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INDIVIDUAL FARMERS AND THEIR REGIONAL DISPARITIES IN SLOVAKIA

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Abstract

The paper points out the regional disparities of the individual farmers in Slovakia and explains the notion of individual farmer according to the Slovak legal regulation. The interests doing business in agriculture as individual farmers is renewed. However, the related legal regulation which is very strict and vaguest needs to be amending mainly on the fact that some rules were created for the purposes of the Czechoslovakia. In spite of the fact that the number of individual farmers has been increased, there are proved some regional disparities in Slovakia. The most individual farmers are concentrated in the Bratislava, the Nitra, the Trnava and the Košice regions. In the Prešov and the Trenčín regions, there are minimum individual farmers. There is a positive spatial autocorrelation and the individual farmers are more concentrated on the fertile lowlands. Therefore the rural development policy should take into account the regional disparities among the regions and counties and support the role of individual farmers according to the priorities of a particular region.

Key words: *individual farmer, legal regulation, development, regional disparities, spatial autocorrelation*

INTRODUCTION

Small farms and family farming systems are the most worldwide favourable systems in the agricultural production. Especially, family farms are the biggest food producers in the world and create the most jobs in agriculture [6]. Family farms are the dominant business model in agriculture in the European Union and Europe as well [11]. Family farms are the business model mainly in small-scale agriculture. Family farms are considered as small farms by various authors [2], [6], [4]. They consider family farming as synonymous with small farms.

Small farms are diversified and contribute for maintenance of traditional values, environmental sustainability and economic flexibility than large farms [21], [6], [20]. Hennessy [11] show the significance of small farms, because large farms share in the global farm system only by a small proportion. The unique and substantial contribution of small farms is given to the food production, public goods creation, and balanced rural development as well [11]. Small farms contribute to a resilient, healthy and balanced regional development. A small farm can thus be seen as a complex and multifunctional entity, which engages in sustainability in its broadest sense - economic, social and environmental [8]. Because of high nature value, the farming systems fulfil an important role in the conservation of biodiversity across the European countryside [15]. However, small farms struggle to compete with large multi-national agro-businesses, they are under pressure from land grabbing, and they face serious challenges to secure public support, as they are often considered unviable and outdated [5]. Moreover, farming in urban environments is increasingly constrained and marginalised [22].

After the complex reforms in Slovakia including land privatization, land restitutions, decollectivization, and creation of new private ownership based farming organizations, market and price liberalization and introduction of market support and incentive framework [3], the dual farm structure has been created. On the one hand there are still large commercial farms (e.g. cooperatives and

commercial corporations) cultivating more than 80 percentage of agricultural land. On the other hand, there are small farms represented mainly by the individual farmers as a legal form of doing business in agriculture that could be established after 1990. It covers the most of small and family farms. The individual farmers create 67.15 % of all agricultural businessmen including the legal entities; however, they cultivate only 16.56 % of all agricultural land [18]. The average acreage of agricultural land which is cultivated by an individual farmer ranges from 46.97 hectares to 103.44 hectares [18]. It is negligible acreage of land when taking into account the average acreage of land cultivated by the cooperatives (1,267.26 ha), joint-stock companies (1,098.01 ha) or companies with the limited liability (455.85 ha) [18]. However, these statistical data do not prove the importance of the individual farmer for Slovak agriculture. And according to the above mentioned views, there are suggestions related to the very significant and worldwide roles of small farmers as well as considerations that small farms are outdated. By the number of individual farmers and their development in Slovakia and in the particular regions of Slovakia we would like to point out the present importance of this legal form of doing business in agriculture. The paper is organised as follows. The first chapter explains the notion of individual farmer from the legal point of view. The second chapter analyses the regional disparities in the number of individual farmer in the particular regions (NUTS III) of Slovakia. If there is an existence of regional disparities, we analyses if it is an accidental distribution of individual farmers in the space or there is a spatial autocorrelation among them.

MATERIALS AND METHODS

We used the statistical data about the number of individual farmers in the particular regions from the database STATdat and register of the organisations that are available at the Statistical Office of the Slovak Republic. The regional disparities are followed in the period 2004- 2014 according to the data available at the above mentioned database; in addition we selected some years to prove the regional disparities among the NUTS III. Moreover, we used the particular legal regulations, scientific papers and literature related to this topic.

