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SUBSIDIES AS A FACTOR AFFECTING ECONOMIC PERFORMANCE OF FARMS IN THE SLOVAK REPUBLIC

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Abstract

The Common Agricultural Policy (CAP) is one of the most important policies of the European Union. It affects the economic performance of farms to a large extent. The objective of the paper was to analyse the relationship of subsidies and several economic indicators of Slovak farms. We have focused on the analysis of five economic indicators - total assets, revenues from the sale of own products and services, economic result, the number of employees and the volume of investments spent on the acquisition of tangible fixed assets. The Spearman's rank correlation coefficient was used to analyse the dependence between economic indicators and the amount of received subsidies. The results show that the level of all types of subsidies was in positive relation to the area of agricultural land and partly with a large majority of economic indicators expressed in absolute terms. When analysing intensity indicators, the situation was less clear.

Key words**:** *agricultural farms, subsidies, economic performance, Spearman's rank correlation coefficient*

INTRODUCTION

According to [12] "the Common Agricultural Policy of the EU is one of the oldest European policies. It is characterized by large and diversified groups of beneficiaries, diversity of objectives, multi-level decision-making and an important budget". The European Union's agricultural sector is currently highly subsidized. The EU Common Agricultural Policy, through various mechanisms, affects a wide range of societal issues, including agricultural production, as well as rural development, employment and environmental protection [3]. [10] states that „agricultural subsidies have been criticized for distorting agricultural markets and labour allocation in the economy by constraining or preventing structural change that is essential for economic growth and development. At the same time, proponents of agricultural subsidies have argued that such policies are crucial to support incomes of farmers and to sustain rural communities by creating jobs and preventing out-migration from rural areas".

Subsidy policy also affects the economic performance of farms to a large extent and is an essential factor that plays a significant role in making optimal decisions for farmers themselves [9]. Therefore, the CAP is a subject of interest to political leaders across the European Union [1].

Most subsidies in the first and partly also in the second pillar of the CAP aim to support the income situation in agricultural sector [5]. The impact of such subsidies on farmers' income and farm profitability is obvious and many farms would generate a loss without subsidies [6]. According to [8] "it is not only this indicator that the subsidy policy has a significant impact on. Subsidies also affect production volume, amount of costs and production efficiency." The study of CAP effects becomes an important issue for the development of future subsidy policy instruments [7].

Several authors have analysed the impact of subsidy policies on the economic performance of farms. [2] examined the impact of subsidies on profitability and the level of inputs / outputs of Russian dairy farms. The authors found that subsidies had a significant impact on the increase in farm profits, but on the other hand they caused distortions in the level of their costs and production. [11] analysed the effect of two types of subsidies - coupled to production and fully decoupled from

production. The results showed that coupled payments had a significant impact on the use of inputs and the amount of production, while in case of decoupled payments these effects were negligible. Similar conclusions have also been reached by [4], when they found a negative impact of subsidies on the level of production of Swiss farms.

[15] examined the effect of subsidy payments on economic indicators of Czech livestock farms. The authors found that direct payments caused a decline in the economic performance of agricultural holdings, as subsidy recipients achieved lower output levels and incurred higher input volumes than agricultural holding which did not receive subsidies. Direct payments thus did not encourage farms to produce more and contributed to waste of resources. [14] analysed the effect of subsidy payments on three types of Czech farms in the period 2007-2012. They found that subsidies had a statistically significant effect on the profitability of conventional farms, but on the other hand they had a negative impact on sales. In the case of organic and biodynamic farms, the effect of subsidies on their economic situation was negligible. In Slovak republic [13] dealt with this topic, they revealed the existence of a strong correlation between the volume of gross agricultural production and the volume of agricultural subsidies paid in individual regions of Slovakia.

The aim of the paper is to analyse the relationship of subsidies and several economic indicators of Slovak farms.

MATERIALS AND METHODS

The data source was the Database of Information Letters of the Ministry of Agriculture and Rural Development of the Slovak Republic (IL MARD SR) for the year 2018.

In this year the database consisted of 1,576 legal entities. We have excluded firms with a different legal form than cooperatives and trading companies, so the final set consisted of 1,503 legal entities.

We put emphasis on the analysis of five economic indicators - total assets, revenues from the sale of own products and services, economic result, the number of employees and the volume of investments spent on the acquisition of tangible fixed assets. In addition to the analyses that we conducted on a sample of all legal entities together, we have also examined relationships in various subgroups of legal entities.

