the fundamental similarities to commuting to work. The analysis is carried out on two levels combining municipality level and household data from a household survey in the functional urban area of Budapest. The results show that the increasing imbalance between regional demand and supply has led to a spatial imbalance within the functional spatial structure of education. The inconsistency between demand and supply has been growing in the past 20 years and resulted in more intensive commuting. The pattern of commuting has not changed, though. As opposed to commuting to work, the dominance of Budapest as a commuting destination has increased. A connection between commuting characteristics and the educational qualifications of the parents, family income and car ownership has also been demonstrated. The results show that socio-economic changes due to suburbanisation in the functional urban area might lead to increasing commuting to Budapest and to a growing car use.

Keywords: urban region, commuting to school, secondary schools, suburbanisation

Introduction

Social space is understood by the Munich school of social geographers² as a series of activity spaces which are interconnected in a number of ways, e.g.

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² Social geography and social geographers will be understood as the followers of the Munich School of "Sozialgeografie" in this study.

PARTZSCH (1964), RUPPERT and SCHÄFFER (1969) (in BERÉNYI, I. 1997). Those activity spaces are linked to the fundamental functions of social activities³. One of the basic social geographical functions is *education, training and culture*. It is concerned with the availability of the institutions providing such services and the spatial movements some groups of the local society have to make in order to access them. The availability of educational institutions is spatially uneven. The supply of and the demand for education are major determinants of spatial activities within the educational functional space (BERÉNYI, I. 1997).

When a qualitative or quantitative imbalance between demand and supply persists, certain members of the local society have to travel regularly between the place of residence and the place of education. That movement connects two social geographical functions: *living*, i. e. the residence of students and *education*, the activity they wish to pursue. In most cases, a third basic function, *transport* provides the connection between the two if the place of residence and education are not at the same location.

In case of education, there is a controversy over how the regular movement of people should be referred to. In the majority of the literature (GORDON, P. *et al.* 1991; VAN OMMEREN, J.N. 2000; SCHWANEN, T. *et al.* 2004; SOHN, J. 2005; AGUILÉRA, A. 2005; HELMINEN, V. *et al.* 2012) and official statistics (Department for Transport, 2010; United States Census Bureau 2012), commuting has traditionally been identified with regular travel to work. In most cases, that has been the case in Hungary, as well (KAPITÁNY, G. and LAKATOS, M. 1993; SZABÓ, P. 1998; ILLÉS, S. 2000; LAKATOS, M. and VÁRADI, R. 2009; BARTUS, T. 2012) with the restriction that the definition of Hungarian statistics restricts commuting to home-to-work journeys crossing municipality borders (KSH 2007, 2008). In a number of countries (e.g. Austria, Germany and Switzerland), however, statisticians distinguish between student and employee commuters (Statistisches Bundesamt, 1991; Bundesamt für Statistik, 2005; Statistik Austria, 2012).

According to BŐHM and PÁL's research carried out in Hungary in the 1970–80s (BŐHM, A. and PÁL, L. 1979, 1985), (employment) commuting emerges when the following four conditions prevail:

- a qualitative or quantitative mismatch of the demand and supply of workforce in the sending settlement,
- vacant jobs in the destination settlement,
- suitable transport connections between the two settlements,
- travel time to the other settlement should be acceptable for the commuter.

³ According to PARTZSCH (in BERÉNYI, I. 1997) the basic social geographical functions are: work; living; services; education, training and culture; transport and communication; leisure time activities; and the local community.

Our opinion is that a student's daily travel to school is fundamentally similar to commuting to the workplace as it conforms to BŎHM and PÁL's criteria. Therefore, if we transcribe the above criteria to students, commuting to school emerges if:

- educational services are not available in the sending settlement at all or not in the required specialisation or quality;
- destination settlements need to have available places at schools;
- a transport connection and especially public transport is necessary between the settlements;
- travel time should be acceptable for the students.

Notwithstanding the differences, we think that daily travel to school is fundamentally similar to daily commuting to the workplace. Based on the fundamental similarities between regular travel to work and school, for the ease of understanding, I will, henceforth refer to daily travel to school as *commuting to school* or *school commuting* as opposed to *commuting to work* or *employment commuting*.

Children's regular travel to school is the third most important travel purpose after travelling to work and shopping in Hungary (KSH, 2010). In 2010, 64,953 primary and secondary school pupils, 20% of all students studying at schools in the functional urban region (FUR) of Budapest commuted daily.

The decision made usually at the age of 13⁴ about the choice of secondary school is fundamental regarding commuting. The choice of the secondary school determines commuting distance, travel time and very often travel mode, as well. School choice is a process of contemplating several different options based on a complex set of criteria (Bowe, T. *et al.* 1994). The possible factors that play a part in the decision are as follows:

- parents' considerations usually based on their own socio-economic and educational background,
- interests of the child,
- school performance of the child,
- availability of schools in the vicinity of the residence,
- required specialisation (languages, technical, professional etc.),
- opinion about local and nearby schools,
- affordability of commuting or hall of residence.

In Scotland, specialisation of schools is a key aspect of school choice and commuting (Derek Halden Consultancy, 2002). Research carried out in Dresden has shown that parents choose schools that are further off from their home if the school offers a special profile or above-the-average quality of teaching (private schools) (MÜLLER, S. *et al.* 2008). In Hungary, bilingual gram-

⁴ There are also 8 and 6-grade grammar schools which pupils attend from the age of 10 and 12 respectively. The majority of secondary schools are, however, 4-grade schools attended by the age group 14–17.

mar schools are good examples of institutions attracting students from a wide area. 6 and 8-form grammar schools are considered to offer the best education, especially in Budapest where they provide education for the elite (BALÁZS, É. 2005). There is also a preference towards church schools and some privately operated schools (e.g. international schools). It has been shown that non-state schools have a higher proportion of higher-status students and attract more commuters (NEUWIRTH, G. and HORN, D. 2007).

In recent years, there has been increased attention to children's commuting from different aspects. ANDERSSON, E. *et al.* (2012) examined children's travel-to-school distances in Sweden, while HALÁS, M. *et al.* (2010) and HOŁOWIECKA, B. and SZYMAŃSKA, D. (2008) used students commuting data to determine functional urban areas. Several studies investigated the travel behaviour of students concentrating on mode choice (WILSON, E.J. *et al.* 2007, 2010; McMILLAN, T.E. 2007) and the health consequences of travelling to school by car (HILLMAN, M. 1997; COOPER, A.R. *et al.* 2003).

In Hungary little research has been carried out on student travel. The topic has been studied primarily by educational researchers investigating the relationship of student commuting and primary school segregation (KERTESI, G. and KÉZDI, G. 2005a,b), and the effects of free choice of schools on mobility (Econmet Kft. 2008; ANDOR, M. and LISKÓ, I. 1999). Transport researchers have primarily approached students' travel to school with a focus on traffic safety (Nemzeti Közlekedési Hatóság, 2009). Due to the limited availability of data, regional differences between commuting to school were studied at an aggregate level. GARAMI, E. (2003) and BALÁZS, E. (2005), for example, investigated the regional differences in commuting to school at county level.

While the metropolitan area of Budapest has undergone fundamental spatial changes in the past 20 years, there has been no research carried out on the potential linkages between that transformation and changes in the commuting patterns of students. According to BERÉNYI, I. (1997), social geographic space changes dynamically through the activities of social activity groups. Economic and social changes may influence the behaviour of those activity groups, which can lead to spatial instability. The transformation of the functional spatial structure is slower than that of the society, which may lead to inconsistencies between the availability of the basic social geographic functions and the requirements of the changing society.