There are used the method of legal science and the statistical and mathematical methods as well. The method of legal analysis is used in the first chapter to find out the problematic aspects of the legal regulations of the individual farmers. The quantitative methods should to prove non-accidental character of regional disparities in the number of individual farmers, mainly the descriptive statistics, statistical induction (non-parametric Kruskal – Wallis test) and the coefficients of spatial autocorrelation (Moran index and Geary index).

For non-parametric testing of the statistical significance differences among the regions NUTS III in the number of individual farmers, the Kruskal – Wallis test was used characterised as follows:

$$H = \left(\frac{12}{N(N+1)} . \sum_{j=1}^{k} \frac{R_j^2}{n_j} \right) - 3.(N+1)$$

H – Kruskal – Wallis test characteristics
N – total number of regions (all groups combined)
Rj – rank total for each group
nj – number of regions in each above mentioned group
k – number of groups

For assessment of the spatial autocorrelation the Moran´s and Geary´s indexes were used.

Moran´s I-index is calculated on a variable *x* for observations *n* at locations *i* and *j*:

$$I = \frac{n}{S_0} \frac{\sum_i \sum_j w_{ij}(x_i - \bar{x})(x_j - \bar{x})}{\sum_i (x_i - \bar{x})^2}$$

$\bar{x}$ - the mean of the variable *x*
w_{ij} – the weight matrix elements
S_0 – sum of the weight matrix elements calculated as: $S_0 = \Sigma i \Sigma j\ w_{ij}$

Weight matrix defines relationships between locations where measurement is made. We used the binary weights and provide the results in the Statistical Analytical System (SAS).

Moran´s I Index ranges from -1 to +1. Moran´s I index is near to zero when autocorrelation is missing. If Moran´s I index tends to +1, it indicates positive spatial autocorrelation. If Moran´s I index is near to -1, negative autocorrelation is high probably [14].

Geary C-index is calculated as follows:

$$C = \frac{n-1}{2S_0} \frac{\sum_i \sum_j w_{ij}(x_i - x_j)^2}{\sum_i (x_i - \bar{x})^2}$$

Geary´s C index varies from zero to a positive value. The value 0 signalises a maximal positive autocorrelation. The higher positive values indicate a higher negative autocorrelation [7].

Moran´s I index is sensitive to extreme values of x. Geary´s C index is sensitive to differences in neighbourhoods. Moran´s I index is preferred in spite of the fact that both indexes should result in similar conclusions [10].

RESULTS AND DISCUSSIONS

Notion of individual farmer in the Slovak legal regulation

The Slovak Commercial Code defines four groups of businessmen. The last one is a natural person engaging in agricultural production and registered in the special evidence of businessmen. The special business evidence was created by the Law 105/1990 Coll. on private business of citizens, mainly its second amendment (Law 219/1991 Coll.) which brought the legal definition of the individual farmer (§ 12a of the Law 105/1990 Coll.). Individual farmer is a natural person engaging in agricultural production on behalf of his/her name, his/her account and his/her responsibility by himself/herself or by help of other persons and for the purpose of permanent source of incomes. In addition the notion of agricultural production is a key to classify a physical person as individual farmers. According to the Law 105/1990 Coll. the agricultural production including the activities in the forest and water areas is:

a)a production of commodities of agricultural production for the purpose of permanent source of incomes, mainly by sales, eventually

b)processing of his/her agricultural production, or

c)occasional activities near to the agricultural production with the occasion to use the agricultural machinery in the season when it is not possible their full utilization for agricultural production, or mining the non-reserved minerals.

According to this definition of agricultural production, the base activity of the individual farmers is an agricultural production (plant and animal production) including the production in the forest and on the water areas. The other activities in the definition have only additional character to the agricultural production. It results from above mentioned definition a contrario that a natural person is no individual farmer if he/she is engaged in the agricultural production only for his/her own consumption or occasional sale of surplus.

By the legal definition, the additional activities to the agricultural production are:

(i)a processing of his/her agricultural production; however own agricultural production. It results a contrario that the processing of an agricultural production from another individual farmer or another natural persons or legal entity is not considered as an activity of the individual farmer. It means that the business license received by the registration in the evidence of individual farmer is not sufficient. This physical person needs business license from the Trade Licensing Bureau according to the Law 455/1991 Coll. Trade License Act.

