



## ORIGINAL ARTICLE


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## Enterprise ownership patterns in the least developed districts of Slovakia

**JEL Classification:** R11; R12

**Keywords:** regional business structure; cluster analysis; spatial autocorrelation; ownership types; least developed districts

### Abstract

**Research background:** The literature overview shows a blank space regarding the effects of ownership on the determination of enterprises' spatial distribution. Various papers identify differences between determinants of the spatial distribution of foreign direct investments, exporters in foreign ownership, and domestically owned exporters; however, they mostly agree on the role of big cities, economic centres, and state of infrastructure as well as historical patterns.

**Purpose of the article:** The article focuses on the spatial distribution analysis of enterprise units from their owner's perspective on the empirical evidence from all 79 districts of the Slovak Republic. Special attention is given to the category of the least developed districts.

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**Methods:** Within the presented article, the authors investigate the characteristics of the regional spatial distribution of business entities concerning standard ownership categories using the cluster analysis. The presented approach is twofold: firstly, the authors investigate the share of individual ownership types on the district level, and secondly, the number of enterprises by ownership categories is adjusted to 100,000 inhabitants. Cluster analysis and methods of spatial statistics are applied in both approaches.

**Findings & value added:** The main results show a relation between the district's inclusion into the group of the least developed districts and enterprise ownership characteristics in these districts mainly through the relative underrepresentation of the secluded inland, foreign and international types of ownership, as well as their geographical clustering. The results of the presented research can be used in policy-making targeting business activity in underdeveloped districts. At the same time, the results provide basis for limited theoretical generalisations based on a single-country case study with regard to principles of business ownership structures development.

## Introduction

The global economy has been undergoing rapid structural changes. Economic theory, along with other social sciences, is confronted with new approaches explaining these changes. Regional development theories try to identify the factors and describe the processes and mechanisms underlying individual economic activities' localisation. They also try to answer the question of why such large regional disparities arise both globally and locally.

One theoretical stream of regional development emphasises the importance of innovation, new technologies, clusters, learning regions. An important feature of globalisation is the increasing interdependence of individual types of international and national economic relations: trade, foreign direct investment, labor movement, capital movement, technology transfer, and others (Zinecker *et al.*, 2021a; Zinecker *et al.*, 2021b; Meluzín *et al.*, 2021). As Porter (1990) states, competitive industries are not evenly distributed concerning competitiveness in a nation with regard to cluster development.

The second theoretical stream comprises regional development theories emphasising the importance of trans-local and global ties and relationships — theory of global production networks (GPNs) (Coe *et al.*, 2008; Coe & Yeung, 2015), the theory of global value chains (Kano *et al.*, 2020), the theory of global commodity chains (Argent, 2017). According to Coe and Yeung (2019), GPNs have the potential to explain uneven development. Frigant and Zumpe (2014) analyze the organisation of automotive supply chains based on the GPNs framework. The GPNs theory explains some of the regional disparities caused by industry. Foreign direct investment (FDI) guided linkages with GPNs can have a very positive impact — and might even be essential — for industrialisation, re-industrialisation of economies

(Landesmann & Stöllinger, 2018). FDI is generally accepted as a key factor in the restructuring of the economy of post-communist countries in Central and Eastern Europe and their regional development (Palatková, 2013). According to Coe and Yeung (2015), the different types of corporate cultures, ownership forms, and national origins significantly influence all involved in GPNs actors' strategic predisposition. Besides, ownership type and national origin will apply to firms in all roles and functions of GPNs such as lead firms, strategic partners, suppliers, and customers (Coe & Yeung, 2015). For these reasons, we consider that ownership relations play a crucial role in further developing businesses in Slovakia.

Slovak regions indeed have not been able to benefit from the economic transformation in the 1990s equally — indirect empirical evidence of such uneven development among individual regions is provided through the introduction of the so-called Least Developed Districts (LDDs) by the Slovak Government in 2015, which are quarterly listed based on the Act No. 336/2015 Coll. on the promotion of the least developed districts. Slovak Business Agency states that a higher dynamic of entrepreneurial activity is immanent to those districts that historically have been characterised by higher entrepreneurial activity for a long time (SBA, 2019a). Dudáš and Grančay (2019) add that the share of Western Slovakia regions on the total FDI stocks in Slovakia is significantly higher than the share of the regions of Central and Eastern Slovakia. As stated by Plešivčák and Buček (2017) on the example of the Banská Bystrica self-governing region, crucial innovation activities are concentrated into a set of large- and medium-sized companies, often with foreign owners.

The development of regional business structures is also relevant to social development, including employment and disposable income. When examining the dependence of wages on the unemployment rate, it was found that at the regional level, wages in regions were decreasing with a rising in the unemployment rate, and increases in wages in districts with higher unemployment rates were lower than in districts with a lower unemployment rate, in the least developed districts reduced unemployment led to a minor increase in wages than expected (Pauhofová & Stehlíková, 2018). Concerning the recently mentioned FDIs, it has already been proved earlier that there is an indirect dependence between the impact of FDI inflow and unemployment development in Slovak regions (Fabuš, 2015).

We do not intend to claim that there is no academic or governmental interest in the particular field of this article; however, the general approaches were related to the analysis of regional development and disparities in general (e. g. Korec *et al.*, 2016 or Kološta, 2016), competitiveness (e. g. Gavurová *et al.*, 2017), sectoral analysis (e. g. Betáková *et al.*, 2018), foreign

direct investment (e. g. Dudáš & Grančay, 2019), employment (e. g. Pauhofová & Stehlíková, 2018) or eventually as a pendant to an analysis of the business environment (e. g. Ministry of Economy, 2019 or Fabuš, 2018). However, most of these indicatively selected, as well as many other papers, do not go below the NUTS levels 2 or 3 (larger regions and self-governing regions, respectively). Without any doubt, the focus of these resources contributes to the discourse on regional development in Slovakia; however, none of them is dedicated to the analysis of the business structure in the regions on the district level.

Given these circumstances, this article focuses on the analysis of Slovak companies from the perspective of their ownership in respective 79 districts (LAU level of classification of territorial units). We will focus on clustering tendencies concerning various types of ownership standardly recorded in statistical databases. We approach the subject from two perspectives: first, we examine clustering tendencies from the viewpoint of ownership type shares; secondly, we adjust the data to the population count (number of enterprises unit by ownership type per 100,000 inhabitants) to eliminate size disparities among districts. Our objective here is to identify ownership structure patterns concerning private business activity development, both domestic and international, on the LAU level. We follow here Sun (2003), who states that it is of both theoretical and policy importance to examine the emergence of unconventional ownership and governance forms of enterprises across economies, to investigate the driving forces behind the evolving dynamics of these emerging forms, and to search for new paradigms on ownership and governance.