One of the most significant spatial, social and demographic changes around Budapest is the large scale residential suburbanisation taking place since the 1990s. Budapest lost a significant proportion of its young population, while smaller municipalities in the FUR have undergone considerable socio-economic changes (KOVÁCS, K. 1999; DÖVÉNYI, Z. and KOVÁCS, Z. 1999, 2006; SZIRMAI, V. *et al.* 2011). In those municipalities, the number of young residents and the socio-economic status of the population increased. It can be assumed

that this process had major consequences on several socio-economic functions and specifically on education. Such a phenomenon may increase commuting and the transformation of commuting patterns due to the imbalance between the supply of educational institutions and the requirements of the society.

There has been, however, no research carried out on the influences of spatial changes on school commuters in functional urban areas in Hungary, and sources elsewhere are also limited. Previous researches focused mainly on the influences of urban form on mode choice at a neighbourhood scale (SCHLOSSBERG, M. *et al.* 2005; McMILLAN, T.E. 2007; LARSEN, K. *et al.* 2009; LIN, J.-J. and CHANG, H.-T. 2009), while studies on the potential linkage between the location of homes and schools and school commuting are few in number (see e.g. MARIQUE, A.F. *et al.* 2013).

The objective of this study is to explore how the supply of and demand for secondary school education has changed since 1990 and how it affected the commuting patterns of students. While it is in the nature of secondary education that there is an imbalance between the demand and supply, and hence commuting occurs, changes in the regional distribution of the secondary-school age population as well as the number and type of educational institutions may affect the extent and patterns of commuting. Consequently, an analysis of recent trends may highlight possible links between current spatial transformations and the commuting of students. Here has to mention that a sub-discipline of social geography, "social transport geography" emphasizes the need for analysis on less aggregate levels to study characteristics of spatial movements of different social groups based on household data (TINER, T. 1986). According to SCHWANEN, T. *et al.* (2004), commuting in urban areas should be examined on multiple spatial levels to capture variations in travel patterns influenced by factors on different geographical levels.

As this research has been carried out as part of a comprehensive research on commuting of employees and students around Budapest, the study area covers the functional urban region (FUR) of Budapest. As no data is available on the home municipalities of commuters to school, data on commuters to work have been used to delineate the FUR. It covers all municipalities from where at least 15% of the population in employment commuted to Budapest in 2001⁵ (VAN DEN BERG, L. *et al.* 1982). This area is broader than the administrative category of the Budapest Agglomeration and extends beyond the boundaries of Pest County. The Budapest FUR incorporates 170 settlements with more than 2.8 million inhabitants, more than one-quarter of the population of Hungary. Although Budapest itself is part of the FUR, for the ease of understanding I, henceforth refer to all municipalities within the FUR outside Budapest as FUR (*Figure 1*).

⁵ As the results of the latest National Census of 2011 have not been published in 2012, data on commuting from the previous Census carried out in 2001 have been used.

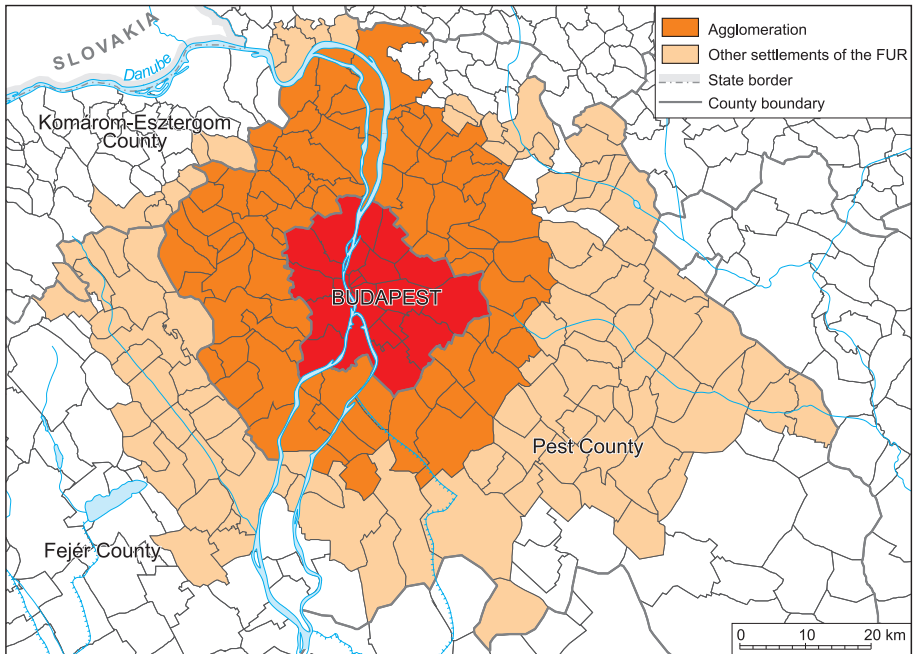


Fig. 1. The zones of the Budapest FUR

In the first part of the paper, the regional distribution of secondary schools in the FUR is analysed and changes in the school offer between 1990 and 2010 is investigated. The second section presents the analysis of changes in demand, i.e. secondary-school-age population. The last section focuses on changes in commuting patterns.

The analysis is based on data published by the KSH (Hungarian Central Statistical Office, HCSO) and the Office for Education (Public Education Information System available at www.oktatas.hu). The analysis is limited to students attending grammar and technical secondary schools as no municipality-level data are available on the commuting patterns of vocational school students.

Supply of secondary schools

The supply of education is determined by the spatial distribution, quality, capacity and specialisation of schools. If certain levels of education are not provided in each locality, there is high likelihood that students need to travel daily to another settlement to attend school.

In Hungary, education is compulsory by law until the age of 18⁶. Pupils between the age of 6–14 are usually educated in primary schools (*általános iskola*). Secondary education is diversified: there are grammar schools (*gimnázium*) providing general education and the foundations to go on to university; they may also specialise on a certain subject area, for example language or arts. Technical secondary schools (*szakközépiskola*) are similar to grammar schools but they also focus on a special area (economics, printing, engineering, nursing etc.) providing a professional qualification. Vocational schools (*szakiskola* and previously *szakmunkásképző*) do not entitle students to go on to university but provide them with vocational qualifications (e.g. tailor, carpenter, machinery operator etc.).

After 1990, the secondary school offer increased rapidly due to increasing competition among schools for students in a race to compensate for the drop in school-age population, shrinking financial resources and the decline in demand for vocational schools (LANNERT, J. 2004). This phenomenon occurred in Central Hungary (Budapest and Pest County) even earlier, therefore this region had a higher proportion of secondary school students compared to the national average already before 1990. Secondary schools also tried to diversify their educational offer by launching new specialisations and forms of education. Grammar schools often started technical classes, while former technical secondary schools introduced grammar school-type education⁷. By the end of the 1990s the proportion of schools offering solely one type of secondary or vocational education decreased to 30% (GARAMI, E. 2003).

Between 1990 and 1999, the number of secondary schools increased by 40% countrywide, while the number of vocational schools by 20%. The expansion was above the average in Budapest and Pest County (GARAMI, E. 2003). After 2001, the number of secondary schools continued to increase, although at a slower rate. Between 2001 and 2010 the number of grammar schools⁸ increased from 51 to 70 (37%) in the FUR, while the number of grammar schools in Budapest increased from 169 to 183 (8%). The rise of the number of secondary technical schools was more moderate: from 45 to 51 (13%) in the FUR, and from 182 to 188 (3%) in Budapest.

Currently, 43 municipalities offer secondary or vocational education in the FUR of Budapest, as opposed to 163 settlements with primary schools. Secondary education is concentrated in Budapest with 183 grammar schools and 188 technical secondary schools⁹. Most schools are concentrated in the

⁶ From 1 September 2012, education is compulsory until the age of 16. As my paper is based on earlier data this change does not affect the current analysis.

