SOCIO-ECONOMIC DISPARITIES IN THE BALTIC STATES: ANALYTICAL COMPARISON AND CATEGORISATION OF THE REGIONS

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Abstract

Although the Baltic states, comprising Estonia, Latvia and Lithuania, situated on the historical boundary of Northern, Central and Eastern Europe, are very similar from the viewpoint of regional identity and development as well as history and geographical characteristics, they exhibit regional disparities. This analysis focuses on monitoring a statistical set of ten selected representative economic and social indicators at the level of the NUTS 3 regions using deviations from the median and cluster method. Based on the analysis, the regions were categorized into groups that have shown the major disparities and differences between the capitals' regions and the rest of the countries.

Key words

Baltic states • NUTS 3 regions • economic and social indicators • regional disparities

Introduction

The Baltic states, as the three countries, Estonia, Latvia and Lithuania, on the Eastern Baltic shore are usually termed, are frequently considered as a single unit with a similar regional identity, history and geographical characteristics. However, this is a strong generalisation made from an external viewpoint.

Apart from the language or religious aspects, we can see obvious differences both in the territorial and economic inclination and the regional development trends and character of internal differentiation. Despite mutual close cooperation motivated, among other things, by the proximity of Russia and common membership of the European Union (EU), these states act in a quite individualist

manner (Nilsson et al. 2010; Miškovský 2012).

The territory of the Baltic states, on the historical boundary of Northern, Central and Eastern Europe forms a part of a transition zone between the European East and West (Halecki 2000; Davies 2007; Nováček 2012), where various influences have intermingled, which may render the existence of differences inside this region and inside the states themselves conditional. Among the major factors for the formation and presence of internal disparities in this area is the position of the region itself, which is the source of a generally lower population density and high concentration of the population on the coast and in the three capital cities. The varying degree of concentration in the capitals' regions is also obvious in many other aspects (Hampl et al. 1987).

These states successfully recovered from the decline of their economies in the 90's after the fall of USSR and, except for the recession of 2008-2010, they are registering relatively quick growth. Despite the tense relationship with neighbouring Russia, their significant link to the Russian economy persists both in an economic (Laaser & Schrader 2002) and social manner. Russians also represent a significant ethnic minority. The presence of ethnic Russians within the populations of Estonia and Latvia is high (about 25% in 2014). In Lithuania, their presence is substantially lower (5%), while the Polish minority here also has a strong presence (6%). At the same time, this aspect of the ethnic heterogeneity can be considered as one of the factors that affect the regional differentiation of these states.

The concentration mechanisms leading to the creation and increase of spatial disparities, or rather, to the deepening of the relationship between the core and the periphery, were associated with industrialisation and urbanization in the past (Hampl et al. 1987). Such processes primarily occurred in the Baltic states in the period from the end of the 19th century to the 1980's (Švec et al. 1996). The collapse of the USSR deeply

afflicted the economies of these countries and resulted in a change of the concentration mechanisms. Academic interest in structural changes in the post-socialist era is demonstrated by many works devoted to the issue of the transformations in Central and Eastern Europe (Dančák et al. 1999; Hampl 2005; Michalski 2006; Sawers 2006; Popjaková 2008; Sýkora & Bouzarovski 2012).

One of the objectives of this study is, therefore, to determine and mutually compare the degree of dominance of the three capitals' regions of their states: Tallinn (Põhja-Eesti) in Estonia, Rīga (Rīga including Pierīga region) in Latvia, and Vilnius (Vilniaus apskritis) in Lithuania in the context of the cited regional disparities. Particularly in the case of Rīga, which was long considered as the major core of the entire Baltic region during the Soviet era, it is possible to assume a higher level of concentration in terms of the monitored socio-economic indicators. In terms of internal disparities based on the location of the region, we can generally expect significant differences between coastal and inland areas in most aspects. To a certain extent, this may also reflect the fact that the coastal areas were permanently in closer contact with the advanced European West than the agricultural inland areas. The other aim of this contribution is to track differences in the Baltic states on the basis of various aspects and to answer the question whether uneven development is based on dominance of the capital cities or on the proximity of advanced Western and Northern economies.

Baltic states in the European context of regional disparities

The issues of regional differentiation and formation of spatial disparities rank highly among the traditional topics of geographical interest. In connection with Central and Eastern Europe (CEE), many inspiring papers have also been written on this issue since the beginning of this century (see chapter 3). In their conclusions, the authors generally agree that in the transformation period after

1989/1990 to date, relatively quick spatial polarisation has been taking place in these countries, specifically the increasing economic and social differences between the capital's region and other areas of each country. From the works that monitor the developmental trends in spatial disparities directly in the Baltic countries, it is possible to primarily give credit to the work of Vošta (2004), Sawers (2006), Burneika (2007), Cibulskienė and Butkus (2007) and Fedorov and Mikhaylov (2018). Some studies focused on research into regional disparities within the CEE countries and draw attention to the presence of a certain East-West gradient (Nováček 2014; Lang 2015; Kubeš & Kebza 2018; Matlovič et al. 2018). The regions in the East of these countries usually exhibit relatively worse economic and social parameters than their more westerly regions (e.g. Barjak 2001).

The existence of territorial disparities is a natural component of the regional differentiation of every state. If we narrowed the entire issue down to only some economic indicators for accession negotiations, such as GDP per capita and unemployment rate, then in the European context we could differentiate three types of generalised forms of prevailing spatial regularity. These three types are on one hand based on the proximity of large core areas of continental importance, such as Blue Banana (Hospers 2003), which is reflected in the form of socio-economic gradients presented e.g. in Nováček (2014). The second component that has an impact on the level of socio-economic development is also the effect of the capital, which is in the context of CEE discussed by Dostál (2002) and by Benedek and Kocziszky (2015) in a more empirical study. In fact, two different layers are projected into reality which overlap with each other. The stated indicators can be considered at the same time as a certain determinant of many social, cultural and political spatial disparities.

