# II. INDEXES OF REGIONAL ECONOMIC GROWTH IN POST-ACCESSION ROMANIA

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## Abstract

*The European Cohesion Policy is designed to yield concrete results, furthering economic and social cohesion and reducing gaps between development levels in the various regions. Considering the context of the early post-accession period, posing significant challenges to regional development in Romania, we have investigated, based on three indexes that we advance in the methodological section, the pace of development, comparatively, in the eight development regions of Romania. The results of the study, further presented, can serve as a basis for more detailed empirical investigation of the phenomena theoretically approached in this paper.*

**Keywords:** cohesion, regional development, integration, intellectual capital
**JEL Classification**: R58, C1

## Literature review

The difficulties in fighting regional gaps have brought to the forefront a more vigorous public policy that would be a direct support to the more disfavored regions. Important consideration outline that, in fact, investments and production look for more positive environment, good facilities and easy access to market and to resources, which are concentrated in the most favored regions or/and large urban centers (Benini and Czyzewski, 2007). Therefore, the dominant trend will not be the relocation to poor

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regions, looking for cheap inputs (subsequent to the neo-classical option), but on the contrary, the further concentration around the national most advanced places and wealthy regions, having as a consequence further deepening of the gaps vis-à-vis the neglected regions. The ''cumulative causation'' explications (Myrdal, 1957) in fact explain this phenomena of the virtuous cycle for which ''who is rich gets richer, and who is poor, gets worst''. Since globalization implies sharing of information, products, values, and norms, there should also be a dissipation and not a concentration of wealth across regions.

It is obvious that *discrepancies between regions* and nations will never disappear, since developed regions possess resources needed to increase their prosperity, while less favored regions lack the means to alleviate poverty and this amplifies their backwardness. These differences are the result of long-term historical and political evolutions, and diminishing their effects is a thorny and costly process (Volkery, Swansson *et al.*, 2006). The concept of core and periphery provide an explanation of *regional disparities* in many instances. The idea is that regions distant from the core of an activity in a region fail to develop equally with areas closer to the core. For example, Krugman (1991) and Krugman and Venables (1990) show that the European Union (EU) has a core containing a high concentration of economic development, modern infrastructure, and advanced social indicators. All the attributes of post-industrial life are concentrated in the core; the periphery contains regions which have been outside the main strands of European development and which in many instances remain locked in the rural life styles of other ages (Dimitrios *et al*., 2000).

Some scientists and politicians noticed the disparity among regions in benefits from the access to European markets resulting in divergent economic growth results (Tomidajewicz, 2003). Although there is a great support from the European Union for regional development, some regions are lagging behind in economic development. During the transition process, regional development has not been uniform across all regions, because the well-off regions have been capable of adapting more efficiently to the reform measures and have been catching up with the socio-economic conditions of the EU members, while the least-favored regions have not. These differences are likely to affect inequality in welfare (Quarado *et al*., 2001). In the case of Romania, the Bucharest-Ilfov region has registered in 2007 a gross domestic product - henceforth GDP - per capita of 10,869 euros, while in the South-West Oltenia region the same indicator was 4,466 euros (Dumitrescu-Răuță, 2008). And if it were to compare, inside the South-West Oltenia region, the average wealth of inhabitants in Craiova with that of people from Rovinari, the discrepancies would be again mind-boggling (Talvescu and Dima, 2008).

Large inter-regional disparities in welfare or living conditions may become important obstacles to development and, moreover, they may stimulate social tensions. It is therefore important to study the disparities between the regions more thoroughly. An additional reason to pay attention to regional inequality is that regions play a significant role in achieving full EU membership. Many theoretical and empirical studies of regional disparities have been restricted to using single economic indicators (e.g., per capita income). A comprehensive measure (Grozea-Helmenstein *et al*., 2006) should be used for benchmarking the attractiveness of different regions,

representing each region in the best possible way, and designed to help firms make decisions on relocating activities or help authorities in properly allocating funds.

