Where the brains are, where the brains move: education, skilled migration, and human capital in Poland

Abstract: The aim of the article is to study the process of human capital creation and concentration in Poland. The research procedure consists of analysis of selected aspects of the creation of human capital at two levels of learning (the lowest – primary school, and the highest – tertiary education), migrations of persons with higher education, and the distribution of human capital resources in Poland. This approach allows tracing the process of human capital formation in space and enables to explain regularities in its spatial concentration. The results show that the resources of early human capital are fairly evenly distributed throughout the country. Clear spatial differences have been displayed in analysis of the distribution of persons with higher education – concentrated in the biggest urban agglomerations. They are both, the largest hubs of higher education and the biggest labour markets, which makes them main destinations of migration of university graduates from smaller towns and peripheral areas. The analysis shows that the chief factors of spatial differences in human capital in Poland are migrations to the biggest cities to study and migrations on graduation to find a job.

Key words: education skills, human capital, migration, labour market, Poland
Role of human capital in the socio-economic development of regions

Human capital, treated as a resource of knowledge and skills, is thought today to be a factor of the success of individuals, towns, regions, and states. It is usually identified with the level of education, which is a rough measure of the body of formal knowledge acquired. A significant feature of human capital is its mobility. Human capital forms in a strictly defined spatial environment, but it can move freely (e.g. brain drain). Hence its resources and distribution in space will be affected by two groups of processes: those connected with its formation (education), and with its movement (migration).

The significance of human capital can be considered in two aspects. First, in terms of the effect of the level of education on opportunities in life, especially wages received. Here a possible analysis can range from a single individual through residents of a region to the population of a state. Secondly, the education level, and hence human capital, is an important endogenous resource of economic development that defines the development potential of territorial systems. In this context the level of education can be treated as a resource of towns, regions or states.

When referring to education as a foundation of human capital, it is worth emphasising that so far the primary concern has been the level of education of adults (who are part of the labour market). The significance of so-called early human capital has been appreciated less often (Ritzen, Winkler, 1977, Psacharopoulos, Wiles, 1981). While it is the last stage of education completed (and learning though action) that has a direct influence on what advantages might derive from the knowledge gained, one cannot negate the strong effect of learning at lower levels: it determines possible choices of a further educational path by narrowing down or expanding options to continue learning (acquiring knowledge) and its quality.

As soon as the interest in the conception of human capital appeared, analyses were made of the relationship between education and wages (Mincer, 1958, Becker, 1962). In this approach, all outlays for building up people’s knowledge or psycho-physical condition were treated as an investment that could be expected to yield profit in the form of higher wages. Naturally, apart from strictly economic returns one could also gain in, e.g., health (Groot & van den Brink 2007), prestige, or entrepreneurship. These features can indirectly contribute to the possibilities of development of both, individuals and entire communities.

The issue of human capital is directly connected with that of migration. Migrations have always been a factor moulding the development potential of areas. An inflow of people with higher education boosts their human capital resources, which then translates into an increase in their level of economic development (Wong Yip, 1999, Stark et al., 1998, Stark, 2004, Poot et al., 2008). In the case of European regions, Huber and Tondl (2012) have found that migrations (irrespective of migrants’ education) generally affect productivity: an inflow of migrants brings about a rise in productivity. What has caused quite a furore in the recent
years (despite far from convincing empirical evidence) is an approach to migration in terms of the formation and movement of the creative class (Florida 2004). In the context of human capital migration, the question of spatial accessibility is highly significant (especially in areas with poor or average infrastructural endowment) and the migration of young people to the largest development centres to take up studies – a considerable proportion of them will stay in the place of schooling for good (Czapiewski & Janc 2007, 2011).

In the case of geographical analyses, the greatest potential lies in viewing human capital in terms of its role in the development of spatial systems. In the last decades of the 20th century human capital started to be treated as an endogenous growth factor in econometric models (Lucas 1988, Romer 1990, 1994, Bassanini & Scarpetta 2002, Brunello & Comi 2004). De la Fuente and Ciccone (2003) state that an additional year of schooling in an average European country can raise productivity at the national level by 6.2%. Depending on their magnitude and quality, capital resources may be a significant barrier or stimulant to development (Tondl & Vuksic 2003). Naturally, the situation is favourable when there is a high proportion of well educated persons, and an unfavourable one, when poorly educated ones predominate. What is important, a high proportion of well educated persons may improve the situation of those worse educated on the labour market in a specific area - through the transfer of knowledge (Schlütte 2012). A concentration of people with greater skills affects the general level of development not only through an increase in productivity, but also an increase in the demand for the labour force (greater entrepreneurship), or an enhanced quality of an area – a higher investment standard (Glaeser et al. 2011).

