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FOOD SECURITY DRIVERS: ECONOMIC SUSTAINABILITY OF PRIMARY AGRICULTURAL PRODUCTION IN THE SLOVAK REPUBLIC

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Abstract. Agriculture constitutes a very important sector in the Slovak economy that generates in addition to the basic food production also services, provides jobs, has a significant impact on regional development and provides nutrition of the population. One of decisive factors influencing the economic stability of agriculture is production efficiency which is strongly linked to support policy, through which partially is ensured the financial availability of enterprises. The use of subsidies by the EU is very important tool for ensuring economic sustainability of agriculture in the Slovak Republic conditions. The aim of this paper is economic evaluation of primary agricultural production in manufacturing and economic conditions in the Slovak Republic and their alternative comparison with selected EU Member States. The paper also refers to differences in level of subsidies in selected countries in the EU and their impact on possibilities of investing funds into the production development. Our calculations showed that without the intervention of the Common Agricultural Policy of the EU (especially subsidy policy) would be Slovak agriculture economically unprofitable, what could lead to its failure.

Keywords: food security, agriculture, economic sustainability, net profit, primary production, subsidies

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JEL Classifications: H2, Q14, Q01

1. Introduction

The European agricultural sector, just as the rest of the economy, is facing the challenges of this decade's market globalization and new trends in economic movements (Farah, Gómez-Ramos, 2014). The food and drink industry, although is not directly involved in farming, is engaged in a series of concrete initiatives to support sustainable agricultural practices in the EU and globally. The natural environment is where raw materials for the food and drink manufacturing sector are grown. About 70% of EU agricultural produce is purchased by the EU food and drink industry. For the long – term health and prosperity of the industry, it is crucial that agricultural production systems are sustainable (CIAA, 2007).

Under conditions of growing population and increasing demand for food products, it is important to provide search on rational elements of regional policy ensuring food security in the countries with developed mechanisms in market economy. Along with regional economic growth, nowadays, important priorities are: improving quality of life, health of population, increasing natural resource efficiency of production capacity, result-

ing in creating favorable environment in regions on the basis of sustainable socio-economical and ecological development (Dezellus et al., 2015; Travkina, 2015; Tvaronavičienė, 2016; Rezk et al., 2016; Czyżewski and Smędzik-Ambroży, 2015).

Share of GDP of world agriculture in the world GDP has a decreasing trend nevertheless this industry has irreplaceable importance in the development and settlement in each country. With increasing population of the earth also grows demand for agricultural production due to provide food sources for humanity. Agricultural development is highly differentiated and production is concentrated in economically developed countries that achieve high production efficiency and labour productivity and low employment. Except developed countries the share of agriculture in national economy is crucial in less developed countries too (MPSR, 2014).

Agriculture has always been one of the most important parts of the national economy of Slovakia (Fiľa, Tóthová, Slíšková, 2013). It promotes commercial activities and sustainable employment in rural areas, thus, improving the living quality and retaining density of rural population (Ore, 2015). Agriculture in Slovakia has passed through difficult developmental period of recession in recent years and currently persists in stagnation or even in decline in the key economic and production indicators. The decisive factor influencing the economic stability of agriculture is production efficiency and in particular support policy, through which partially ensures the financial availability of enterprises (Chrastinová, 2013). Investments on the farms are also strongly related to the opportunity presented by rural development projects providing subsidies (Dogliotti et al, 2014).

The agricultural subsidies are an essential aspect of agriculture and play an important role in international trade. A policy to support farming incomes in the European Union is called the Common Agricultural Policy (CAP). An impact of policy of EU agricultural support on the economic performance of agricultural enterprises is therefore an interesting question, especially for policy makers (Vozarova, Kotulic, 2016).

Rural areas cover 90 % of the EU territory, of which more than one half is agriculturally farmed (Loudjani, Devos, 2012). After Slovakia's accession to the EU, agricultural land soil has become an essential means of obtaining subsidy means from the Common Agricultural Policy (Rábek et al., 2014). It is becoming more difficult to support farms through subsidies in global markets (Farah, Gómez-Ramos, 2014). It is difficult to compare the subsidies in individual countries where are various input costs (salaries, the price of land, land lease, fertilizers, agricultural machines) as well as different numbers of farmers and different sizes of farms, climatic conditions and soil type. To facilitate the comparison is used the average support per hectare (gross national envelope divided by farmland). However, in most EU countries direct payments are not given per hectare, but the farm. Slovakia in the accession negotiations negotiated an exemption for simpler administrative system and in transitional period has the opportunity to distribute direct payments based on the number of hectares of utilized agricultural land (The simplified Payment area system) (European Commission, 2012).

The three elements of sustainable farming

During the past decades, increasing environmental awareness and progressive acknowledgement of the complex, imperfectly know and predictable interaction between economy, ecology and society generated the notion of sustainable development. According to it, economic growth should be pursued concomitantly with the improvement of human welfare and the conservation of natural resources (Bielik et al., 2014).

The concept of sustainable development is recognized by the international community as the dominant ideology of human life in the twentieth century (Summit "Earth" 1992), therefore particularly important issue is providing modern regional policy regarding food security with taking into account market, social and ecological aspects (Shevchuk, Khvyshchun, 2016; Marques and Almeida, 2013).

Sustainability is seen as a key element towards a profitable long-term future for farming and rural areas (Passel et al, 2007). It is generally accepted, that the three key factors of sustainable development are: environmental protection, economic efficiency and solidarity in society.

The majority of studies analyzing sustainability indicators focus on environmental sustainability and omit socio-economic aspects despite the complexity of farming activities, which warrants a holistic approach to sustainability assessment (Dantsis et al, 2009).