We have analysed the dependence between economic indicators of Slovak farms (in absolute and relative terms) and the amount of received support (total, non-investment and investment) using Spearman's rank correlation coefficient.

Its calculation is as follows:

$$\rho = 1 - \frac{6 \sum d_j^2}{n(n^2 - 1)}$$

where dj represents the difference between the rank of values of the variables examined in the j observation and n is the number of observations.

The Spearman correlation coefficient can take values within <-1, 1>. The closer is its absolute value to 1, the stronger the relationship between variables is, and vice versa, the closer is the absolute value of the coefficient to 0, the weaker association between variables is. Positive coefficient values indicate positive, negative values indicate negative dependence.

The hypotheses verifying statistical significance of the Spearman coefficient are as follows:

- H_0: ρ=0
- H_1: $\rho \neq 0$

Whether the dependence between variables is statistically significant or not, was found by comparing the test statistics t with the table critical value of Student's distribution t_{tab} at the significance level $\alpha = 0.05$ at the degree of freedom n-2.

$$t = \frac{\rho}{\sqrt{\frac{1 - \rho}{n - 2}}}$$

If $t < t_{tab}$, the null hypothesis was not rejected, the dependence between variables is not statistically significant. Vice versa, if $t > t_{tab}$, the hypothesis H_0 was rejected and the

alternative hypothesis H_1 was accepted, the dependence is statistically significant.

We have also examined the differences in values of economic indicators between farms operating in production areas (Nitra and Trnava regions) and in areas with less-favoured natural conditions (Prešov and Žilina regions) using the non-parametric Wilcoxon-Mann-Whitney U test. It is a method that works with ranks of data in the so-called merged sample.

We had two independent samples from a cumulative distribution - X with observations x_1, x_2, ..., x_{n1} and Y with observations y_1, y_2, ..., y_{n2}. The mathematical definition of hypotheses is as follows:

H_0: P(X>Y) = P(Y>X)
H_1: P(X>Y)≠P(Y>X)

The calculation of U test statistics was as follows:

$$U = \min U_i = R_i - \frac{n_i\,(n_i + 1)}{2} \quad i = 1,2$$

where n_i is the number of observations of the i-th sample, R_i is the sum of ranks of the i-th sample, and Ui is the value of test statistics of the i-th sample.

During testing we calculated separately the value of U_1 for the first and the value of U_2 for the second sample. We have chosen min (U_1, U_2) as the test criterion U.

Then we compared the U value with the table critical value of the Wilcoxon-Mann-Whitney test for n_1 and n_2 at significance level α = 0.05, U (α, n_1, n_2).

If the calculated value was less than or equal to the critical value, the null hypothesis was rejected, indicating a statistically significant effect of the investigated factor on the given variable. Otherwise, if the calculated value was greater than the table critical value, the null hypothesis was not rejected, the influence of external factor on examined variable could not be demonstrated.

In the case of Spearman correlation coefficient as well as Wilcoxon-Mann-Whitney test for validation of hypotheses, the SAS 9.3 statistical software, in which we performed the calculations, offers calculation of the so-called P-value. We compared its value to 0.05. If the P-value was greater than 0.05, the null hypothesis was not rejected. Vice versa, if the P-value is less than or equal to 0.05, we have accepted the alternative hypothesis.

RESULTS AND DISCUSSIONS

In the first part of our research we have focused on the relationship between total, non-investment and investment subsidies in relative terms (in relation to the number of hectares of agricultural land) and indicators of economic performance of Slovak farms.

In the case of legal entities, we can see a positive correlation between the area of agricultural land and the intensity of total, non-investment and investment subsidies, which means that with the increase in farm size the amount of subsidies received per hectare has also increased (Table 1).

This may have partly affected the fact that the intensity of all subsidies has positively correlated with almost all economic indicators. The only exceptions were the economic result of farms which did not depend on the intensity of total, non-investment or investment subsidies, added value that was positively related only to the intensity of investment subsidies, and revenue from the sale of own products and services which were demonstrably related only to the intensity of total and investment support. In the case of non-investment subsidies, the number of employees appears to be a significant factor related to their intensity per hectare, while in the case of investment payments it is the volume of assets and investments for its acquisition. Regarding the dependence of intensity values, the situation is more diverse. Non-investment subsidies were in the strongest positive relation with the number of employees. The intensity of assets, investments spent on its acquisition and equity also positively correlated with non-investment subsidies. On the other hand indicators with a significantly negative relationship to the intensity of non-investment support were revenues from sales of own products and added value of farms.