⁷ Schools providing both grammar school and technical secondary school education will be referred to as mixed schools.

⁸ The statistics reflect the number of school sites. A school can have several sites at different locations.

⁹ Statistics include all school sites irrespective of the administrative centre of the school

inner districts as well as the Buda (western) side (Districts XI and XII). The outer districts in the eastern and southern side of the capital have few secondary schools; District XXIII, for instance, has only one grammar school. While technical secondary schools are concentrated on the (eastern) Pest side, there are more grammar schools in the districts of the Buda side (Figure 2).

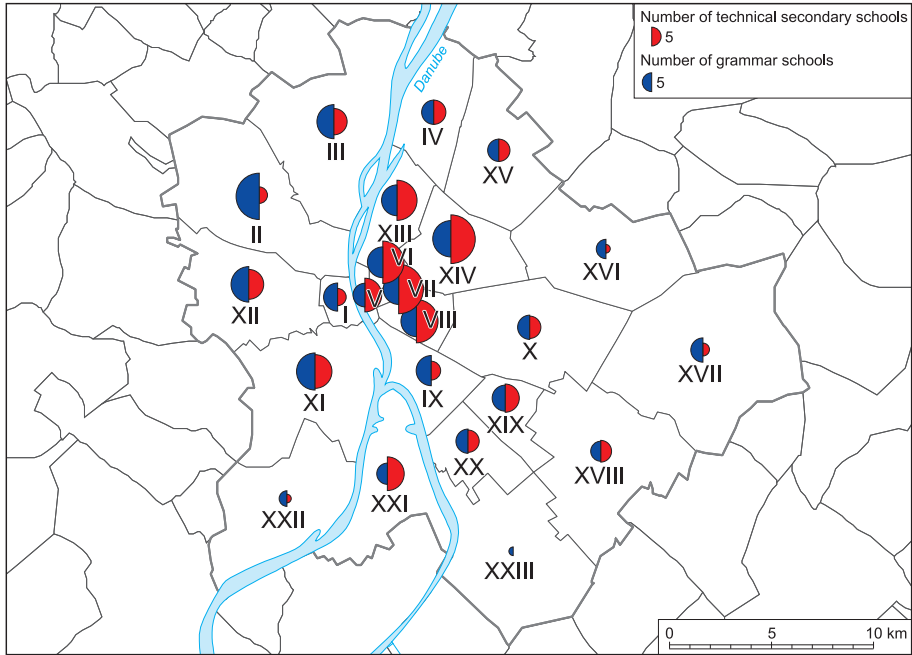


Fig. 2. The distribution of secondary schools in Budapest, 2010. Source: Own elaboration based on the HCSO Dissemination Database – Regional statistics: <http://statinfo.ksh.hu>)

There are 70 grammar schools and 51 technical secondary schools in the FUR. Larger towns in FUR usually have more than one secondary school (Vác, Gödöllő, Szentendre) (Figure 3), but there are some smaller towns that became centres for secondary education. Agglomeration town Szigetszentmiklós, for example, has a population of 26,662, but it has 36% more secondary school students than another one, Érd with a population of 65,000.

Between 1990 and 2010, the number of full-time students¹⁰ attending secondary school in the FUR increased by 114%. The growth was, however, not uniform. Four patterns of change can be identified. Firstly, a significant

as well as all branch institutions that provide full- or part-time education. Some of these branches are very small, and they may only have students in adult education.

¹⁰ Wherever the dataset allows only full-time students are considered as they commute daily to school as opposed to part-time students who usually only commute weekly.

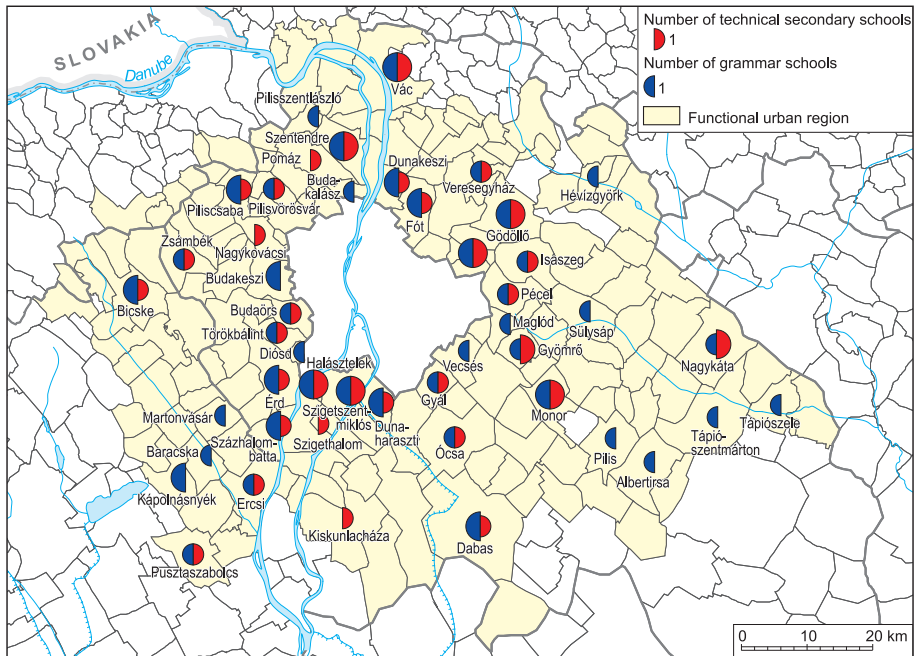


Fig. 3. The distribution of secondary schools in the Budapest FUR, 2010. Source: See Fig 2.

increase can be detected in the major towns of the FUR, which has established schools that had attracted a significant number of students even before 1990 (Vác, Szentendre, Gödöllő, Monor) (Figure 4).

Secondly, the number of students also increased considerably in a number of municipalities with smaller or fewer schools. They are easier to identify if we consider the percentage change of the number of students for each municipality between 1990 and 2010 (Figure 2). Most schools other than the ones in the above-mentioned major towns had 200–300 students in 1990 which increased to 600–800 by 2010. These municipalities include Szigetszentmiklós (364% growth), Törökbálint (518%), Budakeszi (239%), Pilisvörösvár (204%), Piliscsaba (202%), Fót (116%), Százhalombatta (178%) and Ócsa (119%).

The third group of municipalities that increased the number of secondary school students at their schools did not operate a secondary school before 1990 (see shaded areas in Figure 2). Some of these new schools were opened by the church (Zsámbék); expanded an existing primary school with secondary school classes (Vecsés, Pomáz); were founded by a private organisation (International Christian School of Budapest in Diósd); or a public foundation (*közalapítvány*) that has close ties to the local municipality (Gyömrő, Isaszeg) (Figure 5).

In the fourth group of municipalities, the number of secondary school students decreased between 1990 and 2010. Some institutions even ceased operation. The technical secondary school in Kistarcsa, for example, was closed in 2011 because the local municipality did not have the resources to continue operation¹¹. Students were taken over by the nearby schools in Aszód and Gödöllő. Some institutions maintained by public foundations were also closed down in Tök, Nagymaros and Páty. Apart from the secondary school in Kistarcsa, which was attended by 233 students when it ceased operation, the other schools that were closed down were small institutions with a low number of students so their closures did not affect the overall school offer of the FUR significantly.

In Hungary, secondary schools are usually operated by the state, municipalities, the church and other non-state organisations (foundations, private entities, private companies etc.). The ownership of the school is often a consideration when choosing a secondary school, because many of the church and private schools focus on elite education. The proportion of non-public schools is relatively low. In 2009, 79% of all secondary school students attended public schools, 9% church schools and 11% other non-state schools in the country. Their proportion is higher in Central Hungary and especially in Budapest than the national average.