Accordingly, a more precise operational definition of sustainability is necessary to work at the farm level. This work adopts a modified version of the recent definition of sustainable agriculture adopted by the Sustainable Agriculture Initiative in 2003 (Häni, 2003*): "Sustainable Agriculture adopts productive, competitive and efficient production practices, while protecting and improving the natural environment and the global ecosystem, as well as the socio-economic conditions of local communities."*

The main objectives of sustainable agriculture (Horská, Nagyová et al., 2013):
– to provide food in acceptable quality and variety,
– increasing productivity,
– protection of groundwater, reduction in use of pesticides and synthetic fertilizers,
– stress reduction in livestock by providing a certain level of natural activity,
– creation of biotope resistant to harmful factors and adverse conditions,
– conservation of soil organic matter and crop diversity,
– minimization of erosion by applying soil protection cropping systems,
– to ensure crop rotation, recycling and the use of integrative systems.

To enable viable livelihoods to be made from farming activity, sustainable agricultural production should be market – driven and respond to consumer demand.

The economic viability of farms is influenced by many factors. Sustainable profitability of enterprises is the primary incentive to make the company managed to ensure other elements of sustainability. One of the important tools for ensuring economic sustainability of agriculture in the Slovak Republic conditions is the use of subsidy supports by the EU.

2. Material and methods

The aim of this paper is economic evaluation of agricultural production in manufacturing and economic conditions in Slovak Republic and their alternative comparison with selected EU Member States, which have different supports for entrepreneurship in agricultural production, what has a significant impact on net profit and thus on possibilities of investing funds into the production development. In order to fulfil the defined objective of the paper were collected and used primary and secondary sources of information. Underlying secondary sources of information were obtained from available literature and internet sources (NPPC-VÚEPP, STATISTICS), professional book publications from domestic and foreign authors and organizations. When processing of individual underlying data and formulating conclusions of paper were used methods of analysis, synthesis, induction, deduction and the comparative method. From the calculation of net profit follows that when the difference between revenues and costs is positive the company made a profit if the difference is negative, the company achieved a loss.

In the calculations we present total conversion costs (the sum of direct and indirect costs) per hectare of agricultural land in Slovakia. Subsidies are converted to 1 hectare of agricultural land. Its value is affected by the following indicators: production in accounting prices (transfer prices), sale of products in transfer prices, revenue (sale in selling price), own work capitalized, subsidies and other operating revenues. The net profit per hectare is calculated according to the methodology of government regulation of SR.

It is reported net profit for 1 hectare of agricultural land.

Calculation:

+ conversion costs for product
- sale of products (in transfer prices)
+ revenue (sale in selling price)
+ own work capitalized
+ subsidies (I. and II. variant)
+ - other operating revenues

The first variant of quantification of revenues and net profit for agricultural products includes:
complementary national direct payments in plant production (additional area payment), payments for energy crops and separate sugar payment in crop production,
complementary national direct payments on livestock units.

The second variant except subsidy title in the first variant contains an aliquot part:
the single area payment scheme (SAPS),
payments for less – favored areas (LFA).
This support is quantified by a uniform methodology, based on the assumption that this kind of support positively affects the economy of all products and thus the result of whole business entity.

Within each dimension of sustainability, one or more attributes are identified and then measured by the means of indicators. For example, economic sustainability can be measured by net income, but also by some other financial indicators representing production system's resistance, renewability, regeneration, and resilience (Ikerd, 2006; Sydorovych, Wossink, 2008).

In Slovakia, our experts usually use the argument, that the large – scale agriculture production is cheaper and therefore means a greater economic profitability. On the other hand, it must also be observed how many personnel are there employed in such agriculture - as we know it in its present form - and if it really implements all functions as are described in theory (productive, economic, social, ecological and social functions). The goal is to calculate the equation of the linear regression model and determining the degree of dependence between determinants, indicators of agricultural land acreage and number of employees.

Linear regression

Linear regression has been calculated using SAS. Its main objective is to find a linear function using the least squares method. The regression used two types of labeling for the analyzed variables X and Y. The variable Y is generally only variable ascending to the regression model. This variable is called the dependent variable because its development depends on the level of development of the independent variable, eventually independent variables.

The variable X is referred to as the independent variable, which is based on the context of a basic linear equation. Variable X doesn't have any factor or variable from which it might be dependent.
The basic form of the linear regression equation is as follows:

$$y_i = \beta_0 + \beta_1 x_i + \varepsilon_i \qquad i=1,2...n$$

Where:
y_i – the value of the dependent variable Y (criteria) in the i^{th} observation
x_i – the value of the independent variable X (predictor) in the i^{th} observation
β_0 – regression constant (intercept of the regression line with x-axis)
β_1 – regression coefficient (slope of the regression line)
ε_i – random error of the i^{th} observation

Distribution of the analyzed objects based on selected indicators

In order to trace dependencies between small and large farms in terms of the agricultural land acreage indicator, those have been separated into following categories:
– 0,00 – 50,00 hectares,
– 50,01 – 100,00 hectares,
– 100,01 – 500,00 hectares,
– 500,01 – 1 000,00 hectares,
– 1 000,01 < hectares.

Criteria for categorization of farms (legal entities): agricultural land acreage

In terms of the agricultural land acreage as indicator were individual legal entities of primary agricultural production separated into five groups. The first group consisted of companies with acreage up to 50,00 ha of agricultural land, the second group consisted of companies with the size of agricultural land of 50,01 ha to 100,00 ha, a third group of companies with an acreage of 100,01 ha to 500,00 ha of agricultural land, fourth group consisted of companies with a size of 500,01 ha to 1 000,00 ha of agricultural land and the last fifth group consisted of companies with the size of over the 1 000,01 ha of agricultural land.