The remaining part of the paper is organised as follows. After a concise literature review, which provides an overview of related up-to-date theoretical and empirical resources, research methodology as well as the analysed dataset are described. The main findings are presented in the Results section followed by their discussion. The last section of the paper summarises the conclusions of the study.

## **Literature review**

Various forms of enterprise ownership have been described, e.g., by Hansmann (2000), although he focused mainly on business practice in the United States. Most descriptions of the Slovak business structure go hand in hand with an assumption that large foreign-owned companies dominate the Slovak economy. However, as stated by the reports on SMEs (published annually by the Slovak Business Agency), large enterprises form just 0.1%

of all registered business entities (SBA, 2019b). In 2018 there were just 679 large enterprises from a total of 560,521 active business entities, a figure including both legal persons and self-employed persons, freelancers, and independent farmers. SMEs thus account for 99.9% of all entrepreneurs in Slovakia, with further data showing that they provide employment opportunities to almost three-quarters (73%) of the active workforce, contribute more than half (55%) to the creation of the added value, while almost 97% of SMEs are micro-enterprises employing less than ten employees (SBA, 2019a). A more descriptive picture is provided in Table 1.

Various studies on regional FDI distribution provide another depiction of the Slovak business. Government trade and investment promoting agency SARIO stated that between 2002 and 2017 it finalised investment projects with a relatively balanced territorial distribution concerning their number — with half of NUTS level 3 regions having a share between 11 and 12%, three most successful regions (Nitra, Trenčín, and Košice) between 15 and 17% with only the North-Eastern region of Prešov receiving just 8% of all supported or administered projects in the respective period (see the overview of successful projects on SARIO's web), with most employment opportunities created in Western regions of Nitra, Trnava, and Trenčín. Of course, investment incentives should mainly serve to support weaker regions, but the aid was naturally directed to regions based on the investors' localisation decisions (Fabuš & Csabay, 2018). The parameters mentioned above have been confirmed by a recent study by Dudáš and Grančay (2019), which takes into account all FDIs: after elaborating on the reasons for an extreme dominance of the Bratislava region concerning the FDI stock, they hold that following the exclusion of Bratislava, the share of the regions (NUTS level 3, author's note) of Western Slovakia (Trnava, Trenčín and Nitra) on the total FDI stocks in Slovakia is significantly higher than the share of the regions of Central Slovakia (Žilina and Banská Bystrica) and Eastern Slovakia (Košice and Prešov) with Top 10 districts (LAU level, author's note) being almost exclusively situated in Western Slovakia.

Regional disparities at the NUTS 3 level have been, e.g., investigated by Kološta (2016), in this case from the perspective of the pre- and post-crises development (meant is the economic crisis of 2008) with data time series of 1995–2013. His research included the number of entrepreneurs, number of corporations, number of profitable and non-profitable corporations, and number of farmers among microeconomic indicators. His main findings in this regard included the observation that, except for farmers, all investigated disparities increased after 2008, with the Bratislava region standing out compared to other regions. Baláž (2004) analyzes the development of re-

gional disparities in Slovakia and examines neoclassical, polarisation, and new growth theoretical approaches. His econometric model identified that the unemployment rate, the rate of urbanisation, the share of the population with a university education, and the share of foreign-owned enterprises are the main factors influencing the regional divergence.

A more in-depth discourse of the ownership structure of Slovak business has occasionally been present in various research articles: ownership concentration patterns have been researched by Brzica (2005), various aspects of municipal ownership by Jaura (1996). In terms of the business ownership structure, a recent overview is provided again by the SBA report (SBA, 2019b), although only regarding the small and medium-sized enterprises. Private domestic ownership holds a dominant position: in 2018, more than 93% of active SMEs in Slovakia were privately owned by domestic legal and natural persons. Foreign-owned SMEs represent the second-largest stake with a share of approximately 5%. Entities with international ownership have a lower share reaching only 1%. Other types of ownership (such as cooperative, state, territorial self-government, or associations, political parties, and churches) total 0.5%.

With regard to foreign resources on the topic of the geographical distribution of business ownership types on lower administrative levels, we have to state that it appears that the general approaches on regional and sub-regional levels concentrate on slightly different although not very distant topics focusing on the comparison of business activities in economic centres vs. economic periphery and — again — more or less with focus on foreign investment localisation. Characteristic findings include a positive linkage between FDIs and domestic entrepreneurship (Nxazonke & van Wyk, 2020). Foreign-owned companies are generally considered to be holders of know-how, technology, new management methods and skills, initiators of innovation activities, strategic employers, and exporters (Kotíková, 2019). Typically, foreign owners are driven by agglomeration economies, as was found by Hecht (2017) in the German investors' case in the Czech Republic.

The relationship between FDIs and domestic entrepreneurship is relevant from the international viewpoint, as it is widely studied in many countries and is not limited to the Slovak or Czech Republic. Frydman *et al.* (1999) investigated the efficiency of private ownership in the context of privatisation in Poland, Hungary, and the Czech Republic. Błaszczuk *et al.* (2005) created the secondary privatisation analysis in the Czech Republic, Poland, and Slovenia. Although private ownership plays a significant role in the market economy, the state still retains its direct involvement, as

shown by the study of the Organisation for Economic Cooperation and Development (OECD, 2015).

Similar topics have also been investigated, e.g., from the perspective of a foreign shareholder's involvement in local business structure in various regions, including e. g. Italy (Gamba & Montanaro, 2009 or Bentivogli & Miranda, 2017), Norway (Ivanova *et al.*, 2019), Poland (Nazarczuk & Krajewska, 2018), or Hungary (Kanó *et al.*, 2019). Concerning the two latter countries, Elekes *et al.* (2019) showed in a study of 67 Hungarian regions that foreign firms induce more structural change in regions than domestic firms do, and above-mentioned Nazarczuk and Krajewska (2018) proved that urbanisation was a significant factor describing the spatial agglomeration of FDI in Poland. As a matter of fact, FDI in Central and Eastern Europe in the post-crisis period have been a focus of research until recently as e. g. show the works of Szent-Iványi (2017) or Horobet (2018).

