Border Effects in Socioeconomic Inequality – Example of Czechia and Slovakia

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Abstract

The paper focuses on the importance of borders in the context of socio-economic inequality and its spatial aspects on the example of Czechia and Slovakia. Various types of borders (national, regional, historical, cultural) are taken into account. Studying importance of historical or functional borders has not yet been comprehensively studied even though it has direct political implications. From the international perspective, it is interesting to assess importance of national borders. Schengen zone and EU regional policy should have significant impacts on border regions and their socio-economic inequality. Moreover, the national borders are often said to be dissolving. Within the paper, we ask several questions: Are national boundaries important barriers or rather bridges? Is the regional development and specifically socio-economic inequality influenced by borders? How is this phenomenon evolving in time? The questions are answered through extensive empirical analysis in Czechia and Slovakia (due to size restrictions, Poland, Austria, and Germany were omitted from the analysis). To measure spatial aspects of differentiation and assessing border effects we use methods such as Theil index decomposition and spatial autocorrelation. We combine these two different approaches and show how its joint utilization can bring new insights to studying regional/spatial inequality, building on previous methodological research. Moreover, thanks to methods of local spatial analysis (local indicators of spatial association – LISA), we are able to uncover local specifics. Due to utilized methods, data must be on a spatially very detailed level, at least on a municipal one. Micro-regional research of this type is not very common, especially when studying several countries at the same time. For quantification of socio-economic inequality, secondary data accessible from public sources (censes in this case) such as unemployment rate, age preference index, and education are used. The period between 2001 and 2011 is studied. The results from the quantitative analysis should be a basis for subsequent intensive research looking for causalities.

Key words: borders, inequality, spatial autocorrelation, Theil index, Czechia, Slovakia

JEL Classification: R12, C21, C20

1 Introduction

We live in the age of global communication, governance, transport and entertainment – the age of hyper connectivity. You can turn on your smart TV at home in your suburban villa, have a chat with your friend from Beijing, attend a videoconference with your co-workers, do your weekly shopping and watch your favourite NBA team live. This may raise a feeling that we live in a borderless world. The borderless and deterritorialized world has become a buzzword for globalization (Caney, 2005). However, the basic ordering of society still requires categories and

compartments, and borders create order (van Houtum and van Naerssen, 2002). On the other hand, it is the bordering process rather than the border per se, which affects our daily lives on the global as well as on the local and micro scale (Newman, 2006). Moreover, increase in connectivity has not brought increase in equality. There are still winners and losers among countries, regions, and individuals.

There is a vast number of border studies today (see bibliography in Newman and Paasi, 1998). However, majority of studies are theoretical or focusing on very particular cases. There are only few papers capitalizing on available quantitative data (Thiemann et al., 2010) and even less are focusing on the connection between borders and inequality (Wonders, 2006). The border is usually understood as national (Parsley and Shang-Jin, 2001, Adelman and Aron, 1999), cultural/historical (Newman and Paasi, 1998), or administrative (Badinger et al., 2004). The most important border influencing our lives, functional, is usually not included within this research niche.

In this paper, we are approaching borders complexly, taking national, historical, cultural, and functional borders into account, focusing mainly on their importance towards inequality. Since this paper cannot, due to size restrictions, comprehend the topic in bigger scope, it is rather an example of possibilities within this research objective. The main simplifications are:

- The geographical area is limited to Czechia and Slovakia. The Central European analysis including Poland, Austria, and Germany is not included even though ready for publication. Comparing different countries (geographical systems) bring not only complications such as data comparability, but also an opportunity to develop novel methods such as "geographical standardization" (see Methods).
- Only quantitative analyses are presented. The quantitative approach can comprehend the most important quantifiable characteristics of both current situation and evolutionary tendencies. It is, obviously, only a partial representation of much more complex reality, but it can be a basis for more detailed/sensitive analyses (Hampl, 2007). The qualitative analyses based on the results of the quantitative ones are not included in this paper.