The single indicator approach has been criticized by, amongst others, Atkinson (1970), Atkinson and Bourguignon (1982), Maasoumi and Jeong (1985) Maasoumi (1986), Maasoumi and Nickelsburg (1988), Maasoumi and Zandvakily (1992, 1999) and by, *inter alia*, Folmer (1986) and Nijkamp (1988), in the context of regional inequality analysis. For instance, Bradfield (1988) and Davezies (1992) show that different results are obtained by using income per capita or personal disposable income per household as the inequality measures. Moreover, many studies analyze inequality using income as an indicator. However, this indicator does not always match with particular goods related to welfare, even if they are measured in monetary terms (Richardson, 1997). For instance, improvement in health conditions may improve welfare much more than the same amount of expenditure on certain consumption goods. Most importantly, however, Sen (1983, 1985) shows that inequality is linked to many aspects of a person's life including income, the availability of educational facilities, the provision of medical care, the quality of housing, safety, the quality of the natural environment, etc. (MacGranahan *et al*., 1985; Mazundar, 1986; Cohen, 2000). In a regional setting, this implies that regions should be viewed as complex systems made up of a number of profiles or subsystems, such as an economic, social, environmental, political and infrastructural subsystems (Hansen, 1995; Folmer, 1986).

In general, the most frequently used composite *index of development* is the Physical Quality of Life Index (PQLI) with three variables: infant survival rate, adult literacy rate and life expectancy (Morris, 1979). However, it is generally believed that quality of life/welfare should be measured on the basis of a large number of attributes as it is relevant and feasible (see Slottje, 1996; Hirschberg *et al.,* 1991; Sen, 1985, 1987; Maasoumi, 1986; Atkinson and Bourguignon, 1982; Kolm, 1977). Therefore, Majumider *et al.* (1995) attempt to widen the scope of the physical quality of life measure by incorporating variables from various groups of socio-economic characteristics of people (urban population, life expectancy, infant survival rate, calories supply per capita, adult literacy rate, energy consumption per capita, etc.). Their point of view is that socio-economic up-liftment of its people is the main objective of any country at any point of time. This obviously requires an increase in the level of Per Capita Gross Domestic Product (PCGDP) of the country. But a higher level of PCGDP does not necessarily mean a higher level of development in terms of socio-economic aspects of life. In fact, PCGDP is not the sum of human life, it is only a means used to create an environment for people to enjoy long, healthy and creative life. Thus, to have an idea of the level of development of a country/region it is more important to look at the *socio-economic* aspect, rather than concentrating only on PCGDP.

In most studies, *regional development*, quality of life or other indices are taken as the weighted mean of a set of amenities and the basic problem in constructing those lies with developing a method for weighting the different amenities. Previous work in this area – for example, Gyourko and Tracy (1991), Blomquist *et al*. (1985, 1988); Roback (1982, 1988); Rosen (1979) – defines a quality of life index (which may be interpreted as a *regional development index*) that is a weighted average of local amenities and

uses that index to rank a set of areas; the contention is that the well-being of economic agents depends (among other factors) on the characteristics of each area.

The regional development pattern of five regions, viz., North, South, Tropical America, Tropical Asia and Tropical Africa (Majumider *et al.*, 1995) was studied using two indices based on a group of representative socio-economic indicators. The analysis was based on measures of 'inequality' and 'mobility'. Comparison of results using these indices and the Per Capita Gross Domestic Product (PCGDP) revealed that while the situation with respect to PCGDP had worsened over the years that with respect to the socio-economic indicators had become better.

Dimitrios *et al.* (2000) analyzed inter-regional differences and identified a suitable combination of policies for a set of regions. Their methodology was based on the development of a composite index and was applied to compare (i) the members of the Former Soviet Union (FSU) and (ii) the regions of Russia. The FSU countries were positioned on a regional development index – per capita income mapping to investigate whether emphasis should be placed on regional, environmental or sustainable development policies. At the same time, an index that incorporates various socioeconomic components was computed for the regions of Russia which were subsequently classified based on the value of this index.

In 2001, Quadrado *et al.* identified the least-favored regions and the most favored regions with respect to welfare in Hungary. They adopted a multivariate rather than a univariate approach, because welfare and inequality in welfare are linked to many aspects of an individual's life. Using Theil's second measure of inequality, they constructed a composite index made up of health and education indicators, housing conditions, Gross Domestic Product per capita (per capita GDP), regional investments and the regional unemployment rate.

The regional development in Spain has been widely studied. Nevertheless, the attention has almost exclusively been focused, from a macroeconomic point of view, on two key variables: per capita income and labor productivity. These variables are indistinguishable in a growth model with full capacity utilization, although from an empirical viewpoint their behaviour may be notably different in both the short and the long run (Paci, 1997; Goerlich and Mas, 1998). Goerlich and Mas (2004) focused on per capita income and on two additional variables related to this: inequality and welfare (inequality in the personal distribution of income within a given region, and not to the inequality between the average per capita incomes of the different regions).