Thompson and Zhang (2016) state that the policymakers must be aware of all the influences of greater foreign firm ownership and employment at the local level based on a study of a large sample of entrepreneurs from the UK focused on the relationship between foreign business influence and exporting activities of domestic entrepreneurs. Foreign ownership structures of multinational corporations and their localisation patterns in Denmark's regions have been investigated by Asmussen *et al.* (2018), with results stating that there are substantial differences between the types, roles, activities, and geographic origins of the firms locating in different areas and the ownership structures spanning them. All of the above investigated spatial distribution and location choices of foreign companies in the defined region to tackle regional disparities. Roles of state or private ownership and its effects on various areas of economic activity including entrepreneurial finance, localisation, internationalisation or innovation efficiency is being continuously discussed in the scientific literature with a focus on the state capitalism performed in China or otherwise (see e. g. Yi *et al.*, 2017; Li *et al.*, 2017; Tang, 2019; Gagliardi & Iammarino, 2018).

Nazarczuk *et al.* (2020) hold that foreign and domestic owned enterprises differ in their location preferences. In particular, the former pay more attention to proximity to infrastructure and are more susceptible to agglomeration externalities in the vicinity of metropolitan areas. Determinants and location strategies have been examined by others as well, incl. Ascani *et al.* (2016) or Tang (2017). Foreign-owned firms impact employment and gross domestic product in their host country through four main transmission channels: direct, indirect, induced, and spillover impacts (Jungbluth *et al.*, 2020). Attracting foreign-owned companies is thus usually beneficial for advanced and even more for backward regions. In this context, Thompson

and Zang (2018) suggest that FDIs may contribute to the local economy's resilience in several ways. On the other hand, economic policy decision-making processes shall also consider the empirical evidence that smaller local businesses have a significant and positive association with local economic performance (Rupasingha, 2017).

Pedersen and Thomsen (2003) stated that most previous studies have tended to define ownership structure exclusively in terms of ownership concentration or managerial ownership and to neglect the impact of owner identity. However, also research by Pedersen and Thomsen treats ownership identity differently than we do herein, as they applied four ownership categories, which have previously been found to be representative of the largest owners in the largest European companies: financial investors, (non-financial) companies, single individuals/families and governments. A similar approach towards the ownership structure effects has been applied, e.g., by Filatotchev *et al.* (2005), although with a narrower focus on Taiwanese family-owned firms and their performance.

Based on above-mentioned studies focused on various aspects of business ownership, we may assume that processes of industrialisation and business localisation contribute to the development of specific ownership structures from the perspective of both national and regional economies. However, comprehensive ownership structure patterns and spatial distribution of individual ownership types in underdeveloped regions seem to be rarely in the centre of interest in comparison to, e.g., analysis of FDI localisation or relations between private and state ownerships.

## **Research method**

Data analyzed within our research include information about business entities on the LAU level of territorial administration (formerly also known as NUTS level 4), i.e. seventy-nine districts of the Slovak Republic. All data on business entities have been sourced from the Register of organisations administered by the Statistical Office of the Slovak Republic. The data in the register are continuously updated based on statistical reports. At the end of 2019 were available data from mid-2018, which accounted for 569 742 entities at that time. According to article 21, paragraph 5 of the Act on State Statistics 298/2010 Coll., the data on the entrepreneur's nationality and the number of employees is considered confidential. They can be provided only according to a special regulation. For every district, data comprises an absolute count of active businesses, both legal entities and natural persons — entrepreneurs, structured from the perspective of their size based on the



number of employees, the form of their ownership, and subject of their main economic activity based on the standard NACE classification. Investigation of the business entities from the viewpoint of their main economic activity lies within the authors' research interests; however, it is not the subject of this article.

Following the methodology of the Statistical Office of the Slovak Republic, the type of ownership of the enterprises in the analyzed dataset is divided into eight standard kinds — international with a prevailing public sector, international with a prevailing private sector, foreign, private domestic, cooperative, state, municipal (or other regional self-governing) and the ownership by associations, political parties, and churches (see overview in Table 2). While most ownership classifications do not require further explanation, the use of the categories foreign and international ownership in organizational statistics shall be possibly cleared. While foreign ownership resides with entities established and controlled by a foreign legal person or a natural person — entrepreneur, international ownership is understood if an entity has been jointly established by a domestic and foreign legal person or natural person — entrepreneur. Under the ownership type, we do not understand the legal form through which the owner executes the assets or property management.

Our approach to data is twofold. Firstly, the business structure from the ownership type perspective is described through the share (proportion) of individual types. Secondly, to eliminate the size of the districts, the data were adjusted — the number of businesses in every district was calculated per 100,000 inhabitants.

The data describing the proportion of the ownership type of enterprises are compositional in terms of statistics. Compositional data are those which contain only relative information. Compositional data (Greenacre, 2018) is any data where the numbers make up proportions of a whole. The sample space of compositional data is a simplex:

$S^D = \{(x_1, \dots, x_D) \in R^D: x_i > 0, i = 1, 2, \dots, D; x_1 + \dots + x_D = 1\}$   
 The arithmetic mean of the compositional data set is usually not representative of the set's 'centre'. The geometric mean

$$\text{cen}(\mathbf{X}) = \frac{(g_1, \dots, g_D)}{g_1 + \dots + g_D}, \quad (1)$$

where  $g_j = \left( \prod_{i=1}^N x_{ij} \right)^{\frac{1}{N}}$  is the geometric mean of the  $j^{\text{th}}$  component (i.e. column-wise geometric mean) of the data set, is more representative.

The cluster analysis is a primary analytical method applied in the research. Cluster analysis has been successfully applied by several authors, who have examined topics related or similar to the subject of our interest here. Concerning the use of cluster analysis in the area discussed within this article or in related fields mentioned earlier, it has been applied sporadically, but consistently, over recent years by several authors. In the following text, we will briefly focus solely on its application within the Slovak discourse on regional economics. Chomjaková *et al.* (2016) have investigated regional disparities in Slovakia from the perspective of sustainable development through cluster analysis on the level of NUTS 3 regions. Correspondingly to previously mentioned studies, they present a distortion caused by the more advanced Bratislava region.