However, human capital is not only a resource enhancing the profitability and efficiency of the economy. It is also a key factor in the creation of new knowledge and attracting investors. It is seen as a chance to improve the quality of life of the inhabitants of an area. This makes the unevenness of the distribution of human capital a problem. Human capital is especially important as a component of the so-called milieu, deeply rooted resources of knowledge ensuring a regionally efficient performance in terms of the creation of new knowledge, or innovativeness (Bathelt et al. 2004, Storper & Venables 2004, Hilpert 2006, Gössling & Rutten, 2007). Frequently emphasised, is the significance of co-operation between the principal actors responsible for the creation of new knowledge and for reinforcing and attracting specialised human resources – the so-called triple helix model (Etzkowitz & Leydesdorff 2000, Leydesdorff 2000, Benneworth & Charles 2005, Arbo & Benneworth, 2006). Whatever the approach adopted, the key fact is this: human capital is a foundation of the capacity of territorial systems for development; it makes for their strength or weakness.

Taking into consideration the above features of human capital, this study focuses on the process of its creation and concentration in space. The research procedure included an analysis of selected aspects of the creation of human capital at various levels of learning (the lowest – primary school, and the highest – tertiary education), migrations of persons with higher education, and the distribution of human capital resources in Poland. This approach allows tracing the process of hu-
man capital creation in space and explaining regularities in its spatial concentration. Thus, it makes it possible to answer the questions posed in the title of the article: Where are the brains? Where do the brains move? What is the role of education and skilled migration in building up resources of human capital in the space of Poland?

Spatial differences in educational results in Poland

The Polish system of education has three levels: a 6-year primary school, a 3-year lower secondary school (gymnasium), and a 2-, 3- or 4-year upper secondary school offering a variety of educational profiles and ending (or not) in a matriculation exam, which entitles a pupil to enter an institution of higher learning. Since 2002, a unified system of pupil assessment at the end of each education level has been in force, which allows a diagnosis of spatial differences in educational attainment on graduation from each type of school. The marks pupils obtain at those exams are treated as objective measures of their knowledge and skills.

However, one should keep in mind that there are several factors affecting the educational attainment of pupils; they can be grouped into individual (bio-physiological), school-related (pedagogical), and socio-economic (environmental and regional). In studies of spatial differences in the results of tests and external exams, the most important is the last group. From the analyses conducted to date, the educational success of children seems to depend on:

– the level of education of the parents, and generally of the community (inhabitants of the commune) in which the given pupil lives and studies
– the level of wealth of the parents, and generally the level of wages
– the level of unemployment, which is indirectly connected with the above factors (Śleszyński 2004, Herczyński & Herbst 2002).

Regional differences in the results of school-leaving exams are usually explained by the persistence of two fundamental divisions connected with Poland’s functional and historical-cultural specificity (Śleszyński, 2004). The first significant division is that into town and the countryside, and more precisely, into large, well-developed urban centres and the remaining areas (peripheries). Differences in the results of pupils from urban and rural areas follow partly from the socio-economic factors mentioned above (i.e. the education of parents, their wages, the number of children in the family). An additional, important factor is better endowment of urbanised areas with various educational and cultural facilities allowing pupils to enlarge their body of knowledge through participation in extra-curricular courses, amusement, and culture. The other division still in force is that involving historical boundaries, especially those of the Russian, Prussian and Austrian sectors from the 19th c. period of Partition (Śleszyński 2004).