Poland represents a country with growing regional disparities, which is an unavoidable consequence of the process of transformation and economic growth. Bronisz *et al*. (2008) looked at competitiveness from a regional perspective and attempted to conceptualize regional competitiveness by combining some data, namely inputs, outputs and outcomes into one global index. It allowed to measure the state of 16 Polish regions and ranked them according to the final result. The Huggins approach concerning competitiveness was applied in order to create the ranking of competitiveness of Polish regions consisting of many different components.

More recently, in *A rank order and efficiency evaluation of the EU regions in a social framework*, methods of multi-criteria efficiency evaluation were implemented by Slavova (2008) for ranking the socio-economic systems of the EU regions. The rank

order of the 268 NUTS-2 regions[1] from the 27 European Union countries in the social framework obtained on the basis of 16 socio-economic indicators illustrates social divergence within the European Union and in the new European Union regions.

The indicator weights were calculated as solutions of the explicit absolute optimal weights index (AOWI) procedure and are endogenously optimally selected for each country. The solution of this complicated, non-linear and non-convex problem reflects the development of the social systems of individual regions, adequately representing each region, independent of subjective priorities. Using the proposed wealth measure, Slavova computed and evaluated the uniform rank order of the regions within the European Union in a social framework. The results of the benchmarking attest the great social divergence between the old European regions and the new ones - the Bulgarian and Romanian regions, where the best position is held by the Bulgarian region of Yugozapaden (211). All other Bulgarian and Romanian regions lie at the lower end. Overall, the Bulgarian regions do better than the Romanian ones.

One may see from the summarized research that there is a growing interest in assessing the regional development of newer European regions, in a comparative perspective, in order to equalize the level of development across Europe, and to ensure the adequate absorption of structural funds by those regions needing them in the first place. Studies focusing on Romania, *per se*, are missing from this picture. Some indexes were proposed by Sandu (2006), for rural areas in Romania. He started from primary indexes of development, available in official statistics, and then he obtained by factorial analysis secondary indexes of development, such as human capital index (HUMANVIL), the quality of households (QBUILDINGS), the demographic modernity of the village, its demographic potential, its isolation (ISOLATION), and its updating (UPDATING). From these indexes, the DEVSAT (the index of village development), as tertiary index, was obtained, as a factorial score of the secondary indexes. He then analyzed, comparatively, the historical regions of Romania in terms of the rural area development. Still, this analysis is not encompassing the entire region, but only the villages, which lag far behind elements of the region. If we include a coefficient of rural composition of the region, these data can be treated as significant for the general level of development, constituting a significant starting point for our research.

## Methodology

The distribution of least-favored regions and more prosperous regions is usually based on approaches using single indicators (notably, per capita income). However, distributions thus obtained are likely to differ from the distributions based on multidimensional approaches. Since the allocation of regional aid is based on region's needs, the allocation is likely to change along with the approach applied to measure

[1] *The EU NUTS system (Nomenclature of Territorial Units for Statistics) ammended for the last time in May 2003, (Regulation (EC) NO.1059/2003), classifies EU regions according to their population into three categories: NUTS 1 – with the population ranging between 3.000.000 – 7.000.000 inhabitants; NUTS 2 - with the population ranging between 800.000 –3.000.000 inhabitants; NUTS 3 - with the population ranging between 150.000 – 800.000 inhabitant).*

regional inequality. It is important to observe in this context that Giannas (1999) argues that an allocation based on a multidimensional approach is likely to be more equitable than an allocation using a single and straightforward economic indicator.

Taking this premise, of the multidimensional approach, we have defined nine variables, characterizing the eight development regions in Romania, and collected data for 2007 on these variables from Regional Development Plan for Central Region for the period 2007-2013. The values of the variables corresponding to each development region are synthesized in Table 1 below.