Kuzmišinová and Kuzmišin (2015) researched the cluster potential of Slovak districts (LAU level) in the context of the quality of their business environment. The data analyzed was based on 106 business environment indicators that were used to assess the competitiveness via four sub-indices related to economic activity, public administration and legislation, technologies and infrastructure, and education and human resources. They noted that regions with a highly developed manufacturing sector have a higher cluster potential and vice versa. Their research indicated a low regional cluster specialisation and the finding that clusters based on the business environment's quality are not clearly based on the geographical principle.

A review of recent publications also includes several sectoral studies using the cluster analysis as the primary or supplementary method. Seňová and Antošová (2014) grouped a statistical sample of 84 companies into 9 clusters based on their financing sources. Betáková *et al.* (2017) have investigated the potential for clustering in the agricultural sector. Baculáková (2018) has undertaken a cluster analysis of creative industries in the regions and districts of Slovakia based on the selected subject of economic activity (defined through NACE Rev. 2 statistical classification of economic activities) on the NUTS 3 and LAU levels.

Cluster analysis is a process of grouping objects into groups (clusters), so that objects associated within one cluster possess more similar attributes or characteristics than objects collected in other clusters. Clustering tendency assessment determines whether a given dataset contains meaningful clusters. Hopkins statistic (Banerjee & Davé, 2004) was used to assess the clustering tendency of our data. A value of Hopkins statistic close to 1 tends to indicate the data is highly clustered, random data will tend to result in values around 0.5, and uniformly distributed data will tend to result in values close to 0.

We used the Euclidean distance and Ward's clustering method for the clustering analysis of businesses per 100,000 inhabitants. It is not appropriate to use the Euclidean distance between two compositions to calculate the matrix of distances associated with hierarchic methods (Martín-Fernández *et al.*, 1998). For the classification of a compositional data set, the Ward classification method can be used if it is applied to the data transformed by the centered log-ratio transformation (Martín-Fernández *et al.*, 1998). We use centered log-ratio transformation (clr) of the composition, which is given by

$$\text{clr}(\mathbf{x}) = \left( \log\left(\frac{x_1}{g(\mathbf{x})}\right), \dots, \log\left(\frac{x_D}{g(\mathbf{x})}\right) \right), \quad (2)$$

where  $g(\mathbf{x})$  is the geometric mean of the composition (row-wise geometric mean).

For determining the number of clusters, we use the D index, which is a graphical method. In the D index plot, we seek a significant knee that corresponds to a significant increase in the value of the measure (Halkidi *et al.*, 2002).

Spatial autocorrelation (Gelfan *et al.*, 2010) tools test whether the observed value of a variable at one locality is independent of values of the variable at neighboring localities. One of them is the (global) Moran's I coefficient. Values of the Moran's coefficient are in the range from -1 to 1. Positive values of Moran's I coefficient indicate clustering of similar values; negative values indicate clustering of dissimilar values. Values close to zero indicate randomness of the data. For the global Moran's I statistic, the null hypothesis states that the attribute being analyzed is randomly distributed among the features in the study area. We used the Monte Carlo permutation to calculate the p-value of Moran I. A local measure of spatial autocorrelation — local Moran's I — make it possible to identify areas where similar values are significantly grouped, i.e., in cases when the Moran coefficient is significant, we use the local Moran test to detect local spatial autocorrelation. Local Moran's I identifies local clusters (regions where adjacent areas have similar values) or spatial outliers (areas distinct from their neighbors).

In the course of our analysis, we used the R computing environment (see R Core Team, 2019) and GeoDa program.

We paid particular attention to the ownership structure in the Least Developed Districts (LDDs) defined by the Act No. 336/2015 Coll. and identified quarterly by the Central Office of Labor, Social Affairs and Family

under the Ministry of Labor, Social Affairs and Family of the Slovak Republic. There are 20 such districts at this time. They geographically form an almost continuous area located mainly in the South-Eastern and North-Eastern parts of Slovakia.

## Results

In advance, a significant difference among the districts regarding the number of registered businesses reaching from just 775 in the district of Medzilaborce (ML) to 27 543 in the urban district Bratislava II (B2) can be stated. This fact makes the districts hardly comparable from the economic viewpoint; however, even the smallest sample (i.e., the number of businesses in a respective district) is representative enough for a relevant study from the statistical viewpoint. The data difference among individual districts reflects various levels of economic activity development across the country.

An initial analysis of business entities based on eight registered ownership types showed that the dominating ownership type is the private domestic one oscillating between 68,4% for the Bratislava I (B1) district and 96,7% for the district of Námestovo (NO), with the central tendency for Slovakia 91%. Another introductory remark resides in the fact that one type of ownership — international with prevailing public — has been represented only once in one district (Bratislava I) and, therefore, has been abstracted from it in subsequent research.

Before applying the clustering method, we evaluated the data set for the presence of meaningful clusters. The Hopkins statistics value was 0.1163 for the proportion of the ownership type and 0.0905 for businesses' count adjusted to 100,000 inhabitants. Hopkins statistics values are relatively low, i. e., there is a low clustering tendency present among the districts from both perspectives. Through the application of the D-index method, we determined the optimal number of clusters, in both cases four (see Figure 1 and Figure 2), as the D-index second differences value shown a significant peak for this count with which we proceeded in further research.

The hierarchical clustering presented within the dendrogram shows a rather extensive and varying number of sub-clusters (see Figure 3) depicting the order in which the clusters were merged). The four identified clusters consist of an uneven number of districts, in one case of just two. After data adjustment per 100,000 inhabitants, the districts regrouped to different, and again uneven, four clusters, as shown in Figure 4, with the urban district Bratislava I (Old Town) standing alone in the third cluster.

As is displayed in Figure 5, we found no statistically significant aggregation of districts. However, there are some geographical characteristics that we will mention below within the description of individual clusters, e.g., confirming partially some of the traditional stereotypes related to the location of more advanced regions that are considered more attractive by foreign investors (i. e. with a more significant share of foreign and international ownership). However, after the data adjustment eliminating the districts' population size, some aggregation appeared (see Figure 6).

As mentioned earlier, private domestic ownership has a dominant position in all clusters; still, some differences may be observed (see Table 3). The first cluster comprises mainly the most developed districts: larger Bratislava region (B1-B5, PK, SC, MA), except for K3 all urban Košice districts (K1, K2, K4), except for Prešov (PO) all districts of other regional capitals (BB, NR, TN, TT, ZA) and — quite surprisingly — southern districts of Dunajská Streda (DS), Nové Zámky (NZ) and Komárno (KN). If we do not consider the three urban districts of Košice, in Cluster 1, grouped districts lie geographically in Western Slovakia. This cluster is considerably characterised by a comparably strongest share of the foreign ownership and the private international compared to the other three. As a result, domestic private ownership is the lowest in relative terms for this district (87%, i. e., four percentual points below the national central tendency).