The best educational results on leaving the primary school – although this observation also holds for the other levels of education – (Czapiewski & Śleszyński 2007) are obtained by pupils in most of the economically best developed agglomerations: each regional capital clearly stands out on the map of educational results
(Fig. 1'). This corroborates the thesis about the results differing along the centre–periphery axis. Good results can also be found in southern and eastern Poland. Those areas have kept social capital in a much better state owing to their low dynamics of population processes after the Second World War (Gawryszewski 2005). Here communities are deeply rooted in the local environment and private property has always prevailed in agriculture. In spite of their economic situation being much worse than in urban agglomerations, thanks to cultural traditionalism and the strong position of the family, pupils achieve above-average educational results here. In turn, the poorest results are obtained by pupils from northern and western Poland, i.e. areas mostly settled by Poles only after the Second World War. Their characteristics were a socialised type of ownership, a low sense of local identity, and the state catering for a large proportion of basic needs. In rural areas socialised

![Map of Poland showing educational results](image)

Fig. 1. Results of the primary-school graduation test in 2009
Source: own compilation on the basis of Central Examination Commission data.

2 The maps were prepared using the isoline method and the kriging technique for interpolation. This was possible on the assumption that the phenomenon under study was spatially continuous.
Agriculture predominated and in towns most flats were municipal property or that of state-run workplaces. With a job, housing and basic services ensured, the average citizen became increasingly dependent on the care of the state. In education, this manifested itself in there being no need for parents to take individual care of the educational and social development of their children. The local communities were more inclined to rely on the state for the teaching and bringing up of their children. Today the ‘relieving’ of the parents by the state and their passivity have a clearly negative effect on their offspring’s test and examination results (Śleszyński 2004). This observation, in turn, corroborates the thesis about the influence of historical-civilisational factors on educational attainment.

Despite the clear spatial differences in the distribution of the results obtained by pupils on completion of individual schooling levels, it should be emphasised that in absolute terms those differences are not that significant. The average result of pupils from 10% of the weakest communes is 83% of the national average, and that of pupils from 10% of the best communes, 111%.

**Development of the higher education sector and spatial differences in it**

The relatively small, though significant, differences in the educational results among spatial units at the lowest schooling level may play a key role in aggravating the disproportion between better and weaker pupils in terms of their choice of a further education path, especially at the higher level. Also significant in this case is the strong spatial concentration of tertiary learning in Poland. Because of the crucial effect of the last stage of education on subsequent wages and the occupational situation described earlier in this article, it is necessary to analyse the operation and distribution of higher education in this country when discussing human capital.

Over the last 20 years higher education has changed substantially in Poland. At the start of the systemic and socio-economic transformation, it was an elitist system educating a relatively small number of students (under 0.4 million). As in the other socialist countries of East-Central Europe, education was designed to ‘produce’ engineers, specialists in exact and natural sciences, doctors, and teachers. Studies in broadly understood social and economic sciences were poorly developed and indoctrinated with socialist ideology.

The start of the systemic and socio-economic transformation in 1989 meant also a change in the importance of higher education in society. Higher learning, apart from its task of developing democratic attitudes in the young generation of Polish citizens, was primarily intended to supply the transforming economy with highly qualified specialists (Woźnicki & Morawski 2002, Strahl 2003, Bednarska 2007). Because of the poor condition of public finances but high educational aspirations of people born in the 1970s and during the baby boom of the late 1970s and

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3 Commune – the lowest level of administrative division in Poland; an LAU2 unit in the nomenclature employed by Eurostat.
early ‘80s, the only possibility of increasing the number of students quickly was to deregulate the higher education system, thus helping it to use all its resources (Dietl 2001, Dąbrowa-Szeftler & Jablecka-Prylopska, 2006) and passing on part of the education costs to society (Bednarska, 2007). As early as 1990 there appeared the possibility of setting up not only public universities (offering free studies), but also non-public ones (offering paid schooling). Making extramural studies fee-paying at public universities was made legal and schools were guaranteed a free choice of their enrolment quotas.

These changes soon led to a mushroom growth in the number of students and tertiary institutions of learning. In ten years the enrolment jumped from 0.4 million in 1989 to 1.4 million in 1999, to reach a peak in 2005 at 1.9 million (by 2010 it had dropped to 1.8 million, mostly for demographic reasons). This corresponded to a rise in the gross enrolment rate from 12.9% in 1990 to 53.8% in 2010, and of the net rate from 9.8% to 40.8%. These are figures comparable with those of the economically most advanced states in Europe.