The first type has already been mentioned in connection with the CEE countries, where a certain east-west gradient appears in various modifications. The opposite, thus west-east gradient of territorial polarisation, has been presented long-term in Ukraine. Similarly, we can discuss the south-north (or north-south) gradient as the second type, especially in Mediterranean region, Belgium or Germany (partially). The third type is possible to assign to the countries with a clear dominance of core-periphery polarisation where one dominant region shows substantially different parameters, whereas the disparities between the rest of the regions are either minimal, or do not exhibit any other regularity in the form of some spatial gradient. This is typical particularly for the Nordic countries with a relatively low population density and a high population concentration and activities in one area or narrow belt of the coast. The high disproportions including the concentration of the population and hierarchy of the settlement system here are strongly determined by natural conditions. The significant polarisation between the capital region and the rest of the regions in the country is nonetheless visible in most of the countries, perhaps except for Germany, the Netherlands, Switzerland, Italy and partly Spain (Nováček 2014). Apart from the above-stated groups, we can identify countries in Europe which would be problematic to unambiguously classify under any of the previously mentioned types, an example of which may be the countries of Great Britain or France.

Due to the position of the Baltic countries, it is possible to expect inclination towards the third and potentially also the first type of the so-defined regional disparities. As is obvious from the given typology and outlined determinants, the location of the country itself has a significant impact on territorial polarisation.

In addition to location of the continental core areas and development axes that reflect the typology above, there is also a need to think in terms of regional core-periphery relationships, which are given by the distance to the local or, possibly, national centre and the size of the centre itself (Matlovič et al. 2018). These relationships, as shown by Kubeš and Kebza (2018), can be more pronounced than the gradients mentioned.

Core-periphery is represented here by the leading centre, various groups of areas and lastly, by the periphery (or peripheries, as in Kebza 2018). Both core and periphery are affected by a multitude of processes, summarized in metropolitanization and peripheralization. While metropolitanization in its simplified concept means quantitative development in urban core and suburban hinterlands (Hampl & Marada 2016), peripheralization is a process of producing peripheries under social relations with spatial implications (Kuhn 2015) and might occur even in the most developed regions (Šimon 2017).

In discussing cores, it is necessary to reflect on their quantity – in the logic of previous paragraph, there is a significant difference in development between monocentric and polycentric regions and countries (Matlovič et al. 2018). While in the Baltic states all the studied regions are monocentric, Lithuania as a whole is rather polycentric which may indicate multi-point distribution of socio-economic growth. On the other hand, Latvia is strongly monocentric; to a certain extent, suppressing all the other regional (second-tier) centres.

Regions, indicators, data and methods

During the study of regional disparities, it is always important to consider the four initial methodical steps, which are mutually conditional, limiting and supplementary: (1) selection of regions, i.e. hierarchical level of the spatial (administrative) units which shall be the object of research, (2) selection of indicators and characteristics of the regions which shall be the basis for examination of regional convergence, divergence or polarisation of regions, (3) data base, availability of statistical resources for the selected territorial unit and, last but not least, (4) selection of the methods and tools for examination of the regions.

Concerning selection of regions, the most commonly used regional level in cross-regional analyses and, for instance, also across the CEE countries, is NUTS 2 or NUTS 3 (e.g. Barjak 2001; Egger et al. 2005; Ezcurra et al. 2007; Kallioras 2010; Monastiriotis 2011). These territorial units are part of the European nomenclature and are a tool for structural funds or regional self-government. This regional level is often used in the research studies on interregional differences within one country (e.g. Quadrado et al. 2001; Wostner 2005; Cibulskienė & Butkus 2007; Banerjee & Jarmuzek 2010; Hampl 2010). For research in the presented study of regional disparities in the Baltic countries, the NUTS 3 territorial units were used. This was primarily for the reason of the availability of data and the ensuing mutual comparability of the regions. This concerns a total of 21 administrative units, of which five are in Estonia, six in Latvia and ten in Lithuania. For the purposes of part of the research, the number of regions was reduced to 20 by merging the urban region of Rīga and its hinterland known as Pierīga. Without this step, there would be substantial distortion because the other capital cities, Tallinn and Vilnius, do not have their purely urban regions at this regional level.

Another basic regional analysis step is the selection of indicators. In accordance with the emphasised need for objectivity of the indicators (Crescenzi & Percoco 2013) and drawing on the experience of selection of indicators in other similar studies and, finally, considering the availability of data, ten indicators were selected and used in the analysis. Five indicators represent the economic level and a further five, the social character of the regions. Specifically, GDP per capita and average monthly wages have the potential to describe the living standard in the regions, but also the performance of the economy. Unemployment rate may indicate potential structural problems in the region or, on the contrary, accentuate its high economic performance. The share of workforce employed in agriculture (or share of workforce employed outside agriculture) represents regional economic progressiveness. An indicator with the function of some

sort of economic catalyst is transport infrastructure or major roads density. The selection includes only the most important traffic arteries, and first class (national routes) and other hierarchically higher roads, because monitoring limited solely to motorways would be irrelevant due to their short length. All the economic indicators were set in such a manner that their highest significance reached the positive poles. For this reason, the values of some indicators were inverted, specifically unemployment and the share of employed in agriculture.

The analysis at the same time considered five social factors. Population density together with urbanisation rate may testify about the region's economic development level if we base our judgement on the assumption that strongly urbanised areas can generally be considered as the most developed. The population balance through net migration rate was monitored, which should have accentuated the attractiveness of the region for settlement at the expense of the areas with lower life quality. The share of tertiary education graduates may also reflect the human capital or social status of the population. However, it is possible to assume the deformation of this factor due to the presence of universities in the region. The last indicator is the share of foreigners, which is however in itself highly distorted particularly by the considerable Russian minority in all three countries. For this reason, the population that stated Russian as their mother tongue was excluded from the number of foreigners. In Lithuania, for the same historical reasons, people who stated Polish as their mother tongue were also excluded. An indicator modified in this way should evaluate the progressiveness of the regions in terms of internationalisation, which may be associated with, for instance, gentrification in the capitals.

A problem in the selection of indicators may be the limited existence and availability of data, particularly if the objective is to obtain data for a broad spectrum of indicators, for smaller territorial units, or from various national statistics. In the presented study,

the data of the statistical offices of all three countries (Central Statistical Bureau of Latvia [CSBL] 2015; Statistics Estonia [SE] 2015; Statistics Lithuania [SL] 2015) and the Eurostat (2015) database were used. The data for examination of the indicators primarily relates to 2011, when a population census was conducted in all three countries. In the event of the non-existence of such data, the data from the nearest years was used. An exception is the value that constitutes the overall rise in the population, which was monitored for the entire decade, i.e. 2001-2011.