(ii)occasional activities near to the agricultural production with the occasion to use the agricultural machinery in the season when it is not possible their full utilization for agricultural production. It means that an individual farmer may provide a service to another subject; however there are two

elementary characteristics of these services. Firstly, the service providing is only occasionally. There is no legal definition of the word "occasionally." We can use the synonym "temporary nature" and use the definition from the judgment of the European Court of the Justice. The temporary nature of the provision of services, envisaged in the third paragraph of Article 60 of the EC Treaty, is to be determined in the light of its duration, regularity, periodicity and continuity. Secondly, the agricultural machinery is used at the time when it is not possible their full utilization for agricultural production. So the agricultural machinery is primary used for the agricultural production but it could be used also for the non-agricultural activities if there is a capacity for its utilization mainly out of the agricultural season (e.g. snow plough or lawn mower at the public areas).

(iii)mining the non-reserved minerals. According to the systematic order of this rule, we can state that it is also only additional activity to the agricultural production and occasional activity with the use of the agricultural machinery in the season when it is not possible their full utilization for agricultural production. An individual farmer is not entitled to mine all kinds of minerals but only the non-reserved ones. The non-reserved minerals are the minerals which are not named in paragraph 3 (1) of the Act. No 44/1988 Coll. on the protection and use of mineral resources. The non-reserved minerals are e.g. stone, crushed stone, sand or peat. The reserved minerals are in the state ownership; the non-reserved minerals are a component of the land and belong to a landlord of the land plot.

The present legal regulation was prepared for the needs of Czechoslovakia and therefore it is outdated. Moreover, some of the legal rules are too vague and it is not clear if some activities are still considered as an activity of individual farmer or a business licence is necessary. When increasing interests to do business as individual farmers, there is a need of a new legal regulation of individual farmer as one of the legal form doing business in agriculture.

Regional disparities of the NUTS III in Slovakia

The number of individual farmers was decreased in the period 2004 – 2013; however after the economic crisis the number of individual farmers was increasing in the most of regions. The numbers of individual farmers is not developed similarly in all Slovak regions. The biggest decrease was recorded in the regions with the best conditions for agricultural production; in 2014 with the comparison to year 2004, there was less number of individual farmer about 36.56 % in Nitra region, 33.86 % in the Trnava region, 25.74 % in the Košice region. However, these regions maintained their position with the highest number of individual farmers per 1 km^2 of a region. We suppose that the most individual farmers are concentrated in the regions with the best agricultural conditions. The development of the numbers of individual farmers per 1 km^2 of the particular region is documented in the figure 1.

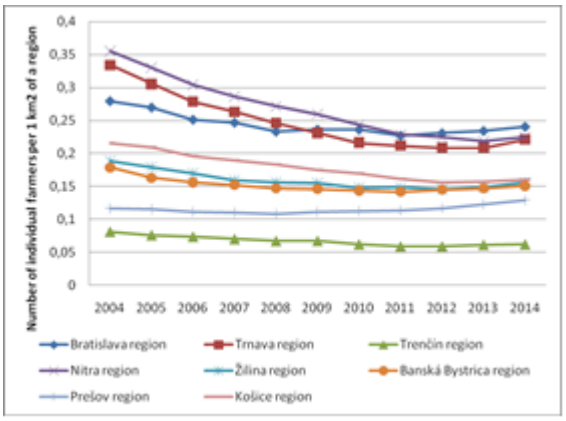

Fig. 1. Development of the number of individual farmers per 1 km2 of a region 2004- 2014

In the most regions, the decrease was stopped after the economic crisis (2012 – 2013).

The number of individual farmers is increasing in all regions what is similar to the trend in Slovakia as well. The individual farmers are oriented more on the plant production which is less costly than the animal production. Moreover, the revenues from the plant production are higher than revenues from the animal production [13], mainly from the production of maize, wheat and oil seeds.

There are no evident differences among the regions, so we need the statistical non-parametric test to prove or reject the hypothesis about the statistical significance differences related to the number of individual farmers among Slovak regions. We use Kruskal-Wallis test described above. The results are in the table 1. The numbers of individual farmers were calculated per 1 hectare of a county (LAU 1) belonging to the particular region (NUTS III). We tested the statistical significant differences in 2004 (access to the EU), 2011 (the biggest decrease of the individual farmers in the regions) and 2014 (period after the economic crisis and the starting point of increasing number of individual farmers in Slovakia).