The main goal of the paper is thus to better understand borders in Czechia and Slovakia, measure their importance towards inequality between 2001 and 2011, find common features as well as differences, and prepare quantitative basis for subsequent intensive research looking for causalities.

The paper is organized as follows: after the introduction, there is a part devoted to utilized methods. It was shortened to a necessary minimum. The methods can be better understood in references included in this chapter. The results are graphically presented in two separate pages followed by a commentary and conclusion in the final chapter.

2 Methods

The key methods applied in this paper are the Theil index and its decomposition (Shorrocks and Wan, 2005) and spatial autocorrelation in global and local form (Anselin, 1995). The joint utilization of both methods and related implications for empirical research has been already

studied by authors (Netrdová and Nosek, 2009, Netrdová and Nosek, 2014) and the outcomes are reflected in the methodology and, importantly, when interpreting the results.
The spatial autocorrelation has two forms, global and local. The global form assesses the level of clustering (i.e. concentration of similar values) of the studied phenomenon in space. It is represented by a single value, Moran's I in this paper (see Anselin, 1995 for mathematical definition). The values range from -1 (maximum negative spatial autocorrelation) to +1 (maximum positive spatial autocorrelation). The value close to 0 indicates a random pattern (Fotheringham et al., 2000). The local representation of clustering is visualized by LISA analysis, the local equivalent of Moran's I (Anselin, 1995). The result of the LISA analysis is a cluster map, where local specifics can be studied. In context of borders, it identifies areas of units with similar characteristics (homogenous regions).

The Theil index decomposition helps to quantify importance of borders or rather importance of regional delimitation for a selected variable. When having overall inequality T (ideally representing inter-personal inequality, which for practical reasons is substituted by inter-municipality inequality), Theil index decomposition (TB/T) calculates the share of differences between regional means (TB) on this overall inequality (T). TB/T equal to 1 means that 100% of the inequality between municipalities can be attributed to differences between regional means (within region inequality being 0) and TB/T equal to 0 that 100% of overall inequality occurs within these regions. This decomposition can be calculated also for the popular Gini coefficient, but not without a residuum (Shorrocks and Wan, 2005, Netrdová and Nosek, 2009). The higher the TB/T, the more important the border is for the studied variable.

There are some aspects, which one need to bear in mind while using these methods. First, the methods behave non-linearly. In other words, changes in different parts of their distributions can have very different meaning. For example a change of TB/T from 5% to 15% is much more important than a change from 75% to 85%. Therefore it would be wrong to interpret the same changes in TB/T and Moran's I in the same way (see graph in Nosek and Netrdová, 2014). Second, the application of inference must not be underestimated. Besides the inference as such (testing whether the result is significant compared with a random result), the geographical standardization isolating contextual and stochastic part of the measured value can be introduced. This standardization mitigates statistical differences, which are implicitly present when studying different geographical systems (such as different countries) with different number of units, overall inequality etc. (Novotný and Nosek, 2012).

Empirical data on a very detailed spatial level are very important for this type of analysis. We work with data from Czechia and Slovakia. The data are from two censes, 2001 and 2011. Due to common history of studied countries, there is no problem with data comparability. The data are on a municipal level, which means roughly 6.000 units in Czechia and 3.000 units in Slovakia. Three variables from both censes years were chosen for the analysis:

- The unemployment rate. It is defined as a share of unemployed on economically active population. It represents a socio-economic variable. The unemployment rate is not a perfect indicator since it is very sensitive to the economic cycle.
- The share of university educated on population. It represents a social variable.
- The age preference index. It is defined as proportion of population above 65 (numerator) and population below 15 (denominator) and it represents a demographic variable.