Table 1. Categorization of legal entities by the size of the agricultural land in year 2005

Variable analysis: Agricultural land acreage						
Agricultural land acreage in hectares	Number of farms	Average	Standard deviation	Minimum value	Maximum value	Median
0,00-50,00	28	26.92	19.03	0.00	48.38	36.70
50,01-100,00	26	76.79	15.35	51.00	97.20	80.65
100,01-500,00	153	300.31	115.70	106.00	499.55	307.42
500,01-1 000,00	197	750.17	146.55	503.00	999.50	760.02
1 000,01<	471	2 198.21	1 275.17	1 000.90	9 200.00	1 807.00

Source: Informačné listy 2005 (Information letters 2005) and own calculations

Table 2. Categorization of legal entities by the size of the agricultural land in year 2006

Variable analysis: Agricultural land acreage						
Agricultural land acreage in hectares	Number of farms	Average	Standard deviation	Minimum value	Maximum value	Median
0,00-50,00	22	31.93	14.33	0.00	48.40	36.10
50,01-100,00	26	75.23	15.70	50.02	98.00	78.01
100,01-500,00	160	306.50	118.42	101.00	500.00	303.02
500,01-1 000,00	197	755.41	142.55	503.00	997.62	761.25
1 000,01<	470	2 190.20	1 238.17	1 001.00	8 302.80	1 767.49

Source: Informačné listy 2006 (Information letters 2006) and own calculations

Table 3. Categorization of legal entities by the size of the agricultural land in year 2007

Variable analysis: Agricultural land acreage						
Agricultural land acreage in hectares	Number of farms	Average	Standard deviation	Minimum value	Maximum value	Median
0,00-50,00	24	30.23	16.92	0.00	49.87	35.74
50,01-100,00	24	75.38	15.96	50.02	99.40	78.89
100,01-500,00	160	308.31	119.66	101.00	500.00	304.51
500,01-1 000,00	197	750.52	142.40	507.00	998.28	750.03
1 000,01<	470	2 170.55	1 214.18	1 001.38	8 302.80	1 772.44

Source: Informačné listy 2007 (Information letters 2007) and own calculations

Table 4. Categorization of legal entities by the size of the agricultural land in year 2008

Variable analysis: Agricultural land acreage						
Agricultural land acreage in hectares	Number of farms	Average	Standard deviation	Minimum value	Maximum value	Median
0,00-50,00	24	28.57	17.97	0.00	48.87	36.53
50,01-100,00	23	75.42	15.09	50.02	97.31	78.00
100,01-500,00	158	310.81	118.51	101.00	500.00	306.68
500,01-1 000,00	200	754.18	148.31	500.18	999.28	757.09
1 000,01<	470	2 142.95	1 177.31	1 002.20	8 302.80	1 773.94

Source: Informačné listy 2008 (Information letters 2008) and own calculations

Table 5. Categorization of legal entities by the size of the agricultural land in year 2009

Variable analysis: Agricultural land acreage						
Agricultural land acreage in hectares	Number of farms	Average	Standard deviation	Minimum value	Maximum value	Median
0,00-50,00	24	25.46	19.42	0.00	50.00	32.50
50,01-100,00	23	73.65	14.21	52.00	97.00	71.00
100,01-500,00	161	309.70	119.12	101.00	500.00	307.00
500,01-1 000,00	205	755.70	148.25	503.00	997.00	749.00
1 000,01<	462	2 134.85	1 145.93	1 006.00	8 303.00	1 779.00

Source: Informačné listy 2009 (Information letters 2009) and own calculations

Table 6. Categorization of legal entities by the size of the agricultural land in year 2010

Variable analysis: Agricultural land acreage						
Agricultural land acreage in hectares	Number of farms	Average	Standard deviation	Minimum value	Maximum value	Median
0,00-50,00	23	27.65	18.06	0.00	50.00	34.00
50,01-100,00	23	73.22	13.67	54.00	97.00	71.00
100,01-500,00	161	304.13	115.95	103.00	500.00	293.00
500,01-1 000,00	203	751.82	143.21	505.00	995.00	746.00
1 000,01<	465	2 116.36	1 138.89	1 002.00	8 303.00	1 769.00

Source: Informačné listy 2010 (Information letters 2010) and own calculations

Table 7. Categorization of legal entities by the size of the agricultural land in year 2011

Variable analysis: Agricultural land acreage						
Agricultural land acreage in hectares	Number of farms	Average	Standard deviation	Minimum value	Maximum value	Median
0,00-50,00	24	26.67	18.36	0.00	49.78	33.07
50,01-100,00	25	74.17	12.21	57.00	97.00	71.52
100,01-500,00	162	304.51	114.68	102.97	500.00	292.10
500,01-1 000,00	204	763.03	146.99	506.13	995.83	767.45
1 000,01<	460	2 111.87	1 134.04	1 001.53	8 302.80	1 780.39

Source: Informačné listy 2011 (Information letters 2011) and own calculations

Table 8. Categorization of legal entities by the size of the agricultural land in year 2012

Variable analysis: Agricultural land acreage						
Agricultural land acreage in hectares	Number of farms	Average	Standard deviation	Minimum value	Maximum value	Median
0,00-50,00	23	27.29	17.38	0.00	48.58	33.00
50,01-100,00	25	71.33	13.60	55.58	97.00	68.92
100,01-500,00	159	297.73	116.24	100.90	499.00	282.74
500,01-1 000,00	213	759.84	150.21	502.84	994.96	765.38
1 000,01<	455	2 096.98	1 093.46	1 001.53	8 302.80	1 779.80

Source: Informačné listy 2012 (Information letters 2012) and own calculations

From the individual tables 1 to 8 containing categorization of farms (legal entities) by size of agricultural land for the relevant years is obvious that the most represented class for the whole period 2005 – 2012 were the farms with the acreage of over than 1 000,01 hectares of agricultural land.