Various methodological tools are used to express economic disparities, from simple statistical indicators to complicated econometric analyses and models. The overviews of some of the most frequently used methods are contained in theoretically-methodologically focused studies (e.g. Blažek & Uhlíř 2002). In the geographical regional analyses focused on Europe, apart from the coefficient of variation, the Gini and Theil coefficients are used, while the Hoover index and Herfindahl index of concentration are also suitable (e.g. Matlovič & Matlovičová 2011; Masso et al. 2012).

In the presented paper, the method derived from the calculation of the deviations from the median (d_m) of the values of the individual indicators for each country, or more precisely, region was used according to the relationship:

$$d_m = \frac{x \cdot 100}{y}$$

where x is the value of the indicator and y is the median for the regions of one country.

The arithmetic mean of the deviations from the medians of the given region was used to calculate its total index, which was subsequently standardised within the interval <0;1>, in which the value 1 was always assigned to the most advanced region of each country (see below Tab. 1, Tab. 2 and Tab. 3). This step was primarily taken for the reason of comparability of the resultant values for the various countries and regions.

This index should summarise all characteristics of the socio-economic advancement of the region. The degree of dominance of the capital's region was derived from the values of the standardised total index, or rather, from the assessment of the degree of polarisation between the capital's region and the rest of the country. The arithmetic mean of the index of all regions in the given country excluding its capital's region thus shows how big their mutual polarity really is. The lower the index value, the higher the disparity, or more precisely, the dominance of the capital's region within the given country.

The applied cluster analysis (Everitt et al. 2011) is based on the hierarchical average-linkage clustering algorithm using the simple Euclidean metric, where the distance between two objects (vector x_i and x_k) is defined for all $i \neq k$ as follows:

$$d_{(x_i; x_k)} = \sqrt{\sum_{j=1}^{n} (x_{ij} - x_{kj})^2}$$

The distance of the clusters was thus determined as the average distance between all the pairs, each of which belongs to a different cluster expressed formally and unequivocally as:

$$d_{(A,B)} = \frac{1}{n_A n_B} \sum_{x_i \in A} \sum_{x_j \in B} d(x_i; x_k)$$

The dendrogram, which was created on this basis (see below Fig. 3) thus visualises the degree of similarity or dissimilarity between the individual clusters of the regions.

Analysis of regional disparities

The focal point of the analysis of regional differences in the Baltic states is presentation and summarisation of all the abovementioned indicators by region in each of the three countries. Attention is devoted to the explanation, substantiation and search for links and causalities of the different level of the indicator in the region based on their

deviations from the median for the individual regions. It is the evaluation of these deviations that forms the actual basis for analysis of the disparities of the Baltic region.

Estonia

In Estonia, the GDP per capita has similar values in all the regions excluding Põhja, the capital region, with particular characteristic deformation in this indicator of the foundation of a company which may run manufacturing operations in another region. Above the median is also the GDP per capita value of Kirde-Eesti (Tab. 1), where the situation is particularly influenced by the industrial character of the city of Narva and its surroundings as well as other coastal towns (e.g. Sillamäe). On the contrary, the least favourable is the situation in Kesk-Eesti, which comprises of extensive inland territory that is less densely populated when compared to the coastal regions. Due to the routing of the transport routes, it is possible to evaluate this region as a transit rather than a manufacturing region. Similar distribution, but with much smaller differences, is also obvious in terms of the average monthly wages. This is naturally highest in the region of the capital city, which is followed by Lääne-Eesti, whose values are, among other things, impacted by seasonal activities related as tourism in summer (as discussed in Ahas et al. 2007). The smallest are the values of the Kesk region with a minimum of population and less economically significant centres.

Unemployment rate shows very small differences in the Estonian regions. A higher unemployment rate exists only in Kirde-Eesti. This fact can be explained in two ways; firstly, as a problem caused by social exclusion of the population of ethnic Russian nationality. As ascertained by Aasland (2002), some working positions are unavailable to these 'non-citizens', but he also adds that the phenomena related to ethnicity need not necessarily lead to social exclusion. Secondly, the decline in industry employment opportunities as a consequence of economic transformation

Table 1. Deviations from the medians and total index in the regions of Estonia

	Põhja-Eesti	Lääne-Eesti	Kesk-Eesti	Kirde-Eesti	Lõuna-Eesti
GDP per capita	203.60	97.20	93.00	101.10	100.00
Average monthly wages	139.60	100.40	97.40	99.80	100.00
Unemployment rate	99.70	100.20	100.00	95.40	100.40
Share of workforce employed in agriculture	118.00	100.00	99.00	116.80	99.50
Major roads density	166.90	49.00	100.00	154.60	73.50
Population density	610.40	65.60	66.10	218.30	100.00
Urbanisation rate	110.90	66.60	100.00	110.70	72.90
Net migration rate	190.40	105.00	81.20	86.70	100.00
Share of tertiary education graduates	191.40	85.70	77.10	100.00	119.10
Share of foreigners	199.10	87.00	96.50	155.7	100.00
Total Index	*203.00*	*85.70*	*91.00*	*123.90*	*96.50*
Standardized Total Index	*1.00*	*0.42*	*0.45*	*0.61*	*0.48*

Source: Statistics Estonia (2015)

can be considered as an explanation. A different arrangement is obvious in the case of the share of workforce employed in agriculture. Their lowest proportion is naturally in the region of the capital city and the industrial region of Kirde. Small differences also exist among the remaining regions, of which Kesk and Lõuna are extensive and mostly inland, and thus have more agricultural activity. The last economic indicator considered was major roads density, in which substantial interregional differences are obvious. The highest route density occurs in the regions of Põhja and Kirde, which can be explained by both the higher population density and the presence of important city traffic nodes (Tallinn, Narva). The lowest density is in Lääne-Eesti, which is placed at a disadvantage by the terminal position, almost outside the main transport routes of national and supranational significance. This absolutely applies to both the largest islands, whereas Hiiumaa does not have even a single road in the monitored category.

The population density values naturally reflect the presence of the area of Tallinn, which also includes other large towns, e.g.