Since the paper deals with various types of borders, data describing these borders were needed. The national borders, as well as administrative borders, are easy to construct. Two administrative units were chosen (okresy – LAU1 and kraje – NUTS3). These levels are comparable thanks to common history of the analysed countries and no further adjustments had to be introduced. These administrative regions are in the text considered as functional. It has been shown that the difference between administrative and real functional regions is not very big in Czechia (Nosek, 2010). The historical borders are defined by Sudetenland in Czechia and historical border of Hungarian minority in Slovakia. Last type of borders used in this paper, cultural, is defined by clusters of atheists (and non-atheists, typically Catholics). This border uses results of LISA analysis in order to have continuous "regions"; there are three types of these regions: significantly atheistic, significantly non-atheistic, and other.

3 Results

Empirical results are captured in Figures 1 and 2. In these figures, there is Moran's I as an indicator of global spatial autocorrelation (clustering), LISA analysis mapping local specifics of clustering, and Theil index decomposition quantifying importance of various types of borders. We will have a look at results by respective variables.

3.1 The unemployment rate

The unemployment rate clusters from the studied variables the most, both in Czechia and Slovakia. This corresponds with finding of Netrdová and Nosek (2014; Nosek and Netrdová, 2010) that clustering increases with increasing complexity of the variable under study. Local clusters are rather stable. In Czechia clusters of low unemployment rates (low-low cluster) form axes stretching radially from Prague towards Pilsen, Liberec, and Brno. In 2011, the cluster with high unemployment rates (high-high) near Ústí nad Labem might be making space for another low-low axis from Prague. The situation in North-Western Bohemia as well as in North-Eastern Moravia (and Silesia) affected by radical change of industry preference after 1990, has significantly improved, at least in employment. On the other hand, peripheral parts of Czechia suffering the highest unemployment rates remained basically the same within the studied period. In Slovakia the pattern is much simpler. There is obvious west-east polarity with littler changes between 2001 and 2011.

Functional regions (represented by administrative regions) are responsible for more than 1/3 of the overall inter-municipality inequality and approximately 1/2 in case of Czechia in 2001. Surprisingly, also historical borders capture approximately 10% of the overall inequality. In Slovakia their importance is decreasing, in Czechia slightly increasing. Cultural border represented by clusters of atheists is unexpectedly important in Slovakia (increased up to 9% in 2011), but insignificant in Czechia. The importance of national border is decreasing from 42% in 2001 to 25% in 2011. Despite the substantial decrease, the border between Czechia and Slovakia still forms a very strong division.

3.2 The share of university educated

The clustering of the share of university educated is relatively high and has been increasing in both countries. This increase may be explained by general polarization between university cities

and the rest. LISA analysis supports this hypothesis; see high-high clusters in Prague, Hradec Králové and Pardubice, or Zlín in Czechia and Bratislava or Košice in Slovakia (but also larger low-low clusters).

This hypothesis is supported also by the Theil index decomposition. The borders are important for all types of borders. The functional borders (kraje, okresy) are the most important ones and the importance has been increasing. Somehow unexpectedly, the cultural border (atheists/catholics) captures around 10% of overall inequality in both countries and both years, but it is decreasing. On the other hand, historical borders are not that important even though significant in all studied cases. There is no real border between Czechia and Slovakia for this variable (TB/T is insignificant).

3.3 The age preference index

The age preference index clusters the least from the analysed variables, which is in line with the hypothesis of increasing clustering with increasing complexity of the variable. From the first look on LISA maps and Moran's Is, little has changed between 2001 and 2011. But the contrary is true for Czechia. Moran's I has more than doubled in Czechia. Moreover, this increase has happened in the lower part of the distribution and thus we should interpret it as more significant. The rise can be explained especially by strong suburban tendencies, see big cities' neighbourhood (Prague, Brno, České Budějovice, Pilsen, Hradec Králové, and Pardubice). On the other hand, more significant rise is offset by dissolving importance of Sudetenland. In Slovakia we can observe a completely different pattern. The age preference index has slightly decreased and the biggest difference between 2001 and 2011 is a smaller number of high-high clusters. The only stable high-high cluster can be found along the eastern border with strong Ruthenian minority.
Although the clustering as such has increased in Czechia, the importance of borders has remained roughly the same or slightly decreased. This is again explained by suburbanization, which typically runs across administrative borders. In this particular case, we would probably find some differences if we used real functional regions instead of administrative ones. In Slovakia, on the other hand, the studied borders have changed significantly. Both administrative borders has doubled its importance on age preference index inequality. But the biggest difference can be observed in case of cultural border, which importance has risen very significantly. This is probably connected with population ageing, which is not so fast in the most religious parts of the country. The national border has lost importance for the age preference index – it has decreased from 17% to insignificant 1%.