3. Results

Subsidies to agriculture reached the level of 55.9 billion EUR in 2012 what was about 0.7 % more than a year ago. Decisive part (82.2 %) of the total support was allocated to the original member countries (46.0 billion EUR). Most of a total EU – 28 supports was allocated in the key production countries, in France (16.7 %), Germany (13.1 %), Spain (11.7 %), Italy (9.8 %) and Great Britain (6.6 %). Slovakia was granted by 0.9 % of the total supports of the EU – 28, what meant 258.4 EUR per hectare of utilized agricultural land, so Slovakia was below the average of the EU – 28. Subsidies to agriculture remain a decisive item of farmers' income in all the EU countries.

Subsidy in the conversion to hectare of utilized agricultural land reached the level of 323.6 EUR as an average of EU – 28 and 373.4 EUR as an average EU – 15 (Figure 1). The most support in conversion to hectare of utilized agricultural had Malta (1727.3 EUR), Finland (936,3 EUR) and Greece (891.9 EUR Less support than Slovakia had Romania (126.2 EUR), Lithuania (136.0 EUR), Bulgaria (139.6 EUR), Latvia (153.7 EUR), Poland (198.0 EUR), Estonia (204.0 EUR) and the UK (235.0 EUR).

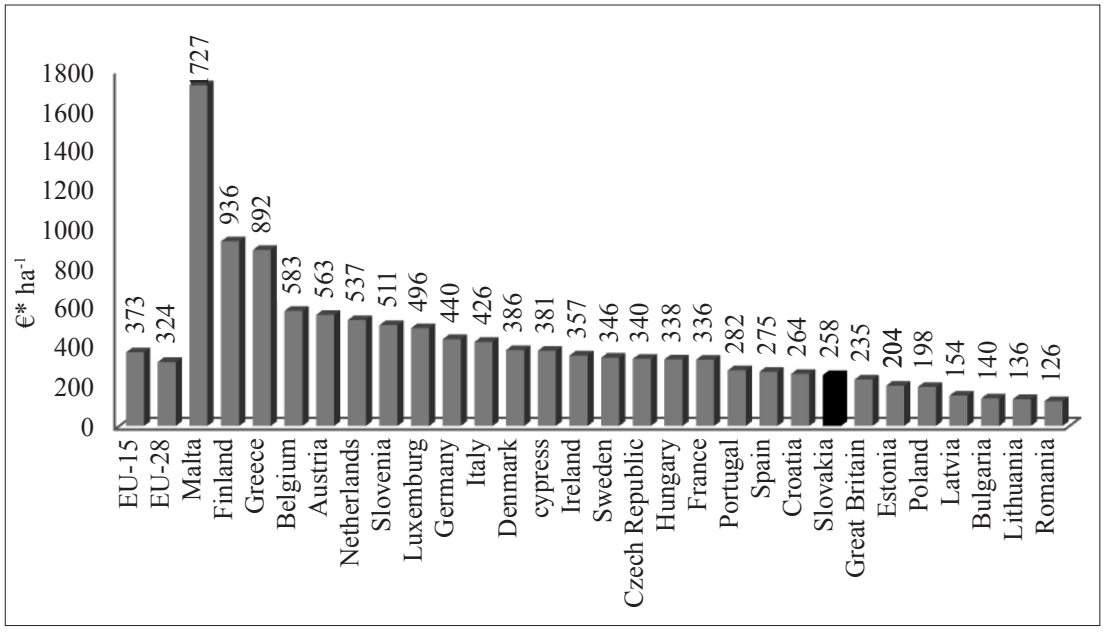


Fig.1. Support in EUR per hectare of utilized agricultural land in 2012

Source: Eurostat, Green Report 2014

In Table 9 we assess the impact of different subsidy supports in selected EU Member States on net profit. In our calculations, we want to emphasize how different subsidy supports affect the entrepreneurship in agriculture in the selected EU countries. We want to point out how would Slovak farmers alternatively well be if they received such subsidies as the farmers in other countries. Dillon et al. (2015) claim that measuring sustainability at the farm level is challenging. Some argue that precise measurement is impossible, as it is site-specific and dynamic.

In our calculations, we show how much would improve net profit and thus also the economic situation of our farmers converted to hectare or to average farm area in Slovakia by area 1038 ha. This situation is documented in Figure 2, which is alternatively converted to an area of one hectare.