Maardu. Higher values also exist in the industrial region of Kirde with the towns of Narva, Kohtla-Järve or Jõhvi. On the contrary, low values exist in the Kesk region, without a more significant centre, and Lääne, containing an extensive and sparsely populated island part. Põhja and Kirde-Eesti also have the highest urbanization rate. The lowest values again are attributed to the island of Lääne and strongly monocentric Lõuna, with a relatively low amount of towns. In the net migration rate values, the region of the capital city is highly dominant, which can be linked to suburbanisation. Lower values exist in the relatively inaccessible Kesk region and industrially unattractive Kirde-Eesti. It is necessary to mention that the differences between the non-metropolitan regions are rather small.

The share of tertiary education graduates significantly reflects the presence of an important university in Tallinn in particular, further in Tartu, which has a branch also in Narva, in whose region the high value may be saturated by the necessity of educated workers in industry. However, the values may be distorted in the regions of Lõuna and Kirde

by the proportion of the rural population for whom the university centres are more difficult to access. There is a small share of tertiary education graduates in Kesk-Eesti, which can again be explained by the fact that the region rather fills the space between the country's centres. The proportion of foreigners is clearly highest in Tallinn's Põhja-Eesti, which is an expression of the natural attractiveness of the capital city, particularly for labour migrants. However, the high proportion in Kirde-Eesti is interesting, even despite the exclusion of the Russian speaking population. The substantial number of this minority thus prepares the ground for migrants with related language knowledge, ideally also from countries with worse wage conditions to take up less qualified industrial jobs; a large proportion of the local minority thus comprises Ukrainians (SE 2015).

In Estonia, there is a relatively significant dichotomy between Põhja and the rest of the country. Among the remaining four regions, the north-eastern region of Kirde stands out in many aspects as it is Russified and industrialised which leads to increased values of some indicators. Lõuna-Eesti, with the second largest Estonian city, Tartu, is surprisingly lagging behind somewhat. The region is too large, particularly in comparison with the cited Kirde, which unlike Lõuna has a larger number of working centres. This may result in distortion of the internal differences that are discernible at lower hierarchical levels. Lääne-Eesti is special; the character of which rather corresponds to an area of seasonal tourism, but not an economic or social centre; it is also strongly rural. This is also related to its internal segmentation, which is mainly attributed to the inland part of the region that is sparsely populated and has an underdeveloped but adequate transport infrastructure.

Latvia

In Latvia, the GDP per capita is distributed very unequally. The larger part is saturated by the Baltic metropolis, Rīga, and its hinterland Pierīga. It benefits from its position as the largest city of the Baltic states, but also its historical context and international importance in the economic sphere. The Rīga region is followed at a distance by Kurzeme with coastal towns with port functions – Liepāja and Ventspils. Here, it is thus possible to assume a high concentration of production and services, similarly to Rīga. On the contrary, the Latgale region (with the towns of Daugavpils and Rēzekne), which is the most easterly Latvian region and whose centre is relatively far from the larger centres, has the lowest value.

The average monthly wages in Latvia show the same spatial pattern, only with lesser dominance of the Rīga region (Tab. 2). The average wage may thus be comprehended as a more realistic indicator, which expresses the economic situation in the regions, but without deformation of the administrative settlement of companies without a labour base. The Latgale region that Herslund & Sørensen (2004), for instance, perceive as the most afflicted with a minimum of business activities and high unemployment, is lagging. But within Latvia, the unemployment in Latgale is not the worst; the highest unemployment rate is in Rīga and the adjacent Pierīga. This can be explained, for instance, by a correlation with migration, which is substantial in the capital region where new migrants are seeking job opportunities and are not always necessarily successful. On the contrary, the lowest unemployment rate is in the Vidzeme region, which can be characterised as rural, but also agrarian. It can be said that this region offers relatively adequate jobs in the rural area, particularly in agriculture, because this region has the largest proportion of employed within this sector of Latvia. The differences between the regions are however very small with only the broader Rīga region differing more significantly. The road network is most dense in the Rīga region thanks to its radial character; the Latgale region also has high values as it lies on the Vilnius-Saint Petersburg axis.

Massive regional differences and the dominance of the capital's region, can be

Table 2. Deviations from the medians and total index in the regions of Latvia

	Pierīga region + Riga	Vidzeme region	Kurzeme region	Zemgale region	Latgale region
GDP per capita	364.0	95.5	129.8	100.0	85.4
Average monthly wages	129.4	94.7	102.2	100.0	85.6
Unemployment rate	98.9	104.7	102.6	99.1	100.0
Share of workforce employed in agriculture	107.0	97.2	100.0	98.4	100.4
Major roads density	188.7	59.1	74.1	100.0	106.2
Population density	472.2	66.3	95.1	113.4	100.0
Urbanisation rate	136.8	75.0	105.6	81.3	100.0
Net migration rate	243.1	96.8	100.0	157.7	73.2
Share of tertiary education graduates	172.1	94.6	95.9	100.0	100.0
Share of foreigners	100.0	56.5	146.8	98.4	106.5
Total Index	*201.2*	*84.0*	*105.2*	*104.8*	*95.7*
Standardized Total Index	*1.00*	*0.42*	*0.52*	*0.52*	*0.48*

Source: Central Statistical Bureau of Latvia (2015)

observed in the population density. This is mainly due to the population concentration in Rīga and the suburbs which surround it. The Vidzeme region has the lowest density since there are no large settlements. The urbanization rate has a very similar character, which also reflects the dominance of Rīga. For that matter, this may be one of the reasons for the very low urbanisation rate in some other regions. For instance, its level is lower than 50% in Zemgale and Vidzeme (CSBL 2015). Thanks to its size, Rīga can attract or siphon the population from regions without a large centre. The area with the highest migration growth is also the capital's region, which may be due to similar causes as those that apply to other capital cities that are attractive from the aspect of jobs and wages. There is also a relatively high net migration rate in the Zemgale region, some of whose parts, particularly the northern parts, may serve as more distant suburbs for Rīga, but also as suburbs for Jelgava. By contrast, Vidzeme and mainly Latgale seem to be distant and unattractive. The safety factor may also play a role.

Apart from Rīga, the share of tertiary education graduates is almost without any differences, which is clearly due to the existence of universities in all regional centres. A very interesting characteristic of Latvia is the share of foreigners, which should indicate the international attractiveness of the place. Rīga is the centre of the Russian-speaking population. The ethnic Latvians in Rīga itself form less than 50% (CSBL 2015). The significant minorities are mainly the Belarusians, Ukrainians and in Kurzeme and Zemgale also the Lithuanians. The smallest proportion of foreigners is in the Vidzeme region, where all the nationalities are represented marginally.