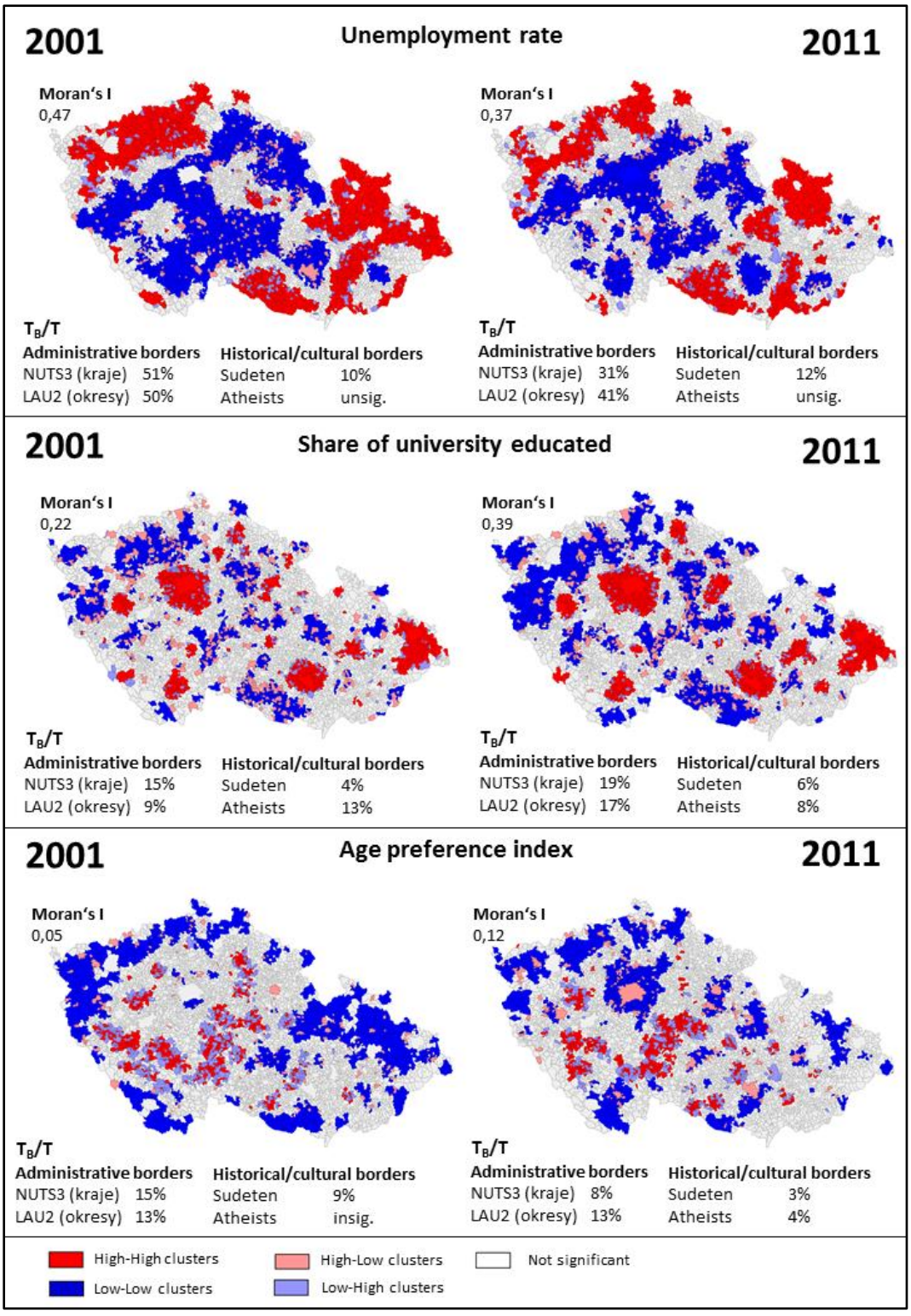

Fig. 1 Empirical analysis of borders in Czechia in 2001 and 2011

Source: Census 2001, Census 2011, own calculation

Notes: All results of Moran's I, LISA, and TB/T are significant on 5% level except those marked "insig.". For calculation of Moran's I and LISA, software GeoDa 1.6.2.6 was used, for Theil index decomposition software EasyStat. TB/T has been adjusted (stochastic part was subtracted).