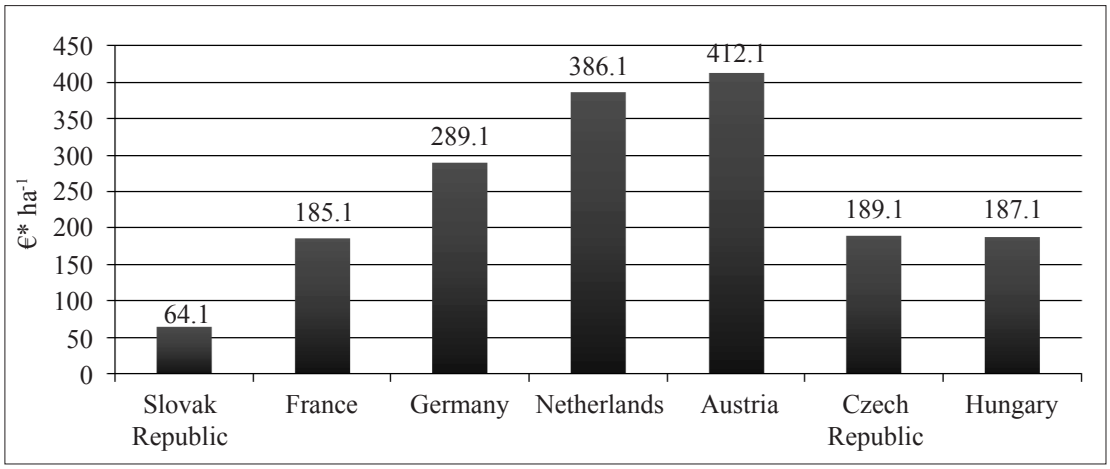
Table 9. Support in EUR per hectare in selected countries of the EU and its economic impact in 2012

	COUNTRY						
	Slovak Republic (SR)	France	Germany	Netherlands	Austria	Czech Republic	Hungary
Support €*ha^{-1}	215	336	440	537	563	340	338
Difference in support between SR and assessed countries (€*ha^{-1})	0	121	225	322	348	125	123
Difference in the average farm support in SR (1038 ha)	0	125598	233550	334236	361224	129750	127674
Net profit after calculating the difference in supports for individual countries (€*ha^{-1})	64.1	185.1	289.1	386.1	412.1	189.1	187.1
Net profit after calculating the average farm support (1038 ha) between SR and other countries	66535.8	192133.8	300085.8	400771.8	427759.8	196285.8	194209.8

Source: Own calculations based on Green Report 2014

Slovak farmers achieved profit in the amount of 66 535.8 EUR per average farm (1 038 ha). If they have the same support as German farmers, they would produce profit in the amount of 300 085.8 EUR. As it can be seen from the Table 9, where there are shown the alternative calculations for the comparison of subsidy supports in Slovak Republic with evaluated countries of the EU.

Fig.2. Net profit after calculating the difference in supports for individual countries (€*ha-1)



Source: Eurostat, Green Report 2014

Table 10 shows conversion costs, subsidies and net profit per hectare of agricultural land in the assessment years 2002 – 2013. Conversion costs report 24 percent growth between 2002 – 2013, what represents 20.72 €*ha-1 in an average annual increase.

Table 10. Economic overview of primary agricultural production (2002 – 2013)

	Total own costs per (ha) of a.l.	Subsidies per (ha) (I+II variant)	Net profit per (ha) of a.l.	Net profit per (ha) of a.l. (without subsidies)	Percentage share of subsidies in costs	The annual growth / decline of subsidies
Unit/ Year	**€*ha $^{-1}$**	**€*ha $^{-1}$**	**€*ha $^{-1}$**	**€*ha $^{-1}$**	**%**	**€*ha $^{-1}$**
2002	1 053.67	106.95	13.88	-93.08	10.15	x
2003	1 059.22	103.03	-54.64	-157.67	9.73	-3.92
2004	1 271.56	182.63	79.93	-102.70	14.36	79.60
2005	1 223.33	186.75	59.28	-127.46	15.27	4.12
2006	1 268.90	199.86	17.56	-182.30	15.75	13.11
2007	1 248.16	239.13	65.09	-174.04	19.16	39.27
2008	1 345.02	258.22	60.21	-198.00	19.20	19.09
2009	1 177.14	271.73	-87.44	-359.17	23.08	13.51
2010	1 113.28	262.65	7.66	-254.99	23.59	-9.08
2011	1 193.27	248.16	103.19	-144.97	20.80	-14.49
2012	1 224.02	239.56	64.10	-175.46	19.57	-8.60
2013	1 302.30	236.70	16.78	-219.92	18.18	-2.86
Growth index 2013/2002	1.24	2.21	345.61	2189.76	x	x
Average profit/ loss	x	x	28.80	-182.48	x	x
Average annual increase / decrease	20.72	10.81	x	x	x	x

Source: According to NPPC – VÚEPP and own calculations

Values are calculated by conversion rate *1 EUR= 30.126 SKK*
per (ha) – per hectare
a.l. – agricultural land

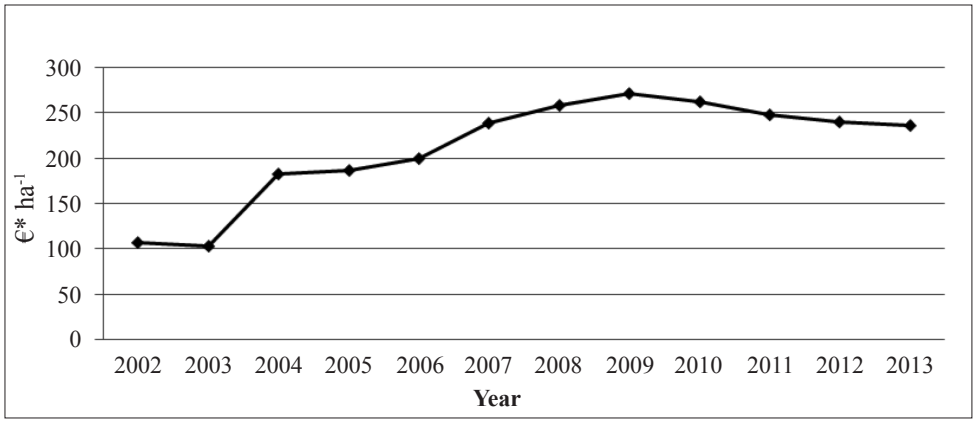
The percentage share of subsidies in costs coverage shows a significant increase between the years 2003 – 2004, when the Slovakia accession to the EU, when subsidies were increased on average by 50 % respectively in 2003 they reached the level of 9,72 % and in 2004 reached 14.36 %. In the other years, Slovakia reports a gradual increase in subsidies and currently it is on a level of 18 % – 19 % to conversion costs.