**Table 1**

**The values considered for the eight Romanian development regions***

| | modr | edinst | hosp | under 15 | over 65 | lifeexp | emplrd | exprd | Stud |
|---|---|---|---|---|---|---|---|---|---|
| SW | 32.4 | 1321 | 42 | 15.6 | 16.2 | 71.6 | 3.0 | 0.49 | 10.2 |
| NE | 25.1 | 1664 | 66 | 18.3 | 14.4 | 71.8 | 2.9 | 0.16 | 10.2 |
| SE | 19.4 | 1772 | 47 | 15.4 | 14.4 | 71.7 | 1.8 | 0.11 | 9.8 |
| SM | 29.2 | 1901 | 62 | 15.2 | 16.5 | 71.6 | 3.2 | 0.31 | 6.8 |
| W | 26.0 | 1242 | 46 | 14.9 | 14.4 | 71.0 | 2.2 | 0.15 | 18.8 |
| NW | 27.2 | 1301 | 61 | 16.1 | 13.4 | 71.0 | 2.3 | 0.22 | 16.9 |
| C | 23.8 | 2040 | 51 | 15.7 | 13.7 | 72.1 | 2.4 | 0.13 | 14.1 |
| B-I | 52.6 | 662 | 58 | 11.8 | 14.7 | 73.8 | 20.8 | 1.0 | 45.0 |

** modr = modernized roads (% public roads); edinst = education institutions (count); hosp = hospitals (count); under15 = population under 15 (% population); over 65 = population over 65 (% population); lifeexp = life expectancy (years); emplrd = employees in R&D (% employees); exprd = expenditures on R&D (% GDP); stud = students (% of school population). SW = South West Oltenia, NE = North-Eastern, SM = South Muntenia, W = Western, NW = North-Western, C = Central, B-I = Bucharest-Ilfov*
*Source: Authors' analysis.*

We have defined, based on these variables, three indexes:

- The infrastructure index (II),
- The population rejuvenation index (PRI),
- The intellectual capital index (ICI).

As the variables are highly inter-correlated, we performed a factorial analysis with orthogonal rotation (Varimax), in order to obtain uncorrelated factors. Based on the factorial analysis, we aggregated three indexes, the infrastructure index, the population rejuvenation index, and the intellectual capital index. Consistent with the World Bank Indexes on Infrastructure, and with the World Development Indicators, the infrastructure index took into account the modernized roads, the education institutions, and the hospitals. Based on studies in social gerontology (Długosz, 2003; Mangen and Peterson, 1982; Redburn and McNamara, 1998), on Billeter's J index (Billeter, 1954, in Dietz, 2002), the index of demographic ageing, we proposed the population rejuvenation index. This index took into account the percentage of the population under 15, the percentage of the population over 65, and the life expectancy, seen as

the fixed base of the replacement rate. Finally, based on the regional intellectual capital index (Carlucci, Lerro, Schiuma, 2005; Schiuma, 2008), we proposed the intellectual capital index, which took into account the number of employees in R&D, the expenditures on R&D as percent of GDP, and the student population. The main limitation of this last index refers to leaving aside those industries which are innovative, without necessarily being very active in R&D as, for instance, the financial services. Thus, further work on expanding the span of this index, to make it more largely applicable, is to be pursued.

These indexes were computed, on a comparative basis, for each region.

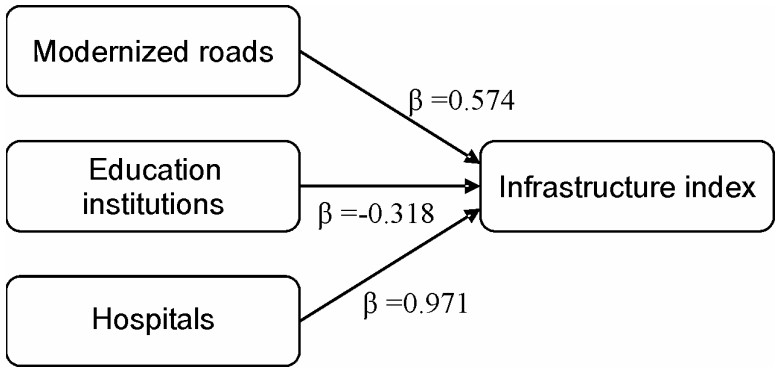
The results of the analysis are presented and discussed in the following section.

## Results and discussions

The factorial scores for the infrastructure index, based on modernized roads, education institutions and hospitals are presented in Figure 1 below.