Table 1. Differences in the number of individual farmers among the region in particular years

Region NUTS III	2004		2011		2014	
	mean	variance	mean	variance	mean	variance
Bratislava	0.00485	1.22E-05	0.004695	2.53E-05	0.004807	2.12E-05
Trnava	0.002806	3.29E-06	0.001775	1.23E-06	0.001877	1.1E-06
Trenčín	0.000876	2.08E-07	0.000661	1.53E-07	0.000678	1.38E-07
Nitra	0.003602	2.04E-06	0.002357	8.34E-07	0.002322	7.27E-07
Žilina	0.001884	3.64E-07	0.0016	4.85E-07	0.001657	5.05E-07
Banská Bystrica	0.001687	6.76E-07	0.001322	2.18E-07	0.001418	1.87E-07
Prešov	0.00123	7.22E-07	0.001194	5.13E-07	0.00136	5.74E-07
Košice	0.002349	1.66E-06	0.001854	8.57E-07	0.001916	7.69E-07
p-value	0.00001836		0.000273		0.000155	
K-W statistics	33.8521		27.4846		28.8322	

Source: own calculations, 2018

By the results of Kruskal-Wallis test (the p-value is smaller than 0, 05 in all tested years), there are statistical significant differences among the regions in the number of individual farmers. The p-value is increasing and the value of Kruskal – Wallis statistics is slightly decreasing between the years 2004 and 2011. We assume that the regional disparities in the number of individual farmers were slightly decreased. However, the year 2014 shows a tendency to deepen the regional disparities among the regions NUTS III again.

Now, there is a question where the statistical significant differences are situated – among all regions or between some of them. The multiple range tests was used in the programme Statgraphics. There are no statistical significant differences among all regions. In 2004, there were statistical significant differences between the Bratislava region and the rest of regions (excluding the Nitra region). The statistical significant differences were also between:

-the Trnava region and the Trenčín and the Prešov regions;

-the Trenčín region and the Nitra and the Košice regions;

-the Nitra region and the Banská Bystrica, the Žilina and the Prešov region.

In 2011 and 2014, the statistical significant differences were between the Bratislava region and other regions of Slovakia. Therefore we exclude the Bratislava region from the observations and we repeated the tests without this region. Thus, we received the statistical significant differences also among other regions. The statistical significant difference in the number of individual farmers was between the Trenčín region and other Slovak regions in all tested years. The Trenčín region has the smallest density of individual farmers per 1 ha. The biggest density of individual farmers is on the lowlands where the most fertile lands are situated (e.g. the Bratislava region, the Nitra region, the Trnava region, the Košice region).

In general according to the Kruskal-Wallis test we can assume the decreasing trend of regional disparities in Slovak regions. However, it is not a trend among all regions of Slovakia. The statistical significant differences between the Nitra and the Žilina regions were disappeared till 2014; however, the statistical significant differences between the Trenčín region on the one hand and the Žilina, the Banská Bystrica and the Prešov regions on the other hand were increased.

With the context of regional disparities of individual farmers in Slovak regions, we considered the arrangement of the individual farmers in particular region is accidently or there is a spatial autocorrelation; it means if there are any relations among the counties (LAU 1) that create a cluster on the base of observed indicator (e.g. the number of individual farmers per 1 ha of a particular county in our case). The spatial autocorrelation is an existence of spatial structure of the mapped indicators in relation to their geographical nearness [9]. If the similar occurrence or attributes are situated nearer in a space, it is a positive

autocorrelation. If the markedly different values are aggregated, the negative autocorrelation is probably. If the data are situated in a space without any relations among them, the analysed values are not statistical significant [16].

We observed the number of individual farmers per 1 ha of a particular county in three selected years 2004, 2011 and 2014 (the reason of this selection is mentioned above). The results calculated by the SAS are in the table 2.