Subsidies increased by 121 % between the years 2002 – 2013. The decisive increase in subsidies we see between the years 2003 – 2004, after the Slovakia accession to the EU (Figure 3). There was a significant increase in subsidies (79.59 €*ha-1), what in percentage terms represents 76 % increase.

If we evaluate an average net profit in our evaluated period of the years 2002 – 2013 so Slovak farmers earn on average 28.80 €*ha-1, according to VÚEPP data.

If we evaluated net profit without subsidies so Slovak farmers would achieve on average loss -182.48 €*ha-1 of agricultural land.

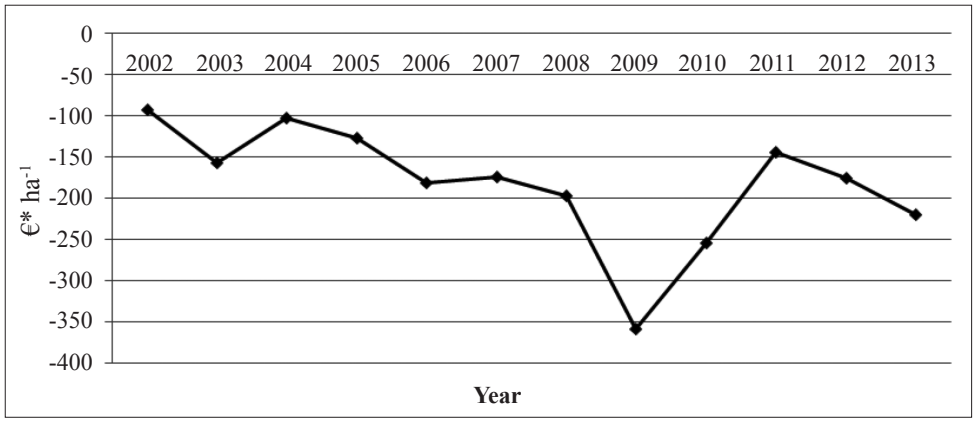
Fig.3. Subsidies per hectare of agricultural land (I+II variant)



Source: Own processing

Net profit per hectare of agricultural land without subsidies implementation demonstrated in the Slovak economic – production conditions the negative economic result in each evaluation year, as is showed in Figure 4. It follows that agricultural production is economically dependent on the amount of subsidies.

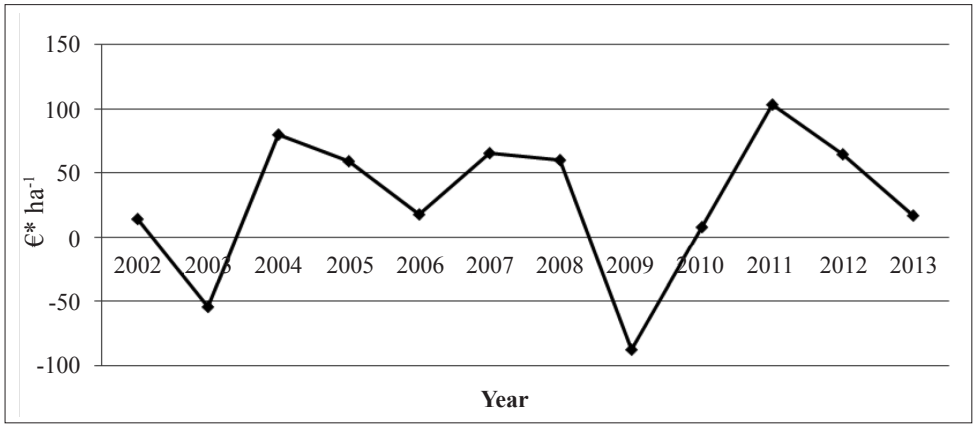
Fig.4. Net profit per hectare of agricultural land without subsidies



Source: Own processing

After including subsidies, we can conclude a significant improvement in profitability on agricultural land and in our evaluated period, farmers achieved a loss only in 2003 and 2009 (Figure 5).

Fig.5. Net profit per hectare of agricultural land (including subsidies)



Source: Own processing

The year 2003 was marked by adverse weather conditions for crop production (extreme drought), what caused low hectare yield what leaded to outage from the realization of revenues in the sale. In 2008, the economic crisis started that significantly affected the amount of realization commodity prices and caused the price fall, as evidenced by a reduction in prices by 20 % – 40 % compared to the previous year.