Latvia can be perceived as strongly polarised in the sense of hypertrophied Rīga versus the rest of the regions, among which very little differences are discernible (Fig. 2). For instance, Kurzeme or Zemgale, have more favourable monitored values, which is conditional on the proximity of Rīga and, in the case of Kurzeme, the maritime connections with the rest of Europe, and the port functions of the towns. Vidzeme has the least favourable values; it is highly rural, without
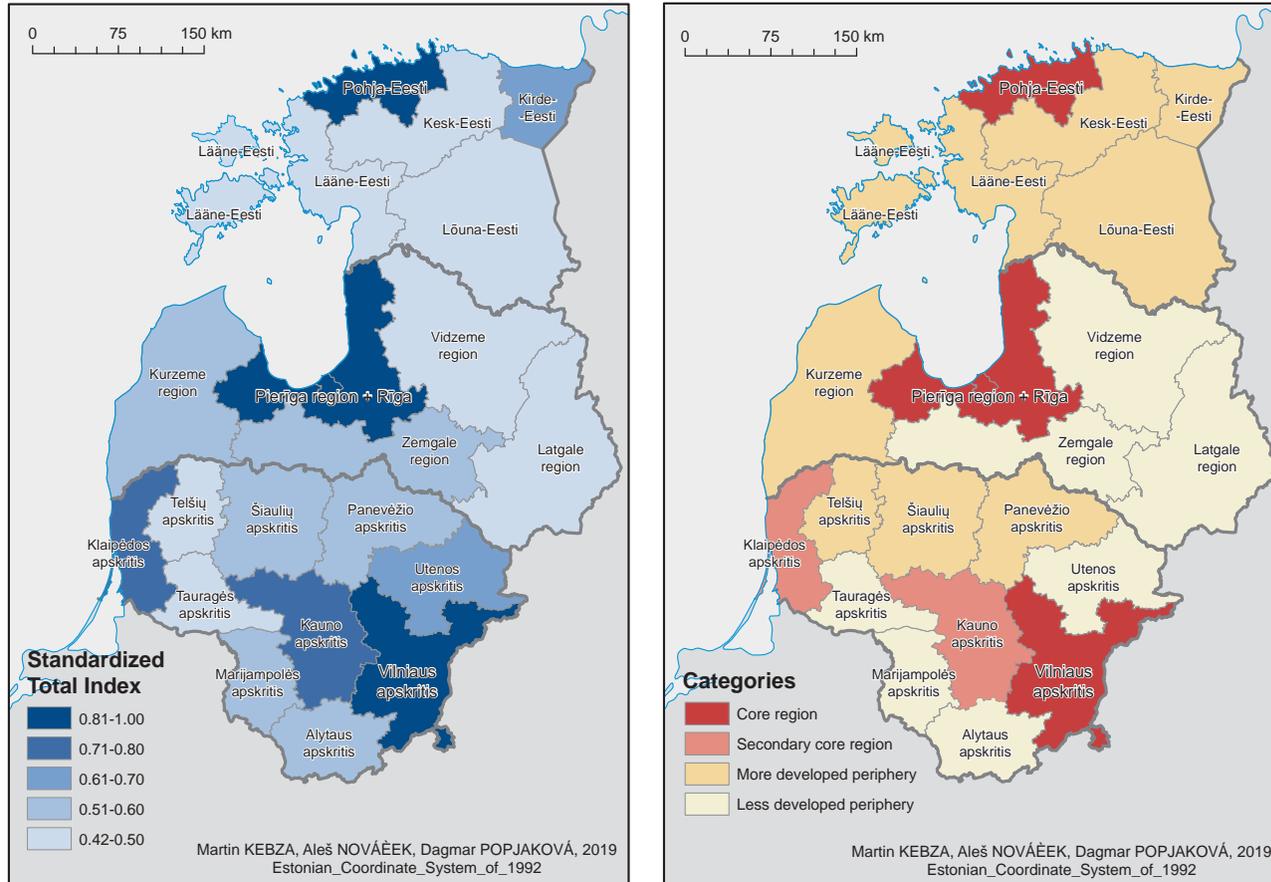
Figure 1. Standardized Total Index (left) and Categories (right) of the NUTS3 regions in the Baltic states

Source: Central Statistical Bureau of Latvia (2015), Statistics Estonia (2015), Statistics Lithuania (2015).

large towns and significant international connections. This substantial dominance may be problematic particularly in the event of an economic recession, or other structural problems in the core.

Lithuania

In Lithuania, the higher GDP per capita values are mainly divided between the Vilniaus region and the Klaipėdos and Kauno regions. Klaipėda and Kaunas are significant population and economic centres of Lithuania. Klaipėda benefits from its coastal location and thus, the port functions, which also integrate production. By far, the lowest GDP per capita is seen in the regions of Marijampolės and Tauragės, which do not have any significant centre. It can also be deduced from the level of the urbanization rate, which is lowest in these two regions, specifically under 50% (SL 2015). Far smaller differences exist in the distribution of the average monthly wage, while they remain the highest in Vilnius and

the cited centres and lowest in Marijampolės and Tauragės, which can again be interpreted as due to the attractiveness of the regions for employers or the rural character of the regions and the ensuing sectoral orientation. A very small deviation in the median can be observed in the case of unemployment rate, but the dominance of the strong centres still appears (Tab. 3). The least favourable situation is found in the regions of Utenos, Alytaus and Telšių, which can primarily be explained due to the lack of labour centres and the fact that they fall under more distant centres in other regions. The three core regions also have the lowest proportion of the population employed in agriculture, which is related to the rise of the tertiary sector in the cores. The largest share of agricultural workers is found in the Tauragės region, which also has the lowest average wage, as discussed above.