The proportion of students attending non-state schools has been increased by 41% between 2001 and 2009 while the school-age population was shrinking (BALÁZS, É. 2011). It could mean that a further increase in the number of non-state schools may also increase the overall rate of commuting.

Since 1989, there has been a proliferation of six and eight-form grammar schools usually within existing secondary schools. They attract 10- and 12-year olds from primary schools whose parents want to ensure that their children get good quality education paving the way to university at an early stage. Better student performance at these schools is indicated by results of competency tests (NEUWIRTH, G. and HORN, D. 2007). In 2009, students in 8-form grammar schools performed best in mathematics and reading comprehension, followed by 6-form and 4-form students (BALÁZS, É. *et al.* ed. 2011). In 2000, 9.6% of all applicants to secondary schools wished to attend a six or eight-form grammar school. In Budapest and Pest County, the proportion of such applications was higher than the national average (BALÁZS, É. 2005). In 2009, 10.3% of grammar school students has been attended 6- or 8-form schools in Budapest, while in Pest County covering roughly the area of the FUR, the proportion was even higher (14.5% compared to the national average of 9.4%).

¹¹ The closure of the school is not reflected on the maps as the latest statistical data available is from 2010.

The quality of teaching can also be a determining factor of school choice. There is a significant difference between the attractiveness of different grammar and secondary schools.

It is reflected by the results of students measured by a national competence test, the rate of admission to university, inter-school competition results, the number of students with language test certificates and the proportion of students admitted to higher education (DUGASZ, J. 2011; Köznevelés 2010). Secondary schools often refer to these ratings in their promotional materials to attract the best students.

Students attending schools maintained by the church have the highest rate of admission to university education (63%), well above the national average (42%). Contrary to common belief, schools maintained by public or private foundations are the worst performers with only 30% of students admitted to higher education on average between 2001 and 2006. There is also a difference between school types (grammar school, technical secondary school, mixed school).

Grammar schools tend to have the best rates of admission to higher education (66%), followed by mixed schools (39%), and technical secondary schools (24%). Within grammar schools there is a difference between 4-, 6- and 8-form schools with the 6- and 8-form systems having higher admission rates (NEUWIRTH, G. and HORN, D. 2007).

The admission rates of schools both in Pest County (41%) and Budapest (37%) are lower than the national average (42%). Schools in Budapest, however, perform much better as regards study competition results; the proportion of students who receive a language certificate until leaving secondary school; the results of written admission tests to higher education; and results in mathematics and reading comprehension on the national competence test (NEUWIRTH, G. and HORN, D. 2007). If we examine the ratings of secondary schools, it is obvious that Budapest has the largest number of well-performing schools (*Table 1*).

Table 1. Number of top rated schools in Budapest and the FUR

Area	Top rated schools*			Together
	grammar school	technical secondary school	mixed school**	
Budapest	20	17	6	43
FUR	4	2	5	11

*Schools are in the best 10% based on admission to higher education, language skills and competition results

**Schools provide both grammar school and technical secondary school education

Data source: Köznevelés, 2010

Demand for secondary schools

As opposed to school locations, data about the location of homes of secondary school students are not available. Commuting data published by KSH only indicate the place of school they attend. As education is compulsory for 6–18 year old pupils in Hungary, demand for secondary schools can be determined by the population of the age group 14–17 typically attending secondary education¹². As 96.6% of primary school pupils go on to secondary or vocational education (GARAMI, E. 2003), the examination of the size of secondary school age population can give us an indication of the demand for secondary education.

Demographic trends and suburbanisation affected the size of secondary school population. The number of 14–17 year olds decreased by 24% countrywide between 1990 and 2010. In contrast, the drop was only 10% in the FUR, while Budapest lost more than half of its adolescent population. There were municipalities in the FUR, which even managed to increase their young population; in some cases by more than 50% (e.g. Telki 261%, Leányfalu 127%, Kisoroszi 100%).

The regional differences of the change in population of 14–17 years old are highlighted on *Figure 6*. Most municipalities with increasing young population are situated in the western (e.g. Diósd, Páty, Biatorbágy), northwestern (e.g. Csobánka, Pilisborosjenő, Solymár, Nagykovácsi, Telki, Budajenő), and northern (e.g. Csömör, Mogyoród, Szada) agglomeration of Budapest. These settlements have been popular targets for suburbanisation (KESERŰ, I. 2004; BAJMÓCY, P. 2006). Demographic change itself, i.e. the increasing proportion of the younger generation has been linked to residential suburbanisation (SZIRMAI, V. *et al.* 2011).

Commuting of secondary school students between 1990 and 2010

The intensity of commuting in the FUR can be estimated by analysing data collected by the Central Statistical Office about the number of students attending secondary schools in each municipality and the number of in-commuters to these municipalities¹³. During the 20 years between 1990 and 2010, secondary school attendance and commuting underwent considerable changes (*Figure 7*).

¹² According to data available about the age of students for Pest County, the typical age to attend secondary school is 14–18 with a mixture of 14–15 year olds in the 9th (typically the first year of secondary education) and 17–18 year olds in the 12th classes (typically the last year of secondary education). At least two thirds of secondary school students start secondary education at the age of 14. In addition, detailed population data retrospectively to 1990 is only available for the age group of 14–17. Hence, this group is used for further analysis.

¹³ Commuter data only includes grammar and technical secondary schools and no such commuting data is available for vocational schools.

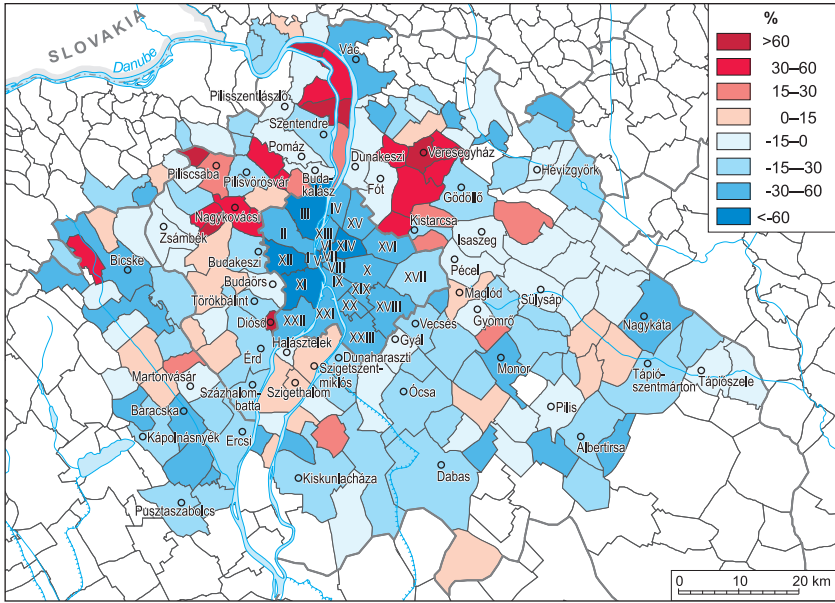


Fig. 6. Change of the size of age group 14–17 between 1990 and 2010. (In case of Budapest between 1991 and 2010). Source: See Fig 2.