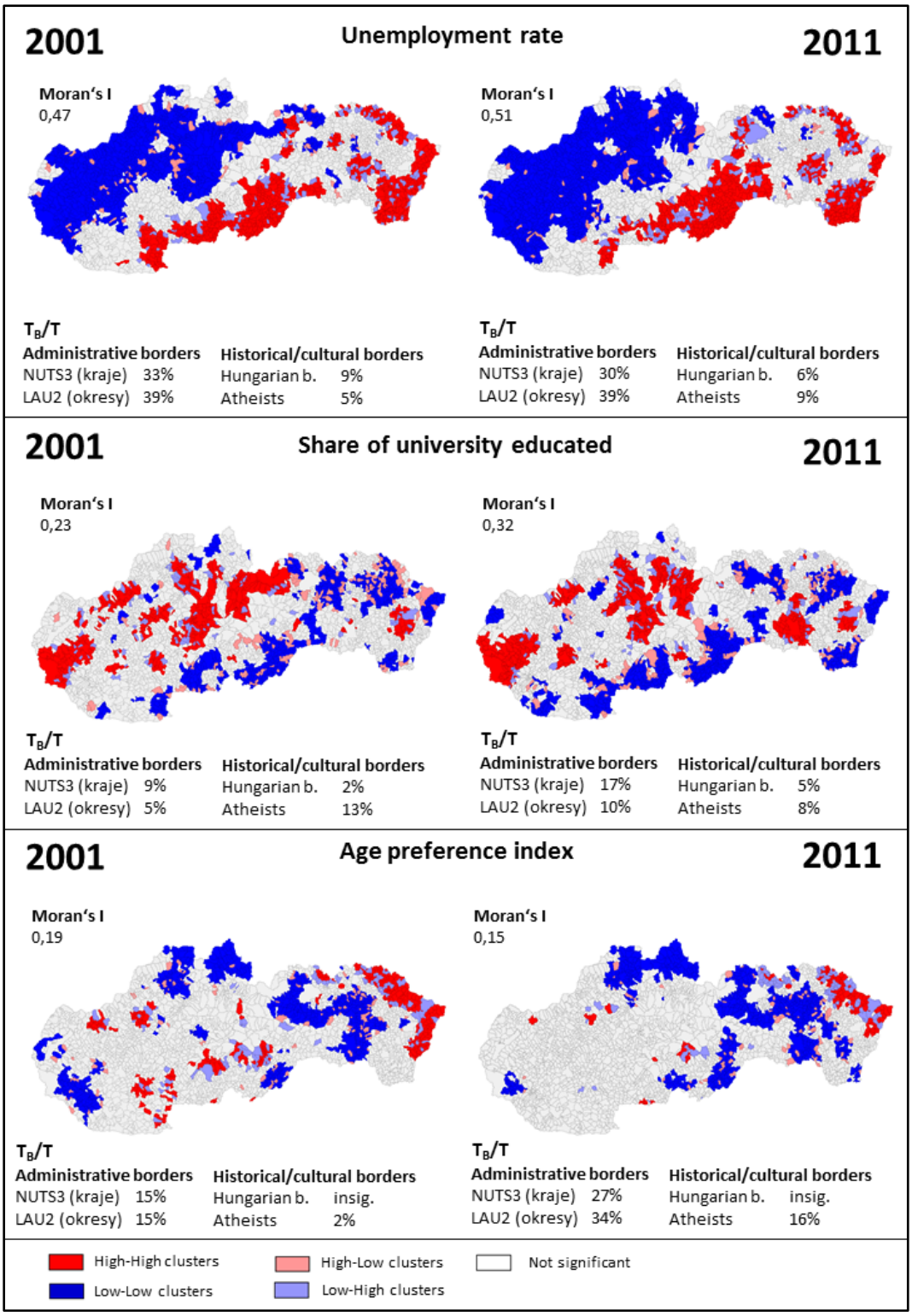

Fig. 2 Empirical analysis of borders in Slovakia in 2001 and 2011

Source: Census 2001, Census 2011, own calculation

Notes: All results of Moran's I, LISA, and TB/T are significant on 5% level except those marked "insig.". For calculation of Moran's I and LISA, software GeoDa 1.6.2.6 was used, for Theil index decomposition software EasyStat. TB/T has been adjusted (stochastic part was subtracted).

3 Conclusions

The paper deals with various types of borders and their importance for socioeconomic inequality. It is a very complex topic and due to size restrictions, the paper had to work with several simplifications. Only data from Czechia and Slovakia were analysed, three variables and four types of borders studied. Importantly, the presented quantitative results should be understood as a first step for the more detailed analysis searching for causalities.

All studied borders proved to have some significance. Not surprisingly, the biggest shares on overall inequality were found in case of administrative regions. Importance of historical borders (Sudeten in Czechia and historical Hungarian border in Slovakia) could have been expected, but importance of cultural borders (atheists and Catholics clusters) was to some extent surprising.
The change between years 2001 and 2011 was not dramatic, but offered some interesting interpretations:

- The national border's importance significantly decreased in case of all studied variables. In 2011, the nation border remained important only for the unemployment rate, capturing 1/4 of the overall inter-municipal inequality.
- Historical borders showed different trend for different variables. They have gained some importance in case of the unemployment rate and lost in case of the age preference index.
- Cultural border is more important in Slovakia, especially in case of the age preference index.