The indicator of major roads density in Lithuania is interesting as it does not reflect the dominance of the three centres

Table 3. Deviations from the medians and total index in the regions of Lithuania

	Alytaus apskritis	Kauno apskritis	Klaipedos apskritis	Marijampoles apskritis	Panevezio apskritis	Siauliu apskritis	Taurages apskritis	Telsiu apskritis	Utenos apskritis	Vilniaus apskritis
GDP per capita	89.0	130.3	145.8	83.9	99.4	100.7	77.4	113.6	91.6	189.7
Average monthly wages	98.2	110.8	114.1	93.5	99.6	96.1	90.4	103.9	100.4	131.8
Unemployment rate	97.2	101.6	101.5	100.8	98.4	100.8	99.3	97.4	97.1	101.9
Share of workforce employed in agriculture	98.4	105.7	105.7	97.8	100.5	100.1	94.7	99.9	97.7	107.2
Major roads density	73.7	169.3	92.6	121.3	93.9	107.4	106.1	80.4	91.8	106.1
Population density	82.8	213.8	185.0	103.0	90.4	100.6	71.0	99.4	60.1	236.4
Urbanisation rate	99.2	119.4	120.7	83.7	99.9	104.3	70.0	100.1	93.7	132.2
Net migration rate	101.5	124.6	129.1	113.7	87.3	17.5	46.1	58.7	98.5	292.6
Share of tertiary educated graduates	93.0	154.3	141.1	66.7	99.2	101.6	70.5	84.5	100.8	195.4
Share of foreigners	91.7	108.3	250.0	77.8	91.7	113.9	58.3	69.4	272.2	308.3
Total Index	*92.5*	*133.8*	*138.6*	*94.2*	*96.0*	*94.3*	*78.4*	*90.7*	*110.4*	*180.2*
Standardized Total Index	*0.51*	*0.74*	*0.77*	*0.52*	*0.53*	*0.52*	*0.44*	*0.50*	*0.61*	*1.00*

Source: Statistics Lithuania (2015)

in relation to the rest of the regions, but rather, the geographical location in relation to the international transport networks. Far higher values also exist in the central Kauno region, which is primarily crossed by motorways from Vilnius to Klaipeda and the artery from Latvia to Poland that further runs through the Marijampolės region, which also has unusually high values. Particularly in Lithuania, there is a question of quality and comparative categorization of the roads and motorways, for example for the well-known exits (e.g. near the city of Kuršėnai) from the high-speed roads.

Big differences or even multi-core polarization can be observed in the population density, based on the obvious spatial pattern. The migration differences are highly significant. It is by far the biggest in the Vilniaus region; it is also high in the regions of Kauno and Klaipėdos, which just like in Latvia or Estonia may indicate the attractiveness of these centres from the viewpoint of opportunities for labour, services or wages. Very small migration increases exist in the regions of Šiaulių, Tauragės and Telšių. These may be uninteresting just because of the distance from the centres, particularly from Vilnius, the largest.

Similar dominance exists in the case of the three Lithuanian centres as well as in the share of tertiary education graduates whereas, once more, small differences exist in the case of the lagging regions of Marijampolės and Tauragės. Comprehensively, a role may be played here by the presence and availability of universities, which primarily serve the three largest cities and the Šiaulių region. A huge disproportion also appears in the distribution of foreigners, whereas in Lithuania, apart from Russians, Poles, who are typical for the south-east of the country, were also excluded. Other than these two groups, a major role is played by Belarusians and Ukrainians, particularly in the Vilniaus, Utenos and Klaipėdos regions, whereas the most significant reason in the case of the first two is geographical proximity. The smallest proportions of foreigners are mainly in the regions of Tauragės and Telšių, which are distant from the Belarus borders, but also

uninteresting from the viewpoint of labour migration.

In Lithuania, Vilnius, as a capital, Kaunas and Klaipėda, as secondary centres, profile as growth poles significantly. This polycentrism has a historical and geographical context. It is interesting that although Kaunas is substantially bigger than Klaipėda, the two regions are at about the same development level. In terms of total index values, the most lagging is the Tauragės region, which is located between Klaipėdos and Kauno. In itself, it has a highly rural character; the transport connections with the cited centres may cause a draining effect leading the region to further decline while the polycentric semblance of Lithuania deepens. The dominance of these three centres is to the detriment of the other regions, where big differences are at the same time being created between these two groups in terms of the key factors, which can be designated as typical for Lithuania. Its centres are also closest to the Rank-Size Rule (Fig. 2). It is possible to perceive the migration flows that primarily draw attention to the concentration of the population mainly in the Vilnius area as problematic, particularly in the depopulation of some little developed regions, whose retrogression may thus deepen as it has especially in the case of the Tauragės region.

Categorisation of the regions

The analysis results confirmed the clear dominance of the capitals' regions in Estonia and Latvia. The values of the standardised total index generated from the set of the ten selected economic and social indicators in their case indicate a substantial difference in all the rest of the NUTS 3 regions with the partial exemption of Kirde-Eesti in Estonia. The regional disparities of Lithuania as compared to this are not clear. The differences in the values of the cited index between the region of Vilnius and other NUTS 3 regions (Fig. 1) are not so polarised and indicate a more relaxed form of the local core-periphery system. Based on the average values of the
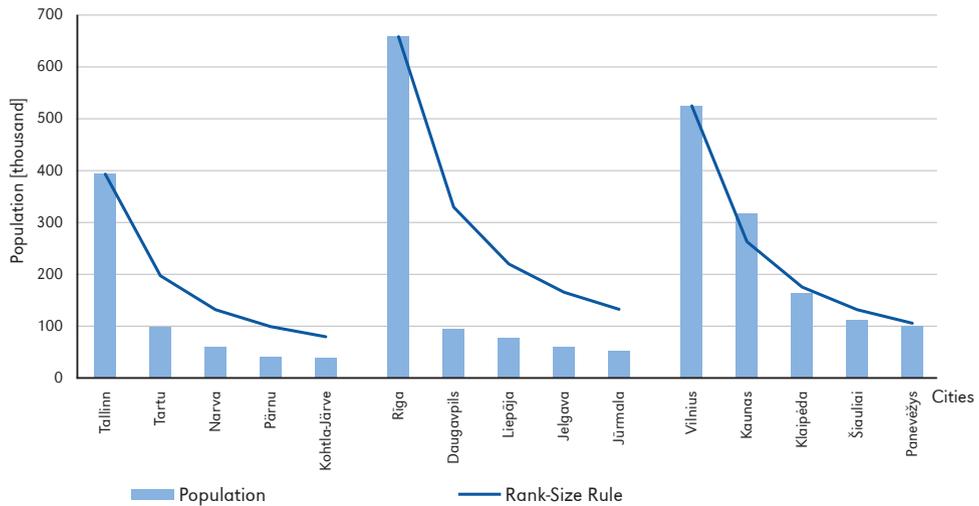
Figure 2. Rank-Size Rule of the five most densely populated cities in the Baltic countries

Source: Central Statistical Bureau of Latvia (2015), Statistics Estonia (2015), Statistics Lithuania (2015).

standardised total index of the regions in the given country excluding the capital region, its dominance level as compared with the rest of the country is almost similar in Estonia as in Latvia (0.49 and 0.485). The higher average index of the rest of the Lithuanian regions (0.57) as compared with Vilniaus apskritis documents its lower dominance level, or rather polarisation between it and the rest of the country.