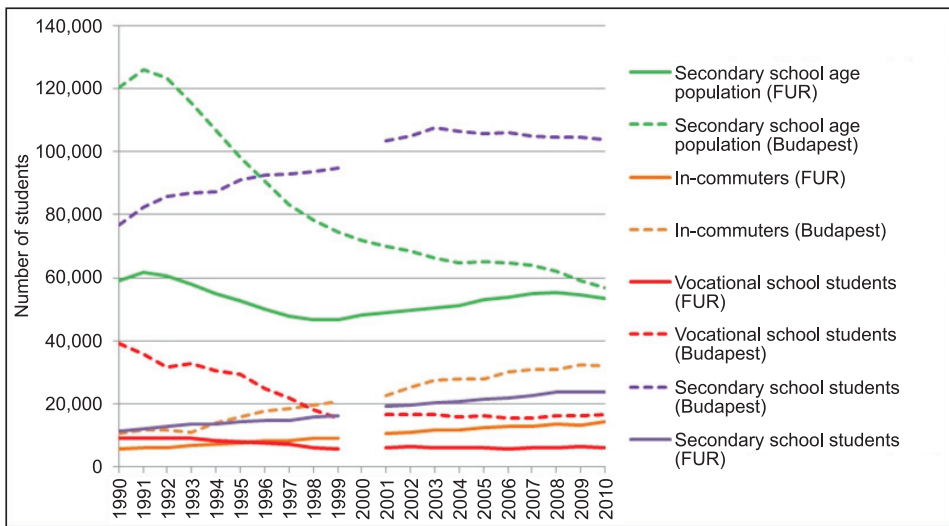


Fig. 7. Number of students attending and commuting to secondary schools and vocational schools in Budapest and the municipalities of the FUR. (Data for the year 2000 were not published due to inaccuracies in the KSH database). Source: See Fig 2.

The dominant role of Budapest in secondary education has not been challenged. At the same time, schools in the FUR expanded significantly educating 20% of all secondary and vocational students by 2010. While the expansion of secondary schools was continuous in the FUR between 1990 and 2010, the number of students in Budapest rose only until 2001 and stagnated afterwards. This indicates that growth in student numbers shifted to the FUR after 2001. Stagnation in case of Budapest is still remarkable in the light of the halving of the secondary school age population in the capital. The phenomenon can be explained by the rise in the number of students commuting to secondary schools in Budapest but living elsewhere.

The imbalance between the demand and supply of secondary education¹⁴ can be demonstrated by calculating the number of secondary school students per children between the age of 14–17 (Table 2). The figures demonstrate the imbalance between demand and supply in relation to Budapest and the FUR. They also reflect a fast growth of secondary schools between 1990 and 2001 in the FUR and a very slow climb after that while the dominance of Budapest continued to increase.

Table 2. The number of secondary and vocational school students per 14–17 year olds

Area	1990	2001	2010
FUR	34	52	56
Budapest	96	172	212

Source: Own elaboration based on the HCSD Dissemination Database – Regional statistics: <http://statinfo.ksh.hu>).

If we compare the number of the students with the size of secondary school age¹⁵ population, it is important to highlight that while the number of 14–17 year olds decreased only slightly from 59,087 to 53,362 in the FUR, the number of students attending school there doubled. This could indicate that demand and supply have been levelling off, hence commuting has decreased. If we examine commuting data in the FUR and Budapest, however, a dramatic intensification of commuting between 1990 and 2010 can be observed.

Commuting to Budapest saw a threefold increase from 10,588 to 31,974. In 2010, 31% of all secondary students studying in Budapest were commuters. In the rest of the FUR, the increase was also remarkable, the number of commuters increased from 5,630 to 14,094. It is unlikely that daily commuting to Budapest from outside of the FUR increased significantly during this period

¹⁴In this particular case data was available for vocational school students as well.

¹⁵14–17 year olds are generally considered as secondary school age population. Since 2001, children attending 6 and 8-form grammar schools from the age of 10 or 12, respectively, are included in the statistics for secondary schools. As here we compared 1990, 2001 and 2010 data and 6 and 8 form grammar schools proliferated after 1990, this did not affect the comparability of the data.

due to the long distance. Thus it can be assumed that the intensification of commuting from the FUR to Budapest compensated for the fall in the number of secondary school age population in the capital.

The most important source of commuters to Budapest is Pest County. In 2011, 72% of all applicants to secondary schools in Budapest lived in Budapest while 91% of those who did not live in the capital had a residence in Pest County.

As our data shows, local demand for educational services decreased considerably in the central city, while it stagnated in the FUR with growing demand in some suburbanising municipalities. At the same time, the supply of educational services did not keep up with the change of demand in the FUR on the quantitative and qualitative side, which led to increasing commuting to Budapest originating from the FUR. This is an evidence of the mismatch between the transformed socio-economic composition of the society and the spatial distribution of educational institutions.

The slow adaptation of the school system is partly due to the fact that it takes decades for a school to create an attractive profile that is very much tied to cities (e.g. high profile secondary schools with long traditions in central Budapest, Vác, Szentendre, and Gödöllő). On the other hand, there are emotional reactions from the local communities to any plans to change the educational system. The combination of tradition and emotion makes it a time-consuming process to implement any changes in the fabric of the school network (BERÉNYI, I. 1997). If we accept that suburbanisation leads to an increase in the school-age population, it can be assumed that there is a link between suburbanisation and commuting if the school supply is unable to fulfil the increasing demand in the suburbanising settlements.

In aggregate, between 1990 and 2010, Budapest's dominance on the secondary education market only slightly decreased. In 1990, 87% of all secondary school students in the FUR and Budapest attended schools in Budapest, while in 2010 the proportion fell to 81% (*Table 3*). At the same time Budapest's proportion of 14–17 year olds within the functional urban area fell considerably from 67% to 52%. This indicates that the discrepancy between demand and supply within the whole FUR (including Budapest) grew.

Consequently, the proportion of students commuting to Budapest, however, increased. In 1990, 12% of all students studying in the FUR and Budapest commuted to Budapest, while only 6% to the FUR (cross-commuting). Although the proportion of commuters to municipalities in the FUR increased to 11% by 2010, so did the share of commuters to Budapest (25%). In the past 20 years commuting intensity increased to both Budapest and the FUR in similar proportions. This indicates that the imbalance between demand for and supply of secondary schools has not been relieved. While a shift from the traditional suburb-city commuting pattern has been detected to cross-commut-

Table 3. Distribution of students and commuters within the functional urban region of Budapest (including Budapest), %

Indicator	1990		2001		2010	
	Budapest	FUR	Budapest	FUR	Budapest	FUR
	Proportion of secondary school students	87	13	84	16	81
Proportion of commuters	65	35	68	32	69	31
Proportion of 14–17 year olds	67	33	59	41	52	48
Proportion of commuters of all students in the FUR and Budapest	12	6	18	9	25	11

Source: Source: Own elaboration based on the HCISO Dissemination Database – Regional statistics: <http://statinfo.ksh.hu>.

ing as regards employees, the proportion of secondary school commuters to the core city in fact increased.

The overall growth of the proportion of commuters may have several underlying reasons. It may be caused by a change in the school offer (new schools and specialisations); an increasing qualitative imbalance in secondary school supply and demand (families moving to the suburbs with high income and educational status cannot find suitable high quality schools locally); demographic changes (drop in the number of secondary school age population in the centre of Budapest).

If we examine the inflow of secondary school commuters on municipality level, it is apparent that Budapest has the greatest level of attraction (*Figure 8*). As opposed to the commuting of primary school pupils, whose parents tend to choose schools at nearby settlements due to the children's limited independence (KESERŰ, I. 2012), secondary school students seem to commute farther. This is especially apparent in Budapest, where the highest number of commuters from outside of the capital attend schools in the inner districts (Districts VII, VIII, IX and XIII). This may also be a reflection of better transport connections into the city centre (railway terminuses, metro network), which may make it easier to reach a school in the centre than in one of the outer districts.

If we examine the change in the number of in-commuters between 1995 and 2010, we should note that in some districts and municipalities, the number of commuters increased by more than 100% (*Figure 9*)¹⁶. It is apparent that growth was concentrated on the outer districts of Budapest (East: XV, XVI, XVII; West: XXII). Outside of Budapest, the only significant increase occurred in some of the most suburbanised municipalities in the Western agglomeration (Pilisvörösvár, Budaörs, Törökbálint, Budakeszi).