Evaluating the determinant for economic outturn of legal entities

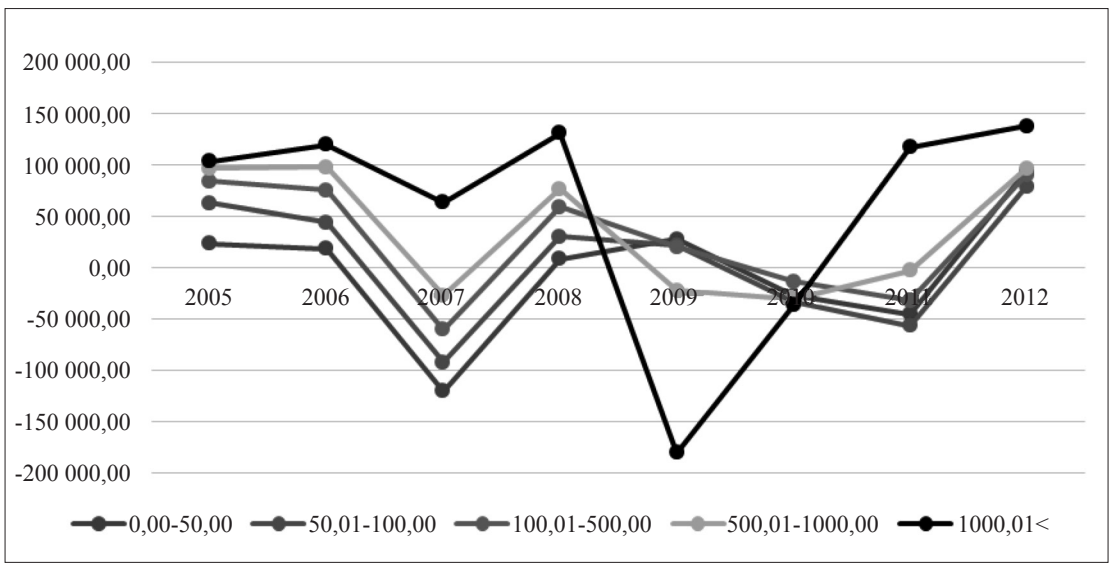
Table 11 points to the analysis of determinant – profit statement indicator and economic outturn of legal entities for individual categories of agricultural land acreage. Data are presented in Euros and quoted for one company. From the table 11 is clear that it's not consequential that with increasing acreage of agricultural land for the analyzed categories of farms is the indicator value – economic outturn increasing as was seen for the other evaluated indicators. For various intervals of agricultural land acreage can be observed similar trends except for the businesses or farms which have acreage of more than 1 000.01 hectares of agricultural land.

Table 11. Development of the average values of the economic outturn indicator (in EUR) by categories of agricultural land acreage (in hectares)

Agricultural land acreage in hectares					
Year	**0,00-50,00**	**50,01-100,00**	**100,01-500,00**	**500,01-1000,00**	**1,000,01<**
2005	23 750.25	39 084.56	21 313.10	12 672.33	7 007.16
2006	18 885.83	25 363.98	31 226.14	22 442.96	22 353.84
2007	-120 218.69	27 869.06	32 042.71	33 322.48	90 660.08
2008	8 824.05	21 596.25	29 003.92	17 733.52	53 914.83
2009	28 283.54	-5 676.17	-1 960.29	-42 669.45	-158 102.62
2010	-26 875.74	-6 637.17	20 025.06	-16 560.00	-6 525.77
2011	-45 323.54	-10 814.36	24 251.81	29 404.54	120 290.99
2012	94 747.39	-15 214.88	10 970.48	6 485.26	41 116.50
Index 2012/2005	3.99	-	0.51	0.51	5.87

Source: Informačné listy 2005-2012 (Information letters 2005-2012) and own calculations

Fig.6. Development of average value of determinant economic outturn (in EUR) by the intervals of the agricultural land (in ha)



Source: Informačné listy 2005-2012 (Information letters 2005-2012) and own calculations

The largest fluctuations were recorded in companies with an acreage of more than 1,000.01 hectares of agricultural land and the largest decrease was recorded in the number of businesses when comparing 2009 against 2008. On the other hand, the biggest increase was recorded in 2010 compared to 2009 as well as in 2011 compared to the year 2010.

From the tables it cannot be statistically assessed whether there is a correlation between the size of the farms by the agricultural land acreage and the economic outturn indicator, therefore an analysis of variance and regression calculation by means of a linear regression model have been performed.

As much as 7,000 figures for the entire period from 2005 to 2012 have been used for the analysis and the regression calculation.

The definition of a dependency and independency is based on context of variables and therefore in this case the indicator Economic Outturn depends on the acreage of agricultural land and the number of employees. We have established Indicator Economic Outturn as the dependent variable. Acreage of agricultural land and the number of employees are independent variables.

Table 12. Variance analysis

Variance Analysis					
Source	**DF**	**Sum of Squares**	**Mean Square**	**F Value**	**Pr > F**
Model	2	2.935848E12	1.467924E12	20.61	<.0001
Error	6997	4.983439E14	71222513913		
Corrected Total	6999	5.012798E14			
Root MSE	266875	R-Square			0.0059
Dependent Mean	17148	Adj R-Sq			0.0056
Coeff Var	1556.31637				

Parameter Estimates					
Variable	**DF**	**Parameter Estimate**	**Standard Error**	**t Value**	**Pr > |t|**
Intercept	1	8502.50143	4848.16393	1.75	0.0795
Agricultural land	1	24.40065	3.93131	6.21	<.0001
Number of employees	1	-651.56777	114.35075	-5.70	<.0001

Source: Informačné listy 2005-2012 (Information letters 2005-2012) and own readouts from SAS software

In evaluating given indicators, we set the following hypotheses:

H_o: *This model as a whole is insignificant*
H_1: *This model as a whole is significant*

The table 12 shows that the value Pr>F which means that we reject the null hypothesis and model as a whole is significant. Value $R^2 = 0.59$ % hence the variability is explained by the linear model to 0.59 %, indeed a very low value.

In terms of the linear regression model, we can state that the basic form of the equation is as follows:

$$y = 8\,502{,}50 + 24{,}4\,x_1 - 651{,}57x_2$$

Intercept is a fixed constant and has value 34 433. Value Pr > |t| is greater than 0.05, so parameter is not significant. Indicator agricultural land is referred to as the regression coefficient and has a value of 24.4. The regression coefficient is significant and is interpreted as a growth in regression curve. In terms of correlation analysis

between agricultural land and an economic outturn index, the value of the Pearson correlation coefficient is 0.03527 ($p = 0.0032 < 0.05$) and the coefficient is significant. Considering the size of the correlation coefficient, it suggests only trivial correlation between agricultural land indicator and economic outturn indicator is (Table 13).