Table 1. Correlation matrix of Spearman coefficients and corresponding P-values for economic indicators and received subsidies of Slovak farms

Variable	Unit	Total subsidies €/ha		Non-investment subsidies €/ha		Investment subsidies €/ha	
		Coefficient	P-value	Coefficient	P-value	Coefficient	P-value
Agricultural land	ha	0.163	0.000	0.156	0.000	0.211	0.000
Assets	€	0.238	0.000	0.173	0.000	0.328	0.000
Equity	€	0.264	0.000	0.221	0.000	0.271	0.000
Liabilities	€	0.138	0.000	0.090	0,001	0.261	0.000
Total revenues	€	0.180	0.000	0.134	0.000	0.276	0.000
Sales of own products and services	€	0.096	0.000	0.039	0.133	0.276	0.000
Total costs	€	0.184	0.000	0.139	0.000	0.286	0.000
Economic result	€	-0.010	0.696	-0.033	0.196	0.046	0.072
Added value	€	0.039	0.135	-0.029	0.263	0.216	0.000
Number of employees	number	0.336	0.000	0.309	0.000	0.288	0.000
Acquisition of tangible fixed assets	€	0.255	0.000	0.149	0.000	0.393	0.000
Assets / ha	€/ha	0.151	0.000	0.065	0.012	0.241	0.000
Equity / ha	€/ha	0.226	0.000	0.183	0.000	0.191	0.000
Liabilities / ha	€/ha	0.036	0.159	-0.019	0.451	0.151	0.000
Total revenues / ha	€/ha	0.062	0.016	-0.007	0.794	0.191	0.000
Sales of own products and services / ha	€/ha	-0.050	0.052	-0.125	0.000	0.000	0.000
Total costs / ha	€/ha	0.066	0.010	-0.004	0.886	0.199	0.000
Economic result / ha	€/ha	-0.029	0.259	-0.047	0.068	-0.019	0.453
Added value / ha	€/ha	0.003	0.916	-0.075	0.004	0.182	0.000
Number of employees / 100 ha	n/100ha	0.331	0.000	0.301	0.000	0.185	0.000
Acquisition of tangible fixed assets / ha	€/ha	0.204	0.000	0.089	0.001	0.317	0.000

Source: Database of Information Letters of the Ministry of Agriculture and Rural Development of the Slovak Republic, own calculations.

Investment subsidies had a positive correlation with the intensity of acquisition of tangible fixed assets, which is not due to their focus surprising. The volume of these supports was also in positive correlation with assets of farms, which can be explained by the fact that mainly farms with larger capital equipment used the Slovakia - Rural Development Programme. The only indicator not related to the amount of investment subsidies was the economic result.

The volume of total subsidies positively correlated with the number of employees, which was probably supported mainly by non-investment subsidies and with assets, equity and investments in the acquisition of tangible fixed assets, which in turn was more related to receiving investment payments.

We have also analysed relationships in separate subgroups of legal entities. The results are presented in Table 2 - Table 6 through Spearman correlation coefficient values.

Volume of assets and investments spend on its acquisition was demonstrably related to the intensity of investment subsidies in cooperatives and also in trading companies (Table 2). Moreover, the assets and investments of companies correlated positively with the intensity of both total and non-investment payments. Revenues from the sale of own products and services were in a positive relationship with the intensity of investment subsidies in both types of farms, but in cooperatives they showed a negative dependence on the intensity of total and non-investment payments.

Only the intensity of investment subsidies in trading companies was in a positive relationship with the economic result, in remaining cases the dependence was not proven. On the other hand, the number of employees correlated positively with the

intensity of all subsidies in both types of farms.