¹⁶ New secondary schools were opened in the mid-1990s in Gyömrő, Piliscsaba, Százhalombatta and in Budapest's District XXIII, hence the growth in the number of students and commuters is not comparable to other districts.

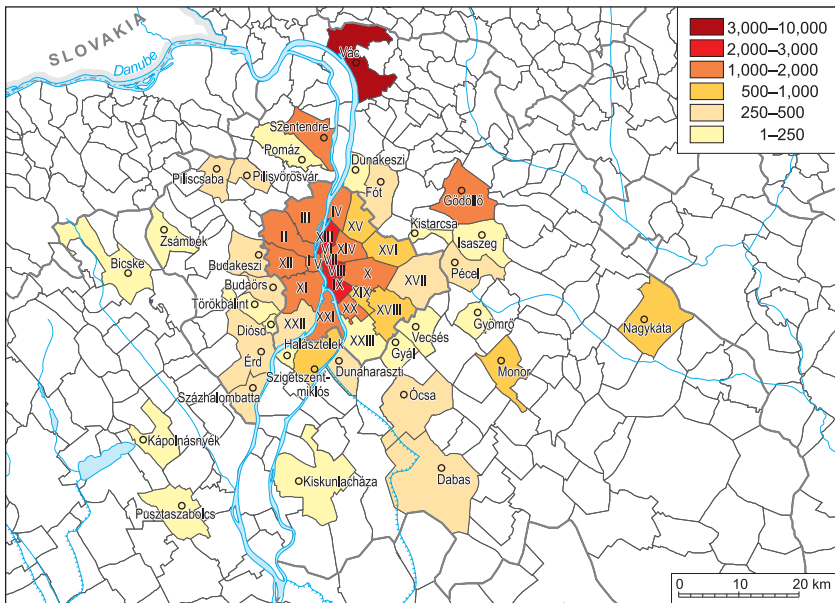


Fig. 8. Number of secondary school commuters in 2010 in the FUR of Budapest. Source: See Fig 2.

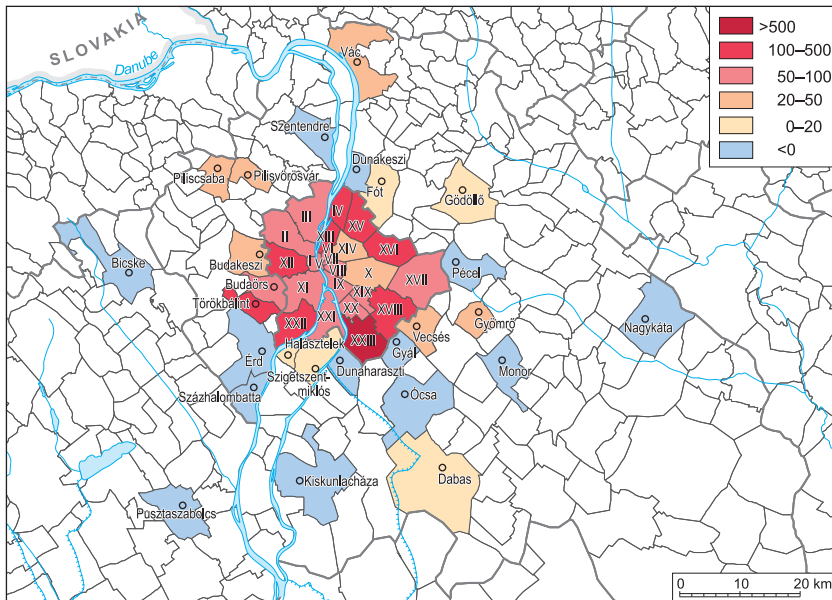


Fig. 9. Change of the number of commuting secondary school students between 1995 and 2010 in the FUR of Budapest. Source: See Fig 2.

Conclusions

The objective of this paper was to explore the potential imbalance between demand for secondary education and the supply of schools within the social activity space of education in the functional urban region of Budapest. It has been suggested that the definition of commuting should be extended to daily travel to school besides travel to work based on the fundamental similarities. The longitudinal analysis of the demand and supply of secondary education showed that while local demand for secondary education (14–17 year old population) was halved in Budapest between 1990 and 2010, the drop was only 10% in the rest of the FUR. This difference has been explained by suburbanisation, as the major social and spatial transformation of the past 20 years around Budapest, which fostered the migration of the younger population to the suburban ring and shifted demand for secondary education to the FUR.

Although the capacity of secondary schools expanded in the FUR through new school openings and the expansion of existing capacities, Budapest's predominance in the educational market has not been challenged. This increasing imbalance between regional demand and supply has led to a spatial imbalance within the functional spatial structure of education. Due to the delay of the institutional framework of education to adapt to societal changes, the inconsistency between the requirements of the changing society (qualitative and quantitative demand for secondary education) and the provision of educational services (qualitative and quantitative supply of secondary schools) resulted in more intensive commuting and increased the size of the spatial activity group of secondary school commuters. While demand in Budapest (school-age population) decreased significantly, commuting to the capital continued to rise.

The pattern of change has been different to commuting to work, where decentralisation of employment has led to an increase in the proportion of cross-commuting and a drop in commuting to Budapest. In case of secondary school commuters, however, the proportion of commuters to Budapest has increased for the past 20 years and secondary school commuting remained largely mono-central.

Possible reasons for the continuing dominance of Budapest have also been highlighted. Church-owned and private secondary schools, which attract commuters from a wider area, are concentrated in Budapest. In addition the performance of secondary school students in Budapest is better than in schools in the surrounding Pest County.

Both commuting to Budapest and to the FUR saw a threefold increase during the 20 years. The regional distribution of the increase shows a concentration in the outer districts of Budapest, and the most intensively suburbanising municipalities in the northwestern part of the FUR. This suggests the intensification of spatial interactions in the suburban zone as regards commuting to school.

In an ideal case, balance between supply and demand could eliminate commuting. Due to free choice of schools, specialisations, differences in teaching quality and different popularity of schools, however, commuting persists even from municipalities where there are local schools. Hence, further research is needed based on empirical data to explore the influence of different motivations of school choice in the functional urban region. It is recommended that future investigations address the question of the relevance of teaching quality as opposed to distance to school preferably carrying out the investigation at school site level as macro-level data masks the effects of local circumstances. In addition, the influence of educational policy, the differences in the quality of transport provision and the accessibility of schools need to be addressed, too.