In the years 1990–2010, universities in Poland granted more than 5.2 million diplomas confirming the completion of higher education. This number included 1.8 million diplomas of uniform master’s studies (5 or 6 years of learning), formerly dominant in the Polish academic system, 2.3 million diplomas of first-degree licentiate studies (first-degree studies – 3 or 3.5 years), and 1.1 million diplomas of complementary master’s studies (second-degree studies – 2 years of learning). This meant an estimated 4 million people acquiring higher education over the years 1989–2010.

The mass development of higher education in Poland was accompanied by the development of a network of higher schools. The number of universities grew between 1989 and 2010 from 121 to 470, of which 338 were non-public institutions (allowed since 1991), and 36 were state-run higher vocational schools (established since 1998). In the years 1990–2010 the number of localities and their complexes in which higher schools or their branches were set up rose from 35 to more than 140 (i.e. by more than 300%). Until the start of the systemic transformation, the increase in the number of higher schools in the already existing academic centres and in new localities with institutions of higher learning or their branches was slight (Fig. 2).

In a spatial approach, the chief factor in the development of higher education in Poland in the years 1989–2010 was the relation between the demand for educational services and their supply in the individual towns and regions. This concerned both, the existing academic centres and those that only appeared after 1989.

In the case of academic centres already in existence in 1989, the chief factor of change in student enrolment was the students/inhabitants rate at the start of the transformation. The lower it was, the greater the increase in the number of students in the successive years (Bajerski 2009). This was connected with both, extended admission limits at public universities and the developing sector of non-public higher education that filled the existing market niches in the demand for studies not satisfied by public institutions (Bednarska 2007, Bajerski 2009).
In the case of new academic centres, a special role in access to higher education was played by non-public schooling. In the peak year 2007, non-public universities had more than 660 thousand students (34% of the total). Initially, they were being set up primarily in large cities showing a great unmet demand for higher education (Chojnicki & Czyż, 1997, Nowosielska 2002, Wolaniuk & Bachvarov 2003, Bednarska 2007, Geryk 2007, Bajerski 2009). While non-public schools were also being established in smaller towns since the start of the transformation (Nowosielska 2002 was among those who drew attention to the gradual lowering of the population threshold of a town ‘capable of maintaining’ a higher school), this became a mass process only after 1998, when universities began to appear in great numbers.

Other factors were access to the research and teaching staff employed at local public universities and the attractiveness of those centres for students from smaller localities.
numbers in towns with under 50 thousand inhabitants (Bajerski 2009). The development of higher schools in small towns resulted from both, a constant surplus of demand for higher education over its supply in the largest cities, and from the socio-economic situation of the population of smaller towns and villages; those who were not able, for example for financial reasons, to undertake studies in the major academic centres (Jałowiecki 2001, Szulc 2004, Ilnicki 2008). A similar role was played by state-run higher vocational schools, set up since 1998 outside the existing academic network and offering free intramural studies (Bajerski, 2009), as well as numerous branches of universities (Ilnicki, 2008).

The above processes led, on the one hand, to the development of higher education in towns of all size categories, and on the other, to its spatial deconcentration. As follows from Bajerski’s (2009) calculations, in the years 1990–2005 the proportion of students learning in cities and urban complexes with over 500 thous. inhabitants dropped from 70% to 60% (Table 1). In that same period the proportion of those studying in towns of under 100 thous. population grew from 2% to 10%. Worth noting is a tenfold increase in the proportion of students in towns of under 50 thousand in population. A consequence of the spatial deconcentration of higher education in Poland was not only an increase in its spatial accessibility (Szabłowski 2001, Dietl 2003, Wojciechowski 2006, Bajerski 2009, 2011, Czapiewski & Janc, 2011), but also in its social accessibility connected with the equalisation of educational chances of young people, especially those from small towns and rural areas (Jałowiecki, 2001, Kwiec, 2008, Ilnicki, 2008).