While the strong foreign presence is understandable for the national and regional capitals as destinations hosting the most FDIs (complementing thus studies focused on this topic), the latter three districts (DS, NZ, KN) need further investigation. Without more profound research, we may try to explain the occurrence of international and foreign ownership here through strong cross-border ties with Hungary. The higher number of business entities attracting international entrepreneurs due to the lively business activity in these three districts compared to the remaining districts neighboring Hungary (VK, LC, RS, RA, RV, KS, TV) may be another reason for the enhanced foreign presence.

The numerous second cluster comprising 29 districts territorially spread around the whole country is significant, with its indifferent position among other clusters showing around-average levels of almost all ownership types. Despite having the lowest presence of the cooperative ownership and the ownership by associations, political parties, and churches (with both levels not too distant from a higher-ranked cluster), in the relative comparison to the other 3 clusters, it has the most balanced representation of all ownership types.

The third cluster has the same high number of 29 included districts similarly distributed across Slovakia; however, contrary to the second cluster, it

has some significant characteristics regarding ownership types. This cluster has the highest presence of domestic private ownership, and after the below-mentioned fourth cluster consisting of just two districts, the second-lowest relative presence of foreign and international private ownership. At the other end of the spectrum, it has the second-highest occurrence of cooperative and self-government ownership. Noteworthy is the strong relative presence of the state ownership, second highest after the first cluster, which, however, comprises the national capital and regional centres, where the visibility of the state is more frequent due to the seats of state-owned corporations.

Districts of Levoča (LE) and Poltár (PT) have created one a bit out-of-the-ordinary cluster as after disregarding the private domestic ownership (constituting 90 and 88% respectively of all registered businesses, which is in relative terms the second lowest as an average among identified clusters), with the lowest presence of both foreign and international ownership and the essential type of ownership is the one by associations, political parties, and churches. Besides that, they have few other characteristics in common: both are present on the LDDs list and possess a relatively low count of registered business entities (2 565 in LE and even less 1 395 in PT). Anecdotally, they both missed one type of ownership: LE international with prevailing private and PT the state ownership. The standing out of LE and PT districts may go in line with a thesis presented by Korec *et al.* (2016) that they belong to a group of peripheral districts with natural spatial location artificially secluded from a more advanced urban region (centre) utilising territorial-administrative division. However, the rest of the respective districts, which Korec *et al.* (2016) identified in the same way (PK, SC, MA, KM, PE, SO, TR, SB, DT, BY), are spread almost evenly among the other three clusters in our dendrogram. That could indicate that an administrative separation from a neighboring economic centre has no significant impact on local businesses' prevailing ownership type.

Concerning the clusters identified in the examination above, LDDs are spread among three of them. Most LDDs (in the total count of 13) are grouped in Cluster 3, thus forming almost one half (45%) of all in this group included districts. The remaining LDDs are divided between Cluster 2 (5) and Cluster 4 (2), effectively forming the latter. There is no LDD present in Cluster 1.

As already indicated, a completely different picture appears after the adjustment of ownership types count per 100,000 inhabitants to eliminate the district population size from the analysis (Table 4). From this adjusted perspective, Cluster 3 stands significantly out. It consists of only one district — Bratislava I, which has the highest counts of most ownership types on

100,000 inhabitants. While most of the LDDs are located in Cluster 4 (12 out of 20; the remaining 8 are part of the numerous Cluster 1), a significant share of them (13 out of 14) is classified as LDDs. Cluster 4 is characterised by a deficient presence of three ownership types after data adjustment — secluded inland, foreign, and international private.

Moran coefficient through which we tested the spatial autocorrelation is not statistically significant for any ownership at the significance level of 0.05 (see Table 5), i. e. that there is no statistically significant aggregation of districts in terms of ownership. However, the population-adjusted count of ownership types, except cooperative ownership, shows a positive spatial autocorrelation (see Table 6).

Figures 7, 8, and 9 show the geographical localisation of districts with spatial autocorrelation regarding domestic private and foreign and international private ownership types. Highlighted districts (red, blue) represent territorial units causing spatial autocorrelation of the examined statistical data — total count of the district's ownership type per 100,000 inhabitants. Red highlighted districts show high value and are neighboring on others with high value; blue highlighted districts, on the other hand, show low value and are neighboring others with a low value. Again, it is possible to identify — although by far not full — certain overlay with LDDs in the case of the latter.

LDDs generally do not differ from the other districts from the private domestic ownership stake's perspective: its share is with the central tendency of 90,5%, just marginally below the national central tendency. Differences appear more visible when we inspect the share of the remaining types of ownership (as shown in Figure 10). LDDs have a lower share of foreign or international ownership and nonsignificantly lower participation of state ownership. On the other hand, ownership by local and regional self-government bodies plays, together with the ownership by associations, political parties, and churches, a relatively more important role than the rest of the country. Cooperative ownership is marginally above the national central tendency, and can be possibly explained by a more agricultural character of these prevalingly rural units, a hypothesis to be eventually verified in future research. Simultaneously, a higher share of the cooperative, state or municipal ownership may very well indicate a lower absolute count of private businesses.

The characteristics mentioned above indeed go hand in hand with primary statistical data, showing a significantly lower count of registered business entities in LDDs: 78,633 in total, forming just 13,8% of registered businesses in the whole country with LDDs representing more than a quarter of all districts. It is less than the count of business entities registered in 5

urban districts of the national capital Bratislava or registered in 7 regional capitals. They form an almost continuous area with low economic activity in absolute and relative terms through their geographical location compared to the count of the economically active population (compare with SBA, 2019b).

## **Discussion**

Literature related to the impact of ownership on entrepreneurship is usually limited to various questions related to FDIs, thus highlighting the level of relationship just between foreign (or international) and domestic elements or to various aspects of direct (not regulatory) state involvement in business activity underlining the relationship between state and private elements. However, it is usually the private domestic ownership, which is the driving force of the business activity. Concerning the discussion of the achieved results, we have no relevant studies to compare concerning Slovakia, the Czech Republic, or other V4 countries.