REFERENCES

- AGUILÉRA, A. 2005. Growth in Commuting Distances in French Polycentric Metropolitan Areas: Paris, Lyon and Marseille. *Urban Studies* 42. (9): 1537–1547.
- ANDERSSON, E., MALMBERG, B. and ÖSTH, J. 2012. Travel-to-school distances in Sweden 2000–2006: changing school geography with equality implications. *Journal of Transport Geography* 23. 35–43.
- ANDOR, M. and LISKÓ, I. 1999. *Iskolaválasztás és mobilitás*. (Choice of schools and mobility). Budapest, Iskolakultúra. Available from: <http://mek.oszk.hu/03600/03672> (Accessed: 10-06-2012)
- BALÁZS, É. 2005. *Közoktatás és regionális fejlődés* (Public education and regional development). Budapest, Országos Közoktatási Intézet. Available from: <http://www.ofi.hu/tudas-tar/oktatas-tarsadalmi/kozoktatas-regionalis> (Accessed: 02-01-2012)
- BALÁZS, É. et al. ed. 2011. *Jelentés a magyar közoktatásról* (Report on the public education in Hungary). Budapest, OFI
- BARTUS, T. 2012. Területi különbségek és ingázás (Regional differences and commuting). In *Nyugdíj, segély, közmunka: a magyar foglalkoztatáspolitikai két évtizede, 1990–2010*. Eds. FAZEKAS, K. and SCHARLE, Á. Budapest, Szakpolitikai Elemző Intézet; MTA KRTK Közgazdaság-tudományi Intézet, 247–258.
- BERÉNYI, I. 1997. *A szociálgeográfia értelmezése* (Understanding of social geography). Budapest, ELTE Eötvös Kiadó Kft.
- BŐHM, A. and PÁL, L. 1979. *Bejáró munkások* (Commuting physical workers). Budapest, MSZMP KB Társadalomtudományi Intézete.
- BŐHM, A. and PÁL, L. 1985. *Társadalmunk ingázói – az ingázók társadalma*. (Commuters of our society – community of commuters). Budapest, MSZMP KB Társadalomtudományi Intézete – Kossuth Könyvkiadó.
- BOWE R., GEWIRTZ, S. and BALL, S.J. 1994. Captured by discourse? Issues and concerns in research in parental choice. *British Journal of Sociology of Education* 15. (1): 63–78.
- Bundesamt für Statistik, 2005. *Eidgenössische Volkszählung 2000 – Erwerbsleben, Pendlermobilität und Ausbildung*. Available from: <http://www.bfs.admin.ch/bfs/portal/de/index/in-fothek/lexikon/lex/0.Document.69280.pdf> (Accessed: 07-10-2012)

- COOPER, A.R. *et al.* 2003. Commuting to school: Are children who walk more physically active? *American Journal of Preventive Medicine* 25. (4): 273–276.
- Department for Transport, 2010. *National Travel Survey: 2010 Notes & Definitions*. Available from: <http://assets.dft.gov.uk/statistics/tables/nts0401.xls> (Accessed: 07-10-2012)
- Derek Halden Consultancy, 2002). *Review of Research on School Travel*. Available from: <http://www.scotland.gov.uk/Publications/2002/05/14690/4172>.
- DÖVÉNYI, Z. and KOVÁCS, Z. 1999. A szuburbanizáció térbeni-társadalmi jellemzői Budapest környékén (Spatial and social features of suburbanisation process in the surroundings of Budapest). *Hungarian Geographical Bulletin / Földrajzi Értesítő* 48. (1–2): 33–58.
- DÖVÉNYI, Z. and KOVÁCS, Z. 2006. Budapest: The Post-Socialist Metropolitan Periphery Between 'Catching Up' and Individual Development Path. *European Spatial Research and Policy* 13. (2): 23–41.
- DUGASZ, J. 2011. *Középiskolai rangsorok felvételizőknek* (Rankings of secondary grammar schools for applicants to university). Budapest, Fapadoskönyv Kiadó.
- Econmet Kft., 2008. *Empirikus elemzés a szabad iskolaválasztás révén bekövetkező általános iskolai körzetszintű és településközi mobilitásról*. (Empirical analysis on the region-wide and inter-local mobility resulted by free choice of schools). Available from: http://www.oktatasikerekasztal.hu/hattertanulmanyok/10/econmet_empirikus.pdf (Accessed 22-01-2012)
- GARAMI, E. 2003. A területi különbségek megjelenése az általános és középiskola utáni pálya alakulásában (Appearance of regional differences during the careers after finishing the elementary and secondary schools). *Iskolakultúra* 1. 83–89. Available from: http://epa.oszk.hu/00000/00011/00067/pdf/iskolakultura_EPA00011_2003_01_083-089.pdf (Accessed: 07-09-2012)
- GORDON, P. *et al.* 1991. The Commuting Paradox. Evidence from the Top Twenty. *Journal of the American Planning Association* 57. (4): 416–420.
- HALÁS, M., KLADIVO, P., SIMACEK, P. and MINTÁLOVÁ, T. 2010. Delimitation of Micro-Regions in the Czech Republic by Nodal Relations. *Moravian Geographical Reports* 18. (2). Available from: <http://geography.upol.cz/soubory/lide/halas/clanky/Halas,Kladivo,Simacek,Mintalova-MGR.pdf> (Accessed: 13-10-2012)
- HELMINEN, V., RITA, H., RISTIMÄKI, M. and KONTIO, P. *et al.* 2012. Commuting to the centre in different urban structures. *Environment and Planning B: Planning and Design* 39. (2): 247–261.
- HILLMAN, M. 1997. The potential of non-motorised transport for promoting health. In *The Greening of Urban Transport: Planning for Walking and Cycling in Western Cities*. Ed. TOLLEY, R. London, John Wiley & Sons Ltd., 21–26.
- HOŁOWIECKA, B. and SZYMAŃSKA, D. 2008. The Changes in the Functional Urban Region in the New Socio-Economic Conditions in Poland. The Case of Toruń. *Bulletin of Geography. Socio-economic Series* 9. (1): 63–78.
- ILLÉS, S. 2000. *Belföldi vándormozgalom a XX. század utolsó évtizedeiben*. (Inner migration in the last decades of the 20th century). Budapest, KSH Népeségutományi Kutató Intézet.
- KAPITÁNY, G. and LAKATOS, M. 1993. A munkaerő napi mozgása Budapesten és a fővárosi agglomerációban, 1970–1990. (Daily movement of labour power in Budapest and its agglomeration zone, 1970–1990). *Statisztikai Szemle* 45. (8): 651–685.

- KERTESI, G. and KÉZDI, G. 2005a. Általános iskolai szegregáció. I. rész. (Segregation in elementary schools. Part 1). *Közgazdasági Szemle* 52. (4): 317–355.
- KERTESI, G. and KÉZDI, G. 2005b. Általános iskolai szegregáció. II. rész. (Segregation in elementary schools. Part 2). *Közgazdasági Szemle* 52. (5): 462–479.
- KESERŰ, I. 2004. A szuburbanizáció közlekedési vonatkozásai a Budapest környéki szuburbanizálódó települések példáján (Transport relations of suburbanisation on the examples of suburban settlements around Budapest). In *II. Magyar Földrajzi Konferencia, Szeged, 2004*. Ed. KOVÁCS, F. Szeged, Szegedi Tudományegyetem. Available from: http://geography.hu/mfk2004/mfk2004/cikkek/keseru_imre.pdf (Accessed 06-07-2012).
- KESERŰ, I. 2012. Bejárók és eljárók: A szuburbanizáció és az általános iskolások ingázásának összefüggései Budapest funkcionális várostérségében. (Contexts of the suburbanization process and the commuting of elementary school pupils inside the functional urban region of Budapest). *Tér és Társadalom* 26. (3): 114–131.
- KOVÁCS, K. 1999. Szuburbanizációs folyamatok a fővárosban és budapesti agglomerációban (Suburbanisation processes in Budapest and in its agglomeration zone). In *Társadalmi-gazdasági átalakulás a budapesti agglomerációban*. Eds. BARTA, Gy. and BELUSZKY, P. Budapest, Regionális Kutatási Alapítvány, 91–114.
- Középiszkolák eredményességi mutatói, 2010. (Quality indicators for secondary schools, 2010). *Köznevelés* 67. 38–39.
- KSH, 2010. *A lakosság közösségi és egyéni közlekedési jellemzői* (Features of public and individual transport of population). Available from: <http://portal.ksh.hu/pls/ksh/docs/hun/xftp/idoszaki/pdf/lakossagikozlekedes09.pdf> (Accessed 07-07-2012)
- LAKATOS, M. and VÁRADI, R. 2009. A foglalkoztatottak napi ingázásának jelentősége a migrációs folyamatokban (Importance of daily commuting of employed people in migration processes). *Statisztikai Szemle* 87. (7–8): 763–794.
- LANNERT, J. 2004. *A közoktatás szerkezetének alakulása Magyarországon* (Changes in the structure of public education in Hungary). Available from: <http://www.nkth.gov.hu/download.php?docID=19157> (Accessed: 25-08-2012)
- LARSEN, K., GILLILAND, J., HESS, P., TUCKER, P., IRWIN, J. and HE, M. 2009. The Influence of the Physical Environment and Socio-demographic Characteristics on Children's Mode of Travel to and From School. *American Journal of Public Health* 99. (3): 520–526.
- LIN, J.-J. and CHANG, H.-T. 2010. Built Environment Effects on Children's School Travel in Taipei: Independence and Travel Mode. *Urban Studies* 47. (4): 867–889.
- MARIQUE, A.-F., DUJARDIN, S., TELLER, J. and REITER, S. 2013. School commuting: the relationship between energy consumption and urban form. *Journal of Transport Geography*. 26. (1): 1–11.
- MCMILLAN, T.E. 2007. The relative influence of urban form on a child's travel mode to school. *Transportation Research, Part A. Policy and Practice* 41. (1): 69–79.
- MÜLLER, S., TSCHARAKTSCHIEW, S. and HAASE, K. 2008. Travel-to-school mode choice modeling and patterns of school choice in urban areas. *Journal of Transport Geography* 16. (5): 342–357.
- Nemzeti Közlekedési Hatóság, 2009. *Felmérés az általános iskolások közlekedésbiztonsági tudásáról* (A survey on transport safety of elementary school pupils). Available from: <http://www.scribd.com/doc/56005739/1/a-tema-aktualitasa> (Accessed: 06-03-2012)