For verifying the analytical findings and polarity of the regions according to the total index, cluster analysis was used (Everitt et al. 2011). Unlike analysis of regional disparities using deviations from the median, cluster analysis transcends the framework of the individual countries and categorises the regions in the context of the entire Baltic states region. The dendrogram obtained using this method confirms the obvious economic and social difference and dominance of all three major capitals' regions from all the other NUTS 3 regions (Fig. 3). It further divides them into three partial clusters based on similarities, advancement and from the derived position in the core-periphery system. Based on this, it is possible to divide the regions into four groups regardless of nationality, which

we could designate as follows: core regions, secondary core regions, more developed periphery and less developed periphery.

The first group comprises the three major core regions: Estonian Põhja (Tallinn), Latvian Pierīga-Rīga and Lithuanian Vilniaus apskritis. The similarity in many aspects can primarily be seen between the regions of Põhja and Vilnius. The status of the Pierīga-Rīga region in the dendrogram indicates partial distance, which can be attributed to the population size of the city of Rīga (0.7 million inhabitants) as the biggest city of the region with extreme concentration of economic activities within Latvia. We can thus propose that, to a certain extent, the current position of Rīga as the major city of the entire Baltic states region, which it was till the collapse of the USSR, is evident only secondarily and as a relict. Besides its demographic significance, Rīga together with Pierīga remains the most significant industrial centre and transport node in the entire region. This slight lead as compared to the other two economies with successfully developing Baltic core regions is, however, weakening long-term.

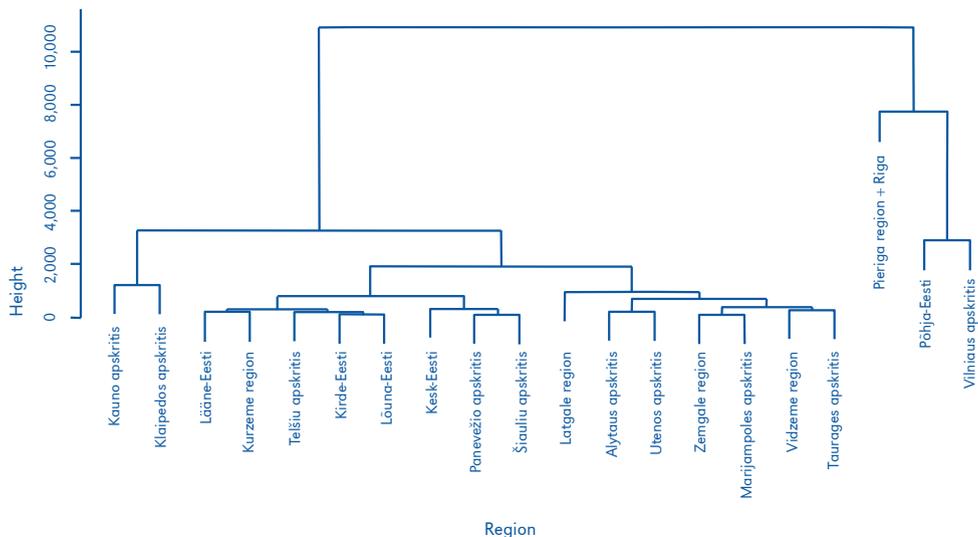As secondary core regions, we can only designate two Lithuanian regions: Kauno and

Figure 3. Dendrogram according to cluster analysis

Source: Central Statistical Bureau of Latvia (2015), Statistics Estonia (2015), Statistics Lithuania (2015).

Klaipėdos. Their administrative centres with populations of 317,000 and 163,000 in 2011 rank them in 4th and 5th place among the biggest cities of a region (SL 2015). The size ranking of the cities in Lithuania thus more or less corresponds to the Rank-Size Rule. The city of Kaunas is only 100 km from Vilnius and due to their mutual geographical interconnection, it is possible in many aspects to consider its region as a broader continuation or hinterland of the major Lithuanian region. The position and character of Klaipedos apskritis is positively influenced and highlighted by its coastal position, whereas its centre Kleipeda within Lithuania fulfils the function as the main gateway to the Baltic Sea.

The remaining two groups are ranked among the regions whose social and economic parameters indicate peripheral status. The results of the cluster analysis assigned this category to two thirds of the monitored regions. This is also indicative of the substantial spatial polarisation of the entire region among the few core regions on one hand (three major core regions; three major capital regions and two secondary core regions in Lithuania – Kaunas and Klaipeda) and

the rest of the sparsely populated, stagnant, or even directly peripheral regions on the other hand. Among them, the cluster analysis based on social similarities differentiated two groups of regions, which on a working basis can be termed more developed periphery and less developed periphery with some reservation. Under the first of them were all the Estonian regions except for 'metropolitan' Põhja, in consequence of the generally higher advancement level of Estonia within the region. This fact is clear particularly in most of the economic indicators. In Latvia, the Kurzeme region fulfils these characteristics. Its coastal location and number of port cities with Liepāja at the peak provide a lot of opportunities for development of economic activities, particularly industry, trade and tourism. In the territory of Latvia, this group comprises of three northern regions: Panevėžio, Šiaulių and Telšių apskritis. A certain advantage among them is the location between Vilnius-Kaunas and Rīga. In the case of Panevėžio and Šiaulių, some relatively more positive values are impacted by the fact that they have strong integration centres like the hundred thousand-strong cities of Šiaulių

and Panevėžio, which rank among the ten cities with the largest populations. Despite this, these Lithuanian regions are afflicted by substantial depopulation, which negatively determines their development potential.

The analysis results placed the inland areas of Latvia (Vidzeme, Zemgale and Latgale) and Lithuania (Utenos, Tauragės, Marijampolės and Alytaus apskritis), regions which are mostly less exposed in terms of location, among the less developed periphery. Except for the city of Daugavpils (population of 100,000) that lies in the secluded Latgale region near the Russian border, they do not have strong centres in terms of population and economy. For this reason, this mostly concerns less populated areas with a higher proportion of rural population and agricultural activities, which are afflicted by high unemployment and depopulation due to a high proportion of older people and the ebb of young and university-educated people to the big centres (their hinterland) and abroad.