During our research, we have determined a relatively low clustering tendency among the 79 districts. The four identified clusters consist of an uneven number of districts, in one case of just two. Among the main results of our research is the finding that there is no statistically significant aggregation of districts in terms of ownership. Spatial autocorrelation on the level of significance 0.1 is statistically significant only for municipal ownership's spatial distribution. However, it shows a negative spatial autocorrelation, which means that districts with a lower and higher share of this ownership alternate.

Some districts attract foreign or international ownership more than others; however, their spatial distribution does not have a specific geographic pattern besides the association with the national and regional capitals, which naturally act as economic centres for their particular regions. Clustering tendencies regarding the ownership structure of these regional centres do not extend with the exemption of the larger Bratislava-Trnava area and Nitra with southwards neighboring districts to their surroundings. National and regional centres formed the core of the first cluster that comprises mainly the most developed districts with foreign and international ownership types present well beyond the central national tendencies. Their vital occurrence causes a relatively lower presence of domestic private ownership in this cluster. However, it is well compensated by the absolute numbers of registered companies, which reflect the lively economic activity in these respective districts.



Identifying the fourth cluster comprising only two districts belonging to 20 so-called Least Developed Districts was an impressive result. Their remarkability may as well lie in the fact that they both lacked one type of ownership if we do not take into account the fact that all but one district lacked the international type, with prevailing public ownership, which was consequently excluded from our examination.

The Least Developed Districts differ from the rest of the local administrative units just marginally. Their resemblance to other regions is demonstrated not only by the similarly high (although slightly lower) share of the domestic private ownership, but mainly by the fact that the 20 districts belonging to this specific group are spread across three of the four identified clusters. The performed cluster analysis indicates that they are not that much distinguishable as a whole group from the perspective of the ownership type's presence. On just contrary, they show similarities to other selected districts with which they formed the respective clusters, or eventually, two of them grouped into a separate cluster. Another main finding concerning the least developed districts is that they have a higher share of enterprise entities in the ownership of associations, political parties, and churches compared to their share in other districts and the whole country's share in general. Similarly, a comparable result appeared for the private inland and municipal ownership.

On the other hand, the share of business entities in foreign and international private ownership in LDDs is significantly lower compared to other districts and the whole country. As a group, LDDs economically suffer from a lower presence of the foreign and international types of ownership and generally lower economic activity defined by the count of established business entities. Together with the general remoteness from the national and regional economic centres grouped in the most advanced first cluster, these facts may effectively represent reasons for their lower level of development.

The cluster analysis applied using the second approach has almost unequivocally placed LDDs into one cluster. The second approach's outcomes have confirmed a statistically significant spatial autocorrelation on the level of significance 0.05 for every ownership type except cooperative ownership. Results of the local measure of spatial autocorrelation have helped to identify areas that have a particular impact on the global process — in the case of enterprise units with private inland, foreign and international ownership types; it became visible that the districts with the lower relative presence of these ownership types are clustered together (in cluster 4), which significantly overlaps with LDDs.

## Conclusions

The structure of businesses in individual districts from the perspective of ownership does not significantly differ with several described exceptions. However, differences appear after the adjustment of ownership types counts to the size of population, especially in LDDs, which are characterised by a lower share of domestic and foreign (as well as international) private ownership. The higher share of cooperative, state, or municipal ownership types cannot compensate for the lack of private business activity, which would create employment opportunities and contribute to the backward region's development under normal circumstances. This statement would probably be confirmed through unemployment levels in individual districts, but this shall be the subject of possible further research.

What we regard as an even more critical issue concerning the presented results of our research, which show the overlay of clusters with lower private business activity and LDDs, is the geographical concentration of these districts in both Southern Central and Eastern parts of the country, creating an almost continuous area with a low count of business entities irrespective of the ownership type. The concentration of clusters with similar characteristics leads to creating extended regions (groups of districts) with lower business activity. Based on the assumption that eventually more advanced neighboring districts may constitute a development driving force for the backward ones, employing clustering analysis, we identified a significant risk that several clustered districts with similar business characteristics due to the absence of relevant business ownership types will indicate a reduced domestic and international interest in doing business, and will be lacking such spillover development incentives. We regard this as a significant challenge for decision-makers and a noteworthy recommendation to them to aim business-promoting activities at these underrepresented ownership types. Besides that, governments more often than private owners pursue non-value maximising goals. Simultaneously, they do not necessarily aim for shareholder value creation (Pedersen & Thomsen, 2003) — an observation, which may also be useful under circumstances when markets and private initiative apparently fail, and private enterprise is commercially unviable.

Results from the presented single-case study should be interpreted cautiously, however, the strength of the dataset combined with the robustness of the applied methodology provide some space for limited generalisations. Regional business activity conducted by various types of ownership may under circumstances develop without links visible through spatial autocorrelation. Localisation of foreign and international ownership types as driv-

ing forces behind economic development has its own rules, not necessarily linked to the creation of geographical clusters that would include both regional economic centres and underdeveloped territorial units. Expansion of these dynamic forms of ownership to less developed districts is not guaranteed without further preconditions (e.g. development of infrastructure). On the other hand, it seems that with regard to underdeveloped regions (LDDs) we proved that districts with low presence of private inland, foreign and international ownership types tend to spatially auto-correlate. Thus, they tend to create larger territorial areas, which suffer from lower standard of living that results, i.a., from the lack of entrepreneurial activity. Without external stimuli, these areas have only limited internal capacities to break out from the cycle of economic backwardness. In this context, we regard the analysis of ownership patterns as a contribution to an improved and informed policy-making.

We are aware that this article's main limitations include its narrow focus on clustering tendencies with regard to business ownership types, focusing only on one of the possible factors affecting regional development. Our perspective here is simplified to the implicit assumption that regional development in general and development of business activity in regions, in particular, shall be linked with an increased presence of both domestic and foreign-owned enterprises. We admit that many aspects of regional development have not been included. However, our ambitions were limited to the filling of a space that we regarded as vacant. Moreover, the study provides a timely snapshot of the entrepreneurial structure before the likely alterations caused by the Covid-19 pandemic, and, consequently, it forms a basis for a possible future longitudinal analysis. This article presents only partial results of our research project "Analysis of the Business Structure in Slovak Regions" on an extensive dataset of all registered business entities.