- NEUWIRTH, G. and HORN, D. 2007. *A középiskolai munka néhány mutatója, 2006.* (A few indicators of activities in secondary schools, 2006). Budapest, Oktatókutató és Fejlesztő Intézet. Available from: <http://www.ofi.hu/tudastar/kozepiskolai-munka/kozepiskolai-munka-090617-5>.
- SCHLOSSBERG, M., PHILLIPS, P.P., JOHNSON, B. and PARKER, B. 2005. How do they get there? A spatial analysis of a 'sprawl school' in Oregon. *Planning Practice and Research* 20. (2): 147–162.
- SCHWANEN, T., DIELEMAN, F.M. and DIJST, M. 2004. The Impact of Metropolitan Structure on Commute Behavior in the Netherlands: A Multilevel Approach. *Growth and Change. Journal of Urban and Regional Policy* 35. (3): 304–333.
- SOHN, J. 2005. Are commuting patterns a good indicator of urban spatial structure? *Journal of Transport Geography* 13. (4): 306–317.
- Statistik Austria, 2012. *Commuter Statistics*. Available from: http://www.statistik.at/web_en/surveys/register_based_labour_market_statistics/commuter_statistics/index.html (Accessed: 08-09-2012)
- Statistisches Bundesamt, 1991. *Pendler – Berufs- und Ausbildungspendler*. Fachserie 1 Heft 9 Teil 2. Wiesbaden, Statistisches Bundesamt.
- SZABÓ, P. 1998. A napi ingázás kérdésköre a kilencvenes években Magyarországon (Questions of daily commuting in the 1990s in Hungary). *Tér és Társadalom* 12. (4): 69–89.
- SZIRMAI, V., VÁRADI, Z., KOVÁCS, S., BARANYAI, N. and SCHUCMANN, J. 2011. Urban Sprawl and its Spatial Social Consequences in the Budapest Metropolitan Region. In *Urban Sprawl in Europe*. Ed. SZIRMAI, V., Budapest, Aula Kiadó, 141–186.
- TINER, T. 1986. A szociál-közlekedéstudrajz kialakulása és vizsgálati módszerei (The origin of social transport geography and its methods of research). *Hungarian Geographical Bulletin / Földrajzi Értesítő* 35. (3–4): 219–230.
- United States Census Bureau, 2012. *Commuting (Journey to Work)*. Available from: <http://www.census.gov/hhes/commuting/> (Accessed 07-09-2012)
- VAN DEN BERG, L., DREWETT, R. and KLAASSEN, L.H. 1982. *Urban Europe: A study of growth and decline*. N.Y., Pergamon Press.
- VAN OMMEREN, J.N. 2000. *Commuting and relocation of jobs and residences*. Farnham, Ashgate.
- WILSON, E.J., MARSHALL, J., WILSON, R. and KRIZEK, K.J. 2010. By foot, bus or car: children's school travel and school choice policy. *Environment and Planning A*. 42. 2168–2185.
- WILSON, E.J., WILSON, R. and KRIZEK, K.J. 2007. The implications of school choice on travel behaviour and environmental emissions. *Transportation Research, Part D, Transport and Environment* 12. (7): 506–518.

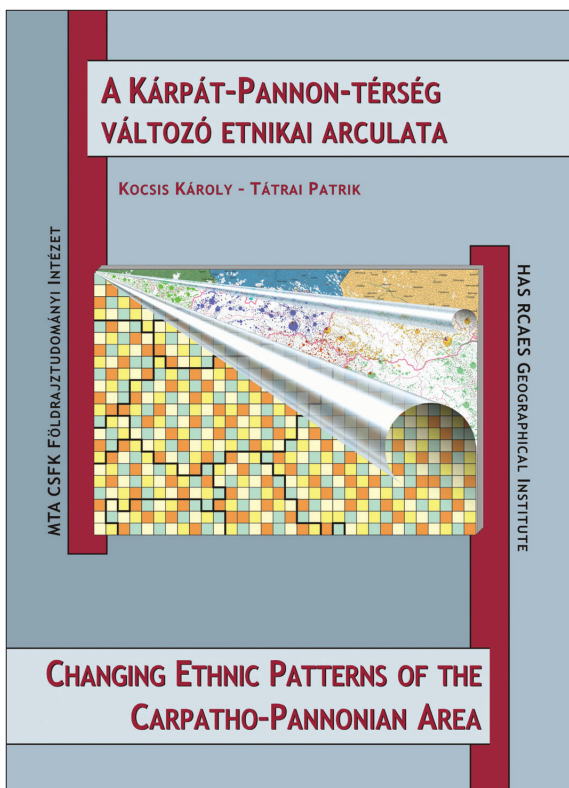
Changing Ethnic Patterns of the Carpatho–Pannonian Area from the Late 15th until the Early 21st Century

Edited by
KÁROLY KOCSIS and PATRIK TÁTRAI

*Hungarian Academy of Sciences, Research Centre for Astronomy and Earth Sciences
Budapest, 2012.*

This is a collection of maps that visually introduces the changing ethnic patterns of the ethnically, religiously, culturally unique Carpathian Basin and its neighbourhood, the Carpatho-Pannonian area.

The Hungarian and English volume consist of three structural units. On the main map, pie charts depict the ethnic structure of the settlements in proportion to the population based on census data of the millennium. In the supplementary maps, changes of the ethnic structure can be seen at nine dates (in 1495, 1784, 1880, 1910, 1930, 1941, 1960, 1990 and 2001). The third unit of the work is the accompanying text, which outlines the ethnic trends of the past five hundred years in the studied area.



The antecedent of this publication is the „series of ethnic maps” published by the Geographical Research Institute of the Hungarian Academy of Sciences from the middle of the 1990’s, which displayed each of the regions of the Carpathian Basin (in order of publication: Transylvania, Slovakia, Transcarpathia, Pannonian Croatia, Vojvodina, Transmura Region, Burgenland, Hungary). This work represents, on the one hand, the updated and revised version of these areas, and, on the other hand, regions beyond the Carpathian Basin not included on previous maps. Thus, the reader can browse ethnic data of some thirty thousand settlements in different maps.

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