### Changes in the Spatial Structure of the Population’s Education in the Years 1970–2002

A consequence of the socio-economic transformation that boosted the demand for well-educated employees, the development of higher education, and of higher edu-

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<td>1,000,000 and more</td>
<td>88,904</td>
<td>22.7</td>
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<td>500,000–999,999</td>
<td>180,084</td>
<td>46.0</td>
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<td>200,000–499,999</td>
<td>73,546</td>
<td>18.8</td>
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<td>100,000–199,999</td>
<td>40,255</td>
<td>10.3</td>
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<td>50,000–100,000</td>
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<td>50,000 and less</td>
<td>1,756</td>
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All | 391,496 | 100 | 192,574 | 100 | 1.00 | 0.0 |

Source: compiled on the basis of Bajerski (2009).
Cultural aspirations of society has been a steep increase in the proportion of the population with higher learning. Between 1970 and 2011, it grew from under 3% to 17.5%. Such a high dynamics had several causes. One was the change in the economic and social systems. The departure from a centrally planned economy resting on unskilled labour and the transition to a market economy relying on the work of highly qualified specialists has made knowledge, and hence also education, a commodity. A university diploma has become a key not only to success on the labour market, but even to making oneself noticed on it in the first place. Prior to 1989, the level of schooling did not differentiate wages, higher education contributed little to social prestige. Another reason for such big growth in the resources of highly educated people (especially in the 1990s) followed from the first. It was the fact that higher education started to be sought by a large number of persons already active on the labour market for several or even some dozen years. The requirements laid down by employers turned those workers, so far without higher education, into students (mostly in the extramural system). Still another reason for the increase in the proportion of the population with higher education has been the change in the system of education at the highest level described in detail in the previous section. A less significant one has been young people treating studies as a transition period ('storage room') at times of difficulties on the labour market. Also, until compulsory military service had been abolished in Poland several years ago - for a group of men - higher studies (usually at non-public universities) were a form of protection against doing more than a year of military practice.

An illustration of the above-mentioned general factors can be the growth rate of the proportion of the population with tertiary and secondary education between censuses (Fig. 3). While in the years 1970–1978 the mean annual increase in the proportion of people with higher learning was 0.22%, in 1978–1988, 0.20%, and in 1988–2002, 0.26%, in the last period it jumped to as much as 0.85%. A similar upward tendency can be found in the proportion of the population with secondary education; today it has reached a saturation level and the increases are symbolic (0.17% per year in the period 2002–2011).

From the spatial perspective, one should note that the proportion of the population with higher education differentiates the so called space of Poland mostly in terms of urban agglomerations – peripheries (Fig. 4). This is a universal dimension, which means that it remains in force in a long-term horizon. Its scope is modified (i.e. changes in time) by the range of influence of the biggest cities. The strong dependence on the settlement network and the distance to the largest cities accounts for the fact that peripheries (here in terms of the education level) are usually located in the border areas of regions. Thus, there crystallise intra-regional peripheries of an educational ‘deficit’. Despite the general rise in the proportion of persons with higher education in the entire country (also in rural, peripheral areas), intra-regional differences persist all the time, and even deepen in relative terms (differences in dynamics over the last two decades). The late 1990s and early 2000s have seen an expansion in areas with a high proportion of population with academic education around the biggest cities and the appearance of islands of sub-regional centres. The remaining areas show only a slight increase in people
with tertiary education. Thus, one can observe in Poland a widening of intra-regional differences in human capital resources between urban agglomerations and peripheral areas.

The clear spatial differences in the distribution of the proportion of persons with higher education also correspond to significant differences in absolute terms. The mean proportion of inhabitants with higher education from 10% of the weakest communes is 24% of the national average, while those from 10% of the best communes account for 158% of the average. These are much wider differences than in the case of the results of final examinations achieved by pupils finishing primary school, described earlier.

In the case of the distribution of human capital resources seen in terms of higher education, we find an obvious analogy to the higher education network (Fig. 4). While tertiary learning naturally involves movement in search of a university, the physical accessibility of one is important, especially for persons from areas where socio-economic development is less advanced, and may be a factor modifying the level of education.

![Graph showing changes in educational attainment in Poland in the years 1970–2011](image)

**Fig. 3. Changes in educational attainment in Poland in the years 1970–2011**

*Source: own compilation on the basis of GUS data.*
Migrations of persons with higher education

Today we can observe, both in the world and in Poland, a concentration of human capital resources in urban agglomerations. This follows from two complementary and interdependent processes. First, as has been demonstrated in the earlier sections, those areas grant their inhabitants greater educational opportunities, a wider educational offer, hence a larger proportion of people decide to finish

Fig. 4. Proportion of persons with higher education (A) and the number of higher schools (B) in 2002
Source: own compilation on the basis of GUS data.
a higher school. Secondly, the building up of human capital is a result of a selective process of migration of persons with higher education. While in the period 1988–2002 such people accounted in Poland for an average of 14% of migrants, in the case of the biggest cities this proportion exceeded 25% (e.g. in Warsaw it was 35%), and in their suburban zones it greatly surpassed the national average (Fig. 5). Areas characterised by a high proportion of residents with higher education tend to be chosen as destinations by similarly educated migrants. This leads to a growing concentration of best-educated people: the coefficient of correlation between the proportion of inhabitants with higher education in 2002 and that of migrants with higher education in the period 1988–2002 at the poviat level is $r = 0.91$.