Table 2. Spatial autocorrelation in the numbers of individual farmers in Slovakia

Coefficients	Observed	Expected	StdDev	Z	Pr> |Z|
Moran´s I					
2004	0.457	-0.0204	0.110	4.341	<.0001
2011	0.302	-0.0204	0.0804	4.01	<.0001
2014	0.394	-0.0204	0.0861	4.813	<.0001
Geary´s c					
2004	0.914	1.0000	0.296	-0.28	0.7724
2011	1.223	1.0000	0.4283	0.52	0.6029
2014	1.122	1.0000	0.4092	0.299	0.7652

Source: own calculations, 2018

Moran´s I index is more effective than Geary´s c index [1] that evaluates only a positive autocorrelation [12]. Geary´s c index is non-significant; it means there is no autocorrelation and the individual farmers are situated in a space accidentally. However, Moran´s I index is more preferred and used more frequently; we state the conclusions from this result. Moran´s I index is statistical significant (all p-values are less than 0.05); therefore we can refuse the hypothesis about the non-existence of spatial autocorrelation and about the accidental arrangement of the individual farmers in Slovak regions. By other words, the numbers of individual farmers has a positive spatial autocorrelation (Z-score and Moran´s index are positive). The values of Moran´s index range from 0.302 to 0.457; it means the middle strong positive autocorrelation.

Moran´s diagram is centred on the position (0.0) because values of an indicator are considered as deviations from their means. Moran´s diagram creates four quadrants; each of them charts a particular type of relations between original values of indicators (localised on the horizontal axe) and average values of the neighbour indicators (localised on the vertical axe). The relations between values of indicators influence the regression slope that represents Moran´s I index [17]. Figure 2 documents Moran ´s diagram.

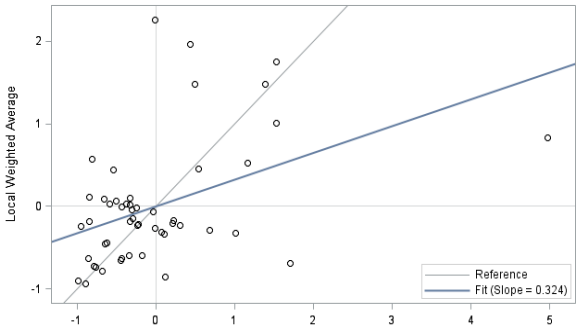

Fig. 2. Moran Scatter Plot

The units localised in the upper right quadrant (hot spots) and quadrant left bottom (cold spots) indicate the positive spatial autocorrelations.

The upper left quadrant and quadrant right bottom signalise the negative spatial autocorrelation. There are spatial outliers. Moran´s diagram signalises that the most of units is concentrated in the quadrant left bottom and in the upper right quadrant that proved the positive spatial autocorrelation of individual farmers in Slovak regions. It confirms the most of individual farmers are situated on the fertile lowlands of the Bratislava, the Nitra, the Trnava and the Košice regions. However, the positive effect that the individual farmers bring for the rural development is necessary also for the less fertile regions as well as the mountains regions.

Therefore the rural development policy should consider the regional disparities among the regions and support the role of individual farmers mainly in the less favourable regions for agricultural business.

CONCLUSIONS

The legal regulation of individual farmers is vague and strict and was created at the time of common state of Czech and Slovak countries. We assume that the renewed interest in the individual farmers needs new legal regulation that will limits more precise the agricultural activities of the individual farmers and their duties when starting their own business as well as during whole time of their business as individual farmers. The carefully legal regulations and political and economic incentives for small and new farmers should be focused also by law makers at the national level because it is a way how to support environmental sustainability, rural development and preserve traditional values of a country. It is also very important to prepare the incentives for new individual farmers however as well as to create the conditions for maintenance of individual farmers.

Moreover, the numbers of individual farmers were not developed in the similar way in all Slovak regions. There are statistical significant differences among the regions in the number of individual farmers that are slightly decreasing over the observed period of time. However, it is not a trend among all regions of Slovakia. The statistical significant differences between the Nitra and the Žilina regions were disappeared till 2014, but the statistical significant differences between the Trenčín region and the Žilina, the Banská Bystrica and the Prešov regions were increased.

The arrangement of the individual farmers in particular region is not accidently, there is a positive spatial autocorrelation among them. They are more concentrated in the regions typically by their lowlands and the most fertile lands. The political and economic difficulties are the reason why the biggest decrease was recorded in the regions having the best conditions for agricultural production. We assume that the positive effect that the individual farmers bring for the rural development is necessary also for the less fertile regions as well as the mountains regions. Therefore the rural development policy should take into account the regional disparities among the regions and support the role of individual farmers especially in the regions which are less favourable for agricultural business. However, at the time of political and economic changes, the support is necessary also for the individual farmers on the lowlands. The results proved the higher sensitivity of these regions on such changes because the decreasing of numbers of individual farmers was much higher than in other regions.

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