The study of effects on entrepreneurial activity and resilience in individual regions may suggest further research based on the known ownership structures. At the same time, currently, the authors analyze the spatial distribution of the leading business activity and company size combined with ownership type on the same LAU level as presented in this article.

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## Annex

**Table 1.** Active business entities (2018)

Size Categories / Legal Forms	Legal persons	Self- employed persons	Free professions	Independent farmers	Total	
					Count	Share (%)
Microbusiness	213 462	302 677	22 703	3 683	542 525	96.8%
Small Business	13 062	1 236	20	10	14 328	2.6%
Medium Business	2 940	47	1	0	2 988	0.5%
Large Business	679	1	0	0	680	0.1%
SMEs Sub-total	229 464	303 960	22 724	3 693	559 841	99.9%
Total	230 143	303 961	22 724	3 693	560 521	100.0%

Source: edited by the authors based on Slovak Business Agency based on data from the Statistical Office of the Slovak Republic.

**Table 2.** Kinds of ownership

Code	Name	Code	Name
1	International with preponderance of public sector	5	Municipality-owned
2	Private inland	6	Ownership of associations, political parties and churches
3	Cooperative-owned	7	Foreign
4	State-owned	8	International with preponderance of private sector

Source: Metadata, Statistical Office of the Slovak Republic (last modification 16.12.2002)

**Table 3.** Central tendencies for SR and clusters of shares of the ownership types

	Private inland (2)	Cooperative (3)	State (4)	Municipal (5)	Assoc., polit. parties, churches (6)	Foreign (7)	Int'l private (8)
General Central Tendency	0.9101	0.0024	0.001 3	0.0142	0.0428	0.0222	0.0068
Cluster 1	0.8711	0.0022	0.001 6	0.0065	0.0447	0.0582	0.0156
Cluster 2	0.9116	0.0021	0.001 2	0.0146	0.0406	0.0215	0.0083
Cluster 3	0.9148	0.0029	0.001 4	0.0216	0.0419	0.0128	0.0046
Cluster 4	0.8990	0.0034	0.000 1	0.0276	0.0619	0.0080	0.0000

**Table 4.** Average number of business units per 100,000 inhabitants for ownership types

	Private inland (2)	Cooperative (3)	State (4)	Municipal (5)	Assoc., polit. parties, churches (6)	Foreign (7)	Int'l private (8)
Cluster 1	8 662	27	14	148	391	260	79
Cluster 2	13 595	31	31	88	664	1 227	304
Cluster 3	36 126	142	321	115	3 103	10 504	2 490
Cluster 4	5 935	20	13	165	359	164	50

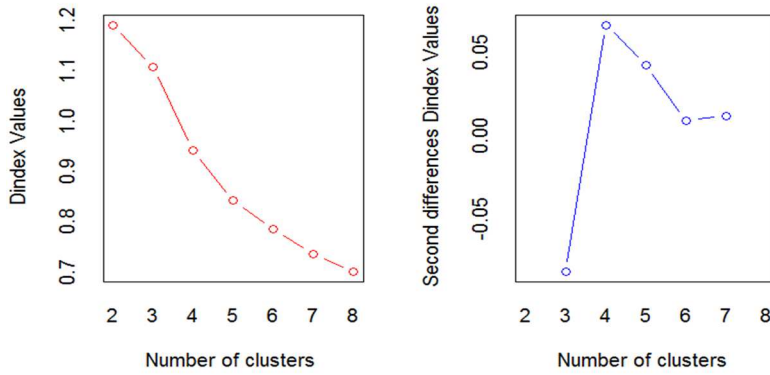
**Table 5.** Moran coefficient for proportions of ownership types

	Private inland (2)	Cooperative (3)	State (4)	Municipal (5)	Assoc., polit. parties, churches (6)	Foreign (7)	Int'l private (8)
Moran coefficient I	0.0067	-0.0860	-0.0629	-0.1009	0.0678	-0.0264	-0.0167
p value	0.3609	0.1475	0.2520	0.0983	0.1339	0.4699	0.4849

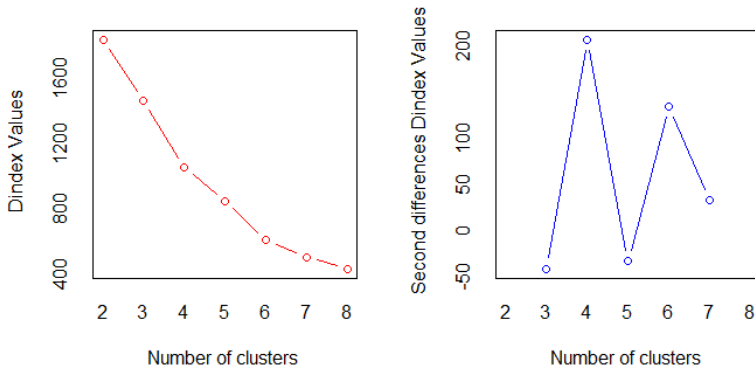
**Table 6.** Moran coefficient for the number of the business units per 100,000 inhabitants for ownership type

	Private inland (2)	Cooperative (3)	State (4)	Municipal (5)	Assoc., polit. parties, churches (6)	Foreign (7)	Int'l private (8)
Moran coefficient I	0.4768	0.0487	0.1862	0.3969	0.3483	0.3258	0.3281
p value	0.0001	0.1678	0.0003	0.0001	0.0001	0.0002	0.0002