- The unemployment rate inequality was believed to transfer to higher regional levels, but the contrary is true. Compared to 2001, the differences between unemployment rates are bigger within these regions. This might be caused by increasing difference between administrative and functional units.

Czechia and Slovakia showed similar patterns but also some differences:

- The share of university educated is very similar in both countries – increasing importance of all border types except cultural ones. On the other hand, the national border is unimportant in both years.
- The unemployment rate has a completely different structure (development axes in Czechia and west-east polarity in Slovakia), also the trend is different.
- The age preference index had a similar structure in both countries in 2001, but very different in 2011. In Czechia the suburban low-low clusters dominate while in Slovakia dominate the low-low clusters in the most religious parts of the country.
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Beside borders and other spatial aspects of socioeconomic inequalities, the results supported hypothesis of increasing clustering with increasing complexity of a studied variable. The notion of complexity is connected with a statistical distribution – complexity is decreasing with distribution changing from asymmetric to normal. However, this hypothesis was not studied in a greater detail.
Despite some interesting results, many questions remained unanswered. First, after including other countries (Poland, Austria, and Germany), changes along national borders can offer some interesting insights concerning the European integration process. Other variables can help to test the complexity hypothesis and find some more general outcomes. Also more types of borders shall be included in the analysis as well as more sophisticated methods of their studying. Finally and the most importantly, the most interesting results from the quantitative analysis shall be studied intensively with a search for causalities.

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