**Figure 1**

**Factorial scores for infrastructure index**




*Source: Authors' analysis.*

The β values for the components of the infrastructure index are placed on the arrows. As one may see, hospitals weight the most in the infrastructure index, unlike the education institutions, which are not that significant for the quality of development in the region. Thus, the level of investment in healthcare can be considered a sound indicator for the level of regional development, and a regionalization of the allocation of funds in healthcare is recommendable. Considering the negative score of the education institutions, we suggest that, contrary to the well established practice of considering them part of the infrastructure, they should be considered part of the intellectual capital index. Indeed, the factorial score for education institutions in the ICI expanded is β= 0.254, which pleads for their placement in the intellectual capital category, rather than infrastructure.

The values of the infrastructure index, for the eight development regions considered, are presented in Table 2.

**Table 2**

**The infrastructure index (II)**

| | II |
|---|---|
| SW | -1.16 |
| NE | 1.04 |
| SE | -1.62 |
| SM | 0.63 |
| W | -0.99 |
| NW | 0.82 |
| C | -1.09 |
| B-I | 2.36 |

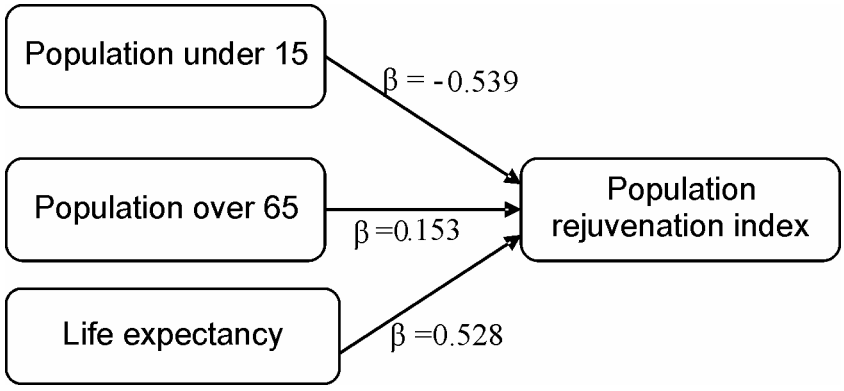
*Source: Authors' analysis.*

Naturally, the largest value of the infrastructure index is obtained in the Bucharest-Ilfov region, while the lowest belongs to the South-Eastern part of the country, which is also the least developed, from the economic point of view. Better scores are obtained by the North-Western and South-Muntenia regions. The North-Western region comprises the northern part of Transylvania, in which several infrastructure development projects, like ClujNetworking4Europe, or Twinning Light, and also cross-borders infrastructure development projects were put in place, which explains the relatively higher score. Also, the South-Muntenia region has implemented the RIS/InnSoM (Regional Innovation Strategy - Innovate South Muntenia) project, promoting sustainable regional development. One may notice that the values of the infrastructure index are generally negative, or well below 1, which indicates a poor level of infrastructure development in the considered regions, as well as a discrepancy between the regions and Bucharest.

The factorial scores for the population rejuvenation index, based on population under 15, population over 65, and life expectancy, are presented in Figure 2 below.

**Figure 2**

**Factorial scores for population rejuvenation index**




*Source: Authors' analysis.*

The population under 15 is separated by the other two variables, and we consider that it counts as a potential in the population rejuvenation index, while the population over 65 is of little importance to the value of the index. The life expectancy, considered as the fixed base of the population replacement rate, has a significant score, which is consistent with the fact that the most developed regions have the highest life expectancy.

The values of the population rejuvenation index for the eight regions considered are presented in Table 3.

**Table 3**

**Population rejuvenation index (PRI)**

| | PRI |
|---|---|
| SW | 0.004 |
| NE | -0.94 |
| SE | -0.12 |
| SM | 0.16 |
| W | -0.39 |
| NW | -0.89 |
| C | -0.07 |
| B-I | 2.25 |