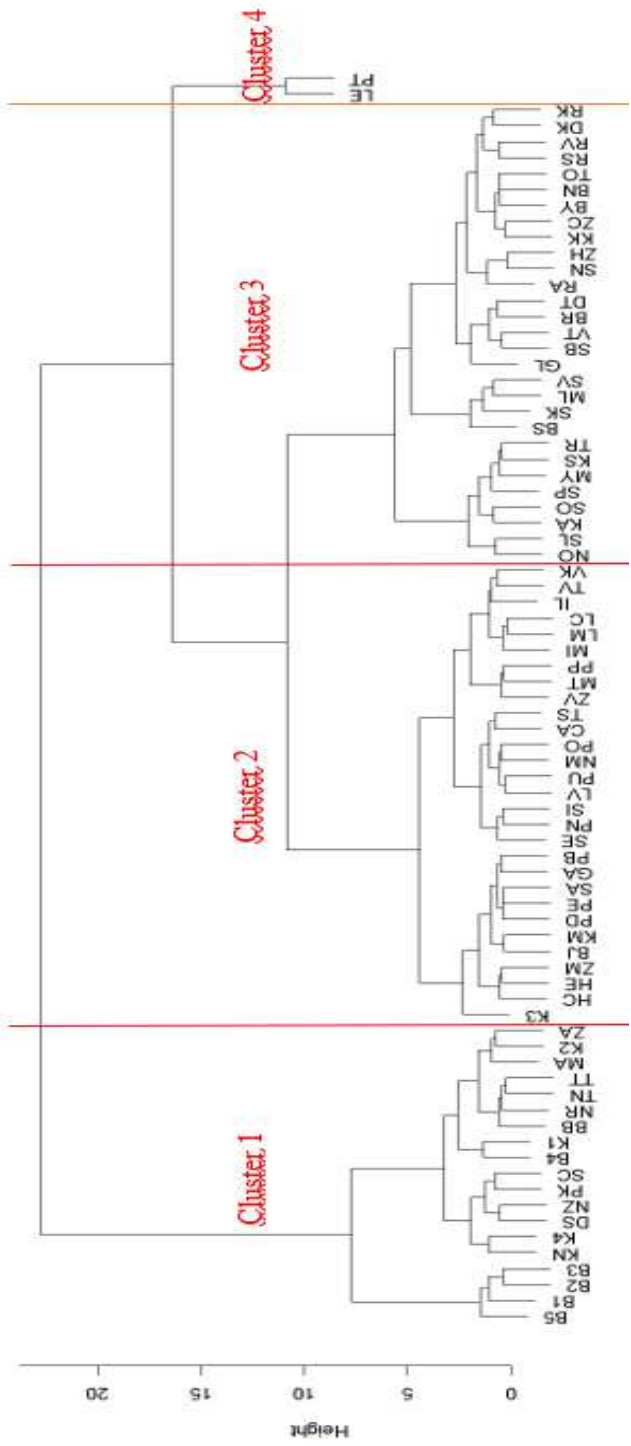
**Figure 1.** Optimal number of clusters for clustering based on proportions of ownership types



**Figure 2** Optimal number of clusters for clustering based on number of enterprises per 100,000 inhabitants for individual ownership types

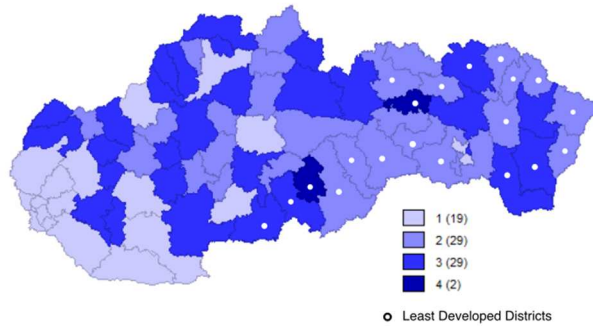


**Figure 3.** Cluster dendrogram showing 4 clusters (proportions of business units for each ownership type)

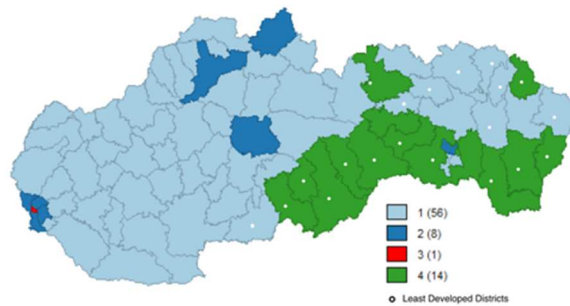




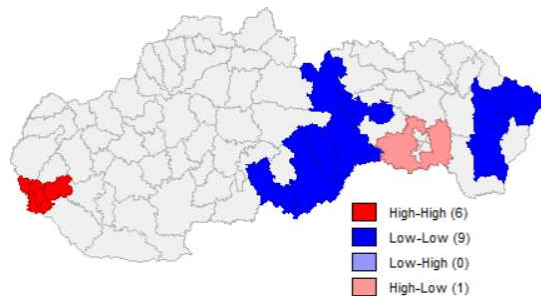
**Figure 5.** Geographical distribution of 4 clusters (created according to shares of ownership types)



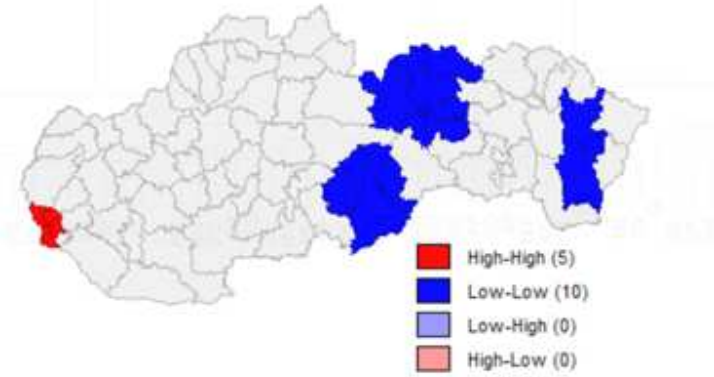
**Figure 6.** Geographical distribution of 4 clusters (created on the basis of the number of business units according to ownership type per 100,000 inhabitants)



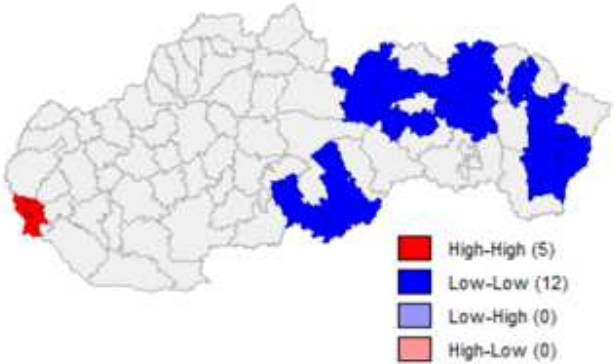
**Figure 7.** LISA cluster map of districts causing spatial autocorrelation of the number of enterprises with private inland ownership per 100,000 inhabitants



**Figure 8.** LISA cluster map of districts causing spatial autocorrelation of the number of enterprises with foreign ownership types per 100,000 inhabitants



**Figure 9.** LISA cluster map of districts causing spatial autocorrelation of the number of enterprises with international ownership types per 100,000 inhabitants



**Figure 10.** Central tendencies of ownership types proportion in the Slovak Republic, LDDs and other districts