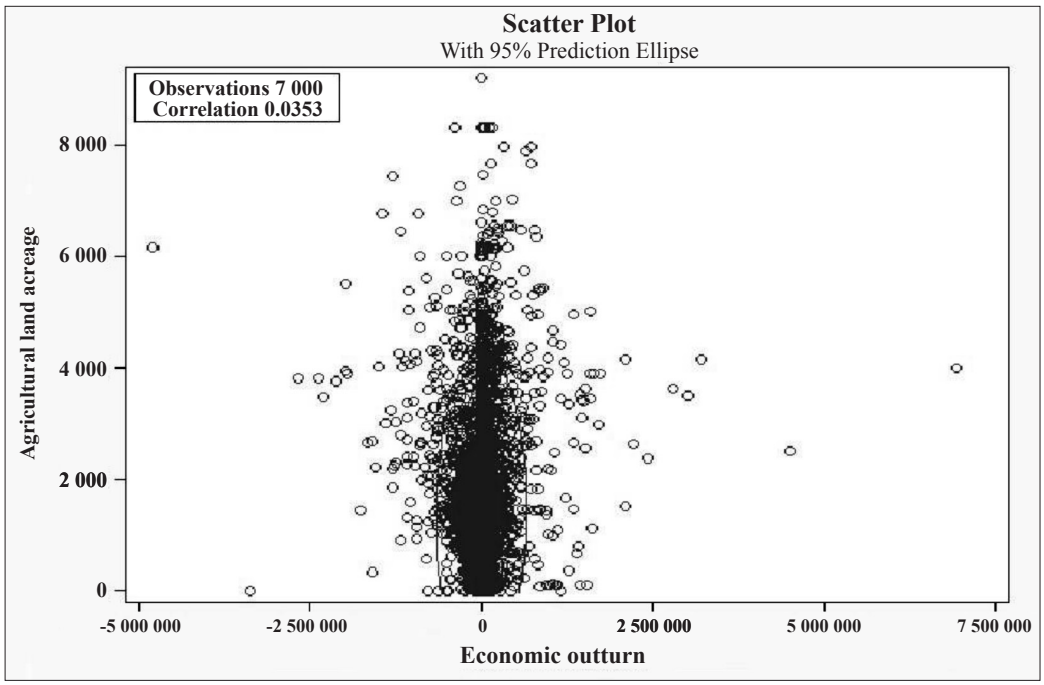
Table 13. Correlation analysis between agricultural land and economic outturn determinants for the period of years 2005 – 2012

Simple Statistics						
Variable	**N**	**Mean**	**Std Dev**	**Sum**	**Minimum**	**Maximum**
Agricultural land	7000	1374	1207	9617237	0	9200
Economic outturn	7000	17148	267622	120035251	-4797882	6967536

Pearson Correlation Coefficients, N = 7000 Prob > |r| under H0: Rho=0	
	Economic outturn
Agricultural land	0.03527 0.0032

Source: Informačné listy 2005-2012 (Information letters 2005-2012) and own readouts from SAS software

Fig.7. Dependency between economic outturn indicator and agricultural land acreage



Source: Informačné listy 2005-2012 (Information letters 2005-2012) and own readouts from SAS software

Discussion and conclusions

In summary, the on-going challenge for an effective system of sustainable agriculture requires the application of a broad set of good farming practices. It is also dependent on integrating all three elements of sustainable farming: economic, environmental and social.

Slovak farmers face to a competitive environment of the EU, which is specific and is controlled by farmer's individual commodity prices and their volatility. The support policy of our country and the EU is in front of the old Member States still lower. The mentioned facts have an impact on the profitability of the agricultural sector, which in our country conditions suffers from a lack of investment capital, which significantly affects the economics of production of individual commodities.

Every country is interested in prosperity of sustainable rural development, which is mainly engaged in agricultural primary production. Rural residents find their jobs in agricultural production, what gives them money thereby ensure subsistence and their livelihoods. By this also ensure the rural habitability in economic – manufacturing conditions of the Slovakia. Our calculations showed that without the intervention of the Common Agricultural Policy of the EU which we have implemented into national legislation, including the subsidy titles would be Slovak agriculture in economic - manufacturing conditions of the Slovakia economically unprofitable, what could lead to its failure and departure of people from agriculture to cities.

Research suggests that it is necessary to contemplate current system of financial support distribution, which at this time is mainly related to the acreage of agricultural land. Research shows that the higher is acreage of farmed agricultural land, the greater support in terms of direct payments such company receives. On the other hand, we must emphasize that with increased acreage and hence with increased direct payments, there's no increase in business results. Macroeconomic point of view says that these indicators are significant because income tax is levied from given results, which is one of the main incomes in the state budget. Therefore, the question arises of what is fair and economically efficient model for the distribution of direct payments. On one side there's interest in supporting small farms, but the research results don't imply that small farms are more economically effective compared to large farms.

Important for the Slovak agriculture is also its constant discrimination in the questions of the amount of support for farmers. Farmers in Western Europe in addition to support from European funds also receive some domestic support. Slovak farmers, as is stated in this work receive even from European sources much less funding when calculated per hectare, as is the case for example in Finland, Greece, Luxembourg, Belgium, Netherland and in other countries. It is important that in one economic space should all business subjects have same conditions for running business (support mechanisms, tax and social security contributions).

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