Interestingly enough, it is only the last dozen or so years that can be treated as a breakthrough period concerning the possibilities of movement of persons with higher education. Population mobility grew considerably when the centrally plan-
The economic situation of the given area and the migrational inflow of new inhabitants with higher education ($r = 0.82$) is certainly bi-directional (Fig. 6). It is hard to separate clearly factors underlying the decision to migrate (dependence: a favourable economic situation determines a population inflow) from the effect that migrants exert on the development of the given area (dependence: the new arrivals, full of initiative and well educated, induce positive development trends). It seems, however, that at first it is a favourable socio-economic situation of an area that attracts an inflow of people to it, and it is only later that its socio-demographic potential and the associated economic potential grow as a result of a selective migration process.

The analyses presented in the article so far have shown that the main role in the formation of human capital resources is played by inducing young people to study and attracting university graduates from other towns to the given labour market. An equally significant factor seems to be the potential of local and regional labour markets, especially in academic towns, to absorb the graduates. This issue, with regional centres as case studies, was analysed by Herbst (2009), who used information about more than 2 million Polish students and university graduates collected in one of the Polish social networking services (Nasza Klasa – a highly popular portal launched in Poland even before Facebook had gained popularity). He examined the territorial origin of students and the declared places of residence of graduates after they had completed their studies. His research showed that only those re-
Regional centres were successful in keeping the graduates on their labour markets that were also the largest and most prestigious academic cities (Warsaw, Cracow, Tri-City, Wrocław, Poznań). The remaining towns, even those with a decades-long tradition of higher education (e.g. Łódź, Lublin or Toruń), educate graduates whose substantial proportion leave them on completion of studies (this concerns primarily students coming from outside the town). The situation is especially unfavourable in peripheral towns and those with a relatively poorly developed higher education sector (e.g. Gorzów Wielkopolski, Kielce, Opole, Zielona Góra). These are primarily places ‘producing’ human capital resources for the biggest urban agglomerations of Poland.

The situation is the least favourable in small and medium-sized towns and rural areas hosting non-public universities or state-run higher vocational schools and offering primarily licentiate (first-degree) studies (Geryk 2007, Bajerski 2009). The BA that they grant still enjoys little prestige in Poland when compared with that of an MA, which opens up much wider job perspectives for its holder (Diagnoza Społeczna, 2009). This often causes migrations to larger academic centres in order to enrol in master’s studies (Dietl 2003, Bajerski 2009). An equally signifi-

![Graph showing the dependence between the level of economic development and the proportion of migrants with higher education]

Fig. 6. Dependence between the level of economic development (calculated on the basis of the unemployment rate, entrepreneurship of inhabitants, and local government income), and the proportion of migrants with higher education in the total number of migrants in the period 1988–2002 (with ‘poviats’ as reference units, n = 379).

cant factor making university graduates flee from those areas is a frequent mis-
match between the structure of courses at local (especially non-public) universi-
ties and the needs of the local labour markets. A study by Dietl (2003) of non-public universities in small Polish towns in the early 2000s demonstrated that a mere 20-30% of their graduates decided to stay on the local labour market.

Early vs. mature human capital

In order to determine the relationship between early and ‘mature’ human capital, a spatial typology was performed. Its basis was the determination of how far com-
munes departed from the model (average) relationship between the proportion of the population with higher education and the results of the primary-school graduation test. Using a simple regression model, and more specifically the best-fit regression line, five groups of communes were distinguished (Fig. 7). Units marked in blue show poorer results of pupils than would follow from the level of education

![Fig. 7. Dependence between the proportion of inhabitants with higher education and the results of the primary-school graduation test](image)

Source: own compilation on the basis of GUS and Central Examination Commission data.