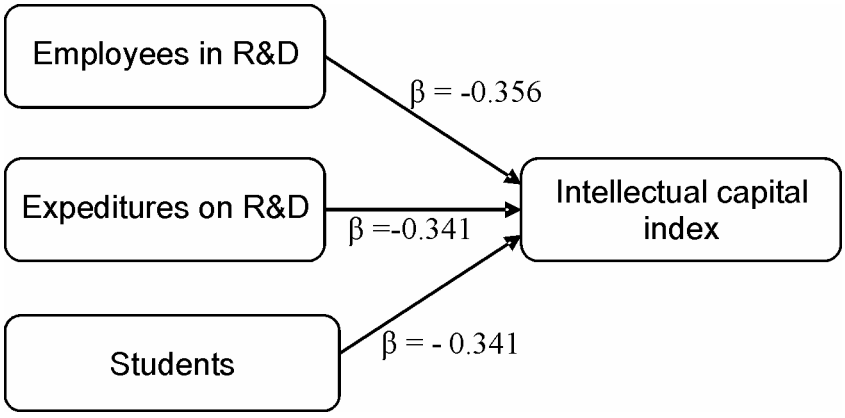
*Source: Authors' analysis.*

For the all regions, except for Bucharest-Ilfov, the population is aged, with little rejuvenation. This unbalanced distribution is explained by the migration of the student population and of the young workforce to Bucharest, and by an increase in birth rate in the most developed regions.

The factorial scores for the third index computed, the intellectual capital index, are presented in Figure 3.

**Figure 3**

**Factorial scores for intellectual capital index**




*Source: Authors' analysis.*

As one may see, the factorial scores are negative for all the variables considered, which shows, as we outlined in the methodology, that the IC index needs additional variables to be included in order to explain its variation.

The values of the intellectual capital index for the eight regions of development are presented in Table 4.

**Table 4**

**Intellectual capital index (ICI)**

| | ICI |
|---|---|
| SW | -0.08 |
| NE | -0.46 |
| SE | -0.59 |
| SM | -0.37 |
| W | -0.27 |
| NW | -0.24 |
| C | -0.41 |
| B-I | 2.44 |

*Source: Authors' analysis.*

Consistent with the presented situation of the other two indexes, the intellectual capital index takes negative values for all the regions, except Bucharest-Ilfov, signaling that there is an R&D concentration in the capital, at the other regions' expense. As outlined before, this does not exclude the presence of a latent intellectual capital in the other regions, which is not well enough extracted by the index, and which should be mapped by adjacent methods of exploration.

## Conclusions

The accession process initiated in 1998 by the European Union represented an important challenge, but also a great opportunity for regions of the CEE countries, due to their future eligibility for Structural Funds. Since the EU's Phare Program was modified in 1998 from a demand-driven program (in which the partner countries apply for funding) to an accession-driven one based on the Accession Partnership, regional development has been viewed as a priority of the EU policy.

The EU Structural and Cohesion Funds for member countries (including Romania) are currently allocated on the basis of criteria such as GDP per capita or unemployment rates (rather than a composite index that, as argued above, reflects properly regional inequality). Regions qualifying for regional inequality funds are backward or economically least-favored. The reduction in social and economic disparities (inequality) has become a key issue in the policy debate at EU level since countries with relatively low incomes (e.g., Spain and Portugal) joined the EU in 1987 (Mcaleavy and de Rynck, 1997). Based on Article 130a of the Treaty, economic and social cohesion is one of the three pillars of the EU along with the monetary union and the single market. The EU latest enlargement to 27 member countries makes economic and social cohesion even more important and more difficult to achieve. In the following

years, due to the accession process, the Union will face severe problems when attempting to integrate countries with extremely poor socio-economic conditions, even in comparison with the "poorest" countries within the EU-15. The achievement of the EU objectives, therefore, depends on three relevant factors: the effectiveness of structural policies for reducing regional inequality; the continuing growth of the new member countries economies and the completion of welfare system reforms in these countries. Thus, the adequate mechanisms for assessing regional development and for reducing disparities among regions should be based on a set of ratios correctly defined according to the socio-economic context. The results of our analysis are relevant for policymaking in this regard.

Our analysis has shown the regional disparities existing in Romania from the point of view of infrastructure development, social demography and intellectual capital evolution. The highest concentration of intellectual capital, due to a better infrastructure development, and to the migration of a young, highly trained workforce, is in the Bucharest-Ilfov region. The two other regions having an above the average value of the infrastructure index, North-West and South-Muntenia, do not confirm their potential when it comes to analyzing the population rejuvenation index, which is highly negative for North-West, and only slightly positive for South-Muntenia, and the intellectual capital index, which is slightly negative for both regions. Still, in the case of the last index, there can be suspected a bias regarding the selection of the variables, as variables related to R&D, although they are classically employed in discussing regional innovation and in assessing regional intellectual capital, do not capture the entirety of the innovative practices, which generate intellectual capital, in the region.

Further research should, thus, focus on expanding the selection of variables, and on collecting, starting from a more sensitive and specific index design, own data, which are more properly tailored for the purpose of the research than the data contained in the official statistics.

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