In comparison with the results of the analysis based on the deviations of selected indicators from the median of their values with the results of the cluster analysis, they exhibit substantial accord. This fact is substantiated in Figure 1. Some differences can be attributed to the varying characters of both applied methods, where the first is tied to the context of the given country and the second focused on the similarity of the character of the regions without considering their nationality. A certain role may also be played here by the fact that using the standardised total index, the regions are divided linearly into five categories, whereas the cluster analysis generated four categories. In this way, it is possible to explain the categorisation of the Estonian regions of Lääne, Lõuna and Kesk-Eesti from the viewpoint of the index under the lowest category (Fig. 1). Although in Figure 1, i.e. in the context of the entire Baltic states region, they figure among the more developed peripheries. On the other hand, the industrial and more densely populated region of Kirde-Eesti with a strong centre

in Narva and large Russian population was categorised in the medium category based on the results of the analysis according to the deviations from the medians. This is missing from Figure 1 and despite the better values of the indicators, in the context of the entire region, it also figures among the more developed peripheries.

The categorisation of the Latvian regions according to both methods is almost identical. A negligible exemption is the Zemgale region. This is properly linked to the region of Pierīga-Rīga and teeters on the imaginary border of the two categories. In the less and more developed periphery categories, there is a relatively high similarity in many aspects (Fig. 3). Apart from many deteriorated economic parameters, in both cases it is usually the lower population density and share of academically educated population or trend of depopulation. The differences in classification in the last two categories are thus rather formal and based on different methodology. This non-anchorage is, besides in the cited Latvian Zemgale, obvious also in Lithuania in the case of the three small regions: Telšių, Marijampolės and Alytaus askritis. The categorisation of the obviously periphery Lithuanian region of Utenos, according to the standardised total index in the medium category, can partially be attributed to the methodical impact and specifically to the high value of the deviation from the median in the share of foreigners. Despite exclusion of the Russians, this area in particular has a high share of Belarusians and Ukrainians who settled here in USSR era.

Conclusion

The analysis of regional disparities focused on the monitoring of a statistical set of selected representative economic and social indicators at the level of the NUTS 3. Based on deviations from the median and the cluster method, the regions were categorized into four groups: core regions, secondary core regions, more developed periphery and less developed periphery (Fig. 1). Despite

the partial differences in the results of both methods, we can state that they identically indicate an extremely high dominance level of the capital regions, particularly in the case of Estonia and Latvia. In the case of Lithuania, the status of its capital's region within the country is less distinct due to the more relaxed concept of the hierarchisation of the settlement system (Fig. 2 – Rank-Size Rule). Vilnius is not hypertrophied in consequence of its inland location and proximity of Kaunas. To a certain extent, this can be considered as a partially competitive centre and at the same time, as the second pole of the more broadly delimited common core region of the country. If we would recourse to the given types of spatial polarisation, which were mentioned above, the categorisation of the Baltic countries would be as follows:

In Estonia and Latvia, this is a case of extremely developed polarisation between one dominant core and the residual part of the country (periphery). This is particularly characteristic for the Nordic countries with coastal locations and generally low population density. Rīga and partially also Tallinn in their time fulfilled port functions for the broad hinterland of the large territory of Russia, subsequently the USSR, and represented its gateway to Europe. Besides this, the coastal location had higher contact with the western coastal areas of more advanced Europe, while the inland territory remained isolated and underdeveloped. Because of this, the same east-west gradient of regional disparities is evident just as applies to most of the CEE countries (Nováček 2014; Lang 2015). The result in Estonia and Latvia is some form of accord of third and first type polarisation of the regional disparities described in the theoretical part in the article.

The more densely populated, more southerly located, Lithuania is rather an inland country with a centre in the east of the country. In the past, in terms of power, economy and culture, it was oriented on the deeper inland territory of the CEE, in Poland and the area of modern day Belarus, which can be interpreted as a reason for the decentralised

location of the Lithuanian capital. Because of its high share of arable land, Lithuania largely remained an agricultural country and manifested a certain phased delay of the process of urbanization, concentration and hierarchisation of the settlement system until the second half of the twentieth century. The status of Vilnius within Lithuania in the inter-war period was negatively impacted by the fact that it was part of Poland and most of the population prior to World War II was comprised of Poles and Jews. World War II and the subsequent resettlement policy thus substantially disrupted the continuity of growth of this city. In order to establish an independent state during the interwar period between 1918-1940, the city of Kaunas was substituted as the capital city of Lithuania. The supported growth of Kaunas continued in the period of socialist industrialisation until the collapse of the USSR. The same also applied in the case of the most significant Lithuanian port of Klaipėda. In this way, unlike the other two Baltic countries during the 20th century (and even earlier), two other strong competitive centres were established in Lithuania, whose current regions can therefore be perceived as secondary core regions. Despite this, the polarity between the main region of Vilniaus apskritis and the peripheries, which include all other regions of the country except for Kauno and Klaipėdos, can be assessed as high. However, it does not reach such levels as in the case of Estonia and Latvia. Due to the location of Vilnius and Kaunas, it is, in contrast, possible to see the east-west or better yet, north-south-east gradient of socio-economic disparities in Lithuania. In terms of typology, we can thus consider regional differentiation within the framework of Lithuania as a certain intersection of the first and third types (with the reversed gradient of spatial disparities).

On the applied level, both methodical approaches proved the mutual compatibility and adequacy during the determination, evaluation and mutual comparison of socio-economic disparities. The resulting values of the standardised total index of deviations

from the median and conclusions of cluster analysis are, nevertheless, dependent on selection of individual indicators. It is thus not ruled out that selection of a different set of socio-economic indicators, despite their mutual conditionality and continuity, could generate partially different results to a certain degree. Their semblance is also dependent on selection of territorial division, in our case NUTS 3, and on the decision to merge the Rīga and the Pierīga region. Thus, it is

appropriate to perceive the achieved results as a certain probe into the issue of regional development focused on research in regional disparities, which in Europe are highest in the Baltic countries.

Editors' note:
Unless otherwise stated, the sources of tables and figures are the authors', on the basis of their own research.

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