The courses of study provided in small towns are usually those in social and economic sciences, the most popular and the cheapest to organise.
of the adult population. Red denotes the opposite situation: children’s results are better than might be expected from the general level of education. A characteristic feature of this dependence is that in areas where the proportion of inhabitants with higher education is low, primary-school pupils achieve widely differing educational results, while in areas with a high proportion of educated persons school results are always above-average. In other words, as the education level of inhabitants increases, the coefficient of variation in pupils’ performance declines.

The spatial typology obtained in this way (Fig. 8) confirms several conclusions presented earlier in the text. First: in western and northern Poland, the high human capital of the older generations is not transmitted to (utilised by) school-age children and young people, unlike in much of Eastern Poland. Secondly, once again one can observe a characteristic trait of Polish space: favourable developments tend to concentrate in the biggest cities and their immediate surroundings. In sum,
when measured against the population’s level of education, school performance is above-average in pupils from most of the urban agglomerations in Poland and from peripherally located communes in the eastern part of the country. In the first case, this tendency might be expected to further foster the supremacy of the largest development centres in terms of the human capital possessed. In the other case, one might expect that the most active and best educated young people will emigrate from those areas as soon as they have enrolled at a university, which will steadily aggravate the disproportion between core and peripheral areas in such endogenous resources as human capital.

Conclusions

It was stated at the beginning that the level and distribution of human capital resources were affected by two basic groups of processes: those connected with its creation (education) and with its movement (migration). The creation of human capital at lower levels of education displays relative spatial stability, which means that spatial patterns do not change over a long time. In Poland school attendance is compulsory until the age of 18, education is free and is the responsibility of the lowest-level self-government units. This makes the situation of young people similar as far as spatial accessibility of schools is concerned. True enough, there are some spatial differences in educational results connected with socio-economic and historical-civilisational factors, but the resources of early human capital are fairly evenly distributed throughout the country (the difference between 10% of communes with the poorest school performance and 10% of those with the best results is 34%).

Human capital resources start to show clear spatial differences when the analysis focuses on the population’s education level (especially on the proportion of persons with higher education). The first factor responsible for this process is the specific distribution of higher education in Poland: five cities with populations of over 500,000 (Warsaw, Cracow, Łódź, Wrocław and Poznań) account among them for 60% of all university enrolment quotas. The ready accessibility of the resources induces a greater number of inhabitants of these cities and their closest environment to undertake tertiary education. In addition, these cities are migration destinations for young people studying there; on completion of learning, a substantial proportion stay and find employment on the local labour markets. Another factor contributing to the growing polarisation in the distribution of best-educated persons is migration. The largest development centres of the country are attractive locations in which to seek work, hence their resources swell with people moving to them from areas where the economic situation is worse. Significantly, migrants adding to the human capital resources of areas to which they move have on average a better education than the resident population. This follows from two reasons: (1) in the largest urban centres jobs are offered primarily in the service sector, which seeks workers with at least secondary education, and (2) persons with tertiary education are more mobile than poorer educated ones. The above processes are re-
sponsible for spatial differences in the resources of human capital possessed (the difference between 10% of communes with the lowest proportion of the population with higher education and 10% of those with the highest figure is 558%).

Thus, Poland has confirmed the basic regularities formulated by the discussed theoretical conceptions of human capital: better educated persons migrate to the biggest cities and their vicinity. This process is driven by the higher socio-economic level of those areas and stimulates their development in its turn. Hence, in answering the questions posed in the title of the article, we can state that the largest human capital resources are concentrated, as in other countries, in the biggest urban centres. They are both, the largest hubs of higher education and the biggest labour markets, which makes them the chief destinations of migration of university graduates from smaller towns and peripheral areas. Migration to the biggest cities in order to study and migration on graduation to find a job, seem to be the chief factors of spatial differences in human capital in Poland. The influence of differences in so-called early human capital connected with the initial stages of education is negligible.

References


Ilnicki D., 2009, Main Spatial Aspects of the Functioning of Higher Education Institutions in Poland, European Spatial Research and Policy, 16, 2: 79–92.


Szulc T., 2004, Dynamika przemian w szkolnictwie wyższym w Polsce a realizacja procesu bolońskiego [The Dynamics of Transformations in Polish Higher Education in Respect to the Bologna Process], *Nauka i Szkolnictwo Wyższe*, 24, 2: 7–36.