Table 2. Correlation matrix of Spearman coefficients for economic indicators and received subsidies of Slovak farms classified by legal form

Variable	Unit	Cooperative farms			Trading companies		
		Total subsidies	Non-investment subsidies	Investment subsidies	Total subsidies	Non-investment subsidies	Investment subsidies
		€/ha	€/ha	€/ha	€/ha	€/ha	€/ha
Assets	€	0.064	-0.023	0.293	0.204	0.140	0.306
Sales of own products and services	€	-0.150	-0.230	0.223	0.068	0.012	0.252
Economic result	€	-0.029	-0.054	0.027	0.073	0.055	0.097
Number of employees	z	0.138	0.100	0.229	0.286	0.255	0.253
Acquisition of tangible fixed assets	€	0.085	-0.066	0.398	0.236	0.138	0.372
Assets / ha	€/ha	0.196	0.106	0.309	0.110	0.026	0.218
Sales of own products and services /	€/ha	-0.131	-0.207	0.206	-0.052	-0.126	0.153
Economic result / ha	€/ha	0.018	-0.005	0.033	0.036	0.021	0.012
Number of employees / 100 ha	n/100ha	0.406	0.402	0.160	0.251	0.214	0.161
Acquisition of tangible fixed assets /	€/ha	0.185	0.020	0.414	0.192	0.089	0.299

Source: Database of Information Letters of the Ministry of Agriculture and Rural Development of the Slovak Republic, own calculations.

As regards the economic indicators in intensity form, the amount of assets and investments for its acquisition per hectare was in a demonstrable positive relation with the intensity of investment and thus also of the total support. Non-investment subsidies correlated positively with assets in the case of cooperatives and with investments in its acquisition in the case of trading companies. In both types of farms, sales per hectare were in a demonstrably negative relationship with non-investment and in a significantly positive relationship with investment payments per hectare. Conclusions for the other two indicators are also similar for both types of farms - as long as the economic result did not correlate with either type of payments, the number of employees was demonstrably positive with all.

Assets and investments for the acquisition of tangible fixed assets (both in absolute and intensive terms) in case of crop and livestock farms related mainly to investment and thus to total subsidies (Table 3). Positive dependence of these indicators with the intensity of non-investment subsidies has been demonstrated only in farms mainly focused on crop production. Sales of own products and services in absolute terms correlated positively with the intensity of all types of subsidies in crop farms and the intensity of investment subsidies in livestock farms.

In the case of sales per hectare, we found a positive correlation only with the intensity of investment support (both types of farms), which in the case of crop farms also resulted in a positive correlation with the intensity of total support. While the number of employees (in absolute and relative terms) was in a positive relationship with all types of subsidies in both types of farms, only the intensity of total support of farms focused on livestock production correlated with the amount of economic result (in absolute and intensity terms).

Furthermore, we divided farms according to the area of farmed land into smaller (up to 1,000 ha) and larger (over 1,000 ha) farms (Table 4). Assets and acquisition of tangible fixed assets (in absolute and intensity terms) correlated in smaller and larger farms with the intensity of investment and total subsidies.

Table 3. Correlation matrix of Spearman coefficients for economic indicators and received subsidies of Slovak farms classified by production specialization

Variable	Unit	Crop production farms			Livestock production farms		
		Total subsidies	Non-investment subsidies	Investment subsidies	Total subsidies	Non-investment subsidies	Investment subsidies
		€/ha	€/ha	€/ha	€/ha	€/ha	€/ha
Assets	€	0.331	0.253	0.348	0.094	0.03	0.291
Sales of own products and services	€	0.232	0.173	0.28	0.004	-0.059	0.27
Economic result	€	-0.002	-0.022	0.04	0.091	0.062	0.061
Number of employees	z	0.366	0.328	0.287	0.152	0.118	0.252
Acquisition of tangible fixed assets	€	0.335	0.208	0.427	0.106	-0.004	0.348
Assets / ha	€/ha	0.249	0.162	0.238	0.158	0.063	0.265
Sales of own products and services /	€/ha	0.091	0.03	0.134	0.016	-0.07	0.24
Economic result / ha	€/ha	-0.041	-0.062	-0.03	0.104	0.081	0.012
Number of employees / 100 ha	n/100ha	0.319	0.295	0.177	0.3	0.251	0.169
Acquisition of tangible fixed assets /	€/ha	0.29	0.161	0.346	0.133	0.011	0.29

Source: Database of Information Sheets of Ministry of Agriculture and Rural Development of Slovak Republic, own calculations.

The intensity of non-investment support was positively linked to the indicator of assets and investments for its acquisition (in absolute and relative terms) in the case of small farms and with the intensity of assets in case of large farms. Sales of own products and services (in absolute and relative terms) were demonstrably positively related to the intensity of investment subsidies in both smaller and larger farms, while their relationship to the intensity of non-investment subsidies was demonstrably negative in three out of four cases. The economic result was negatively related only to the intensity of non-investment subsidies in larger farms and in remaining cases its relationship with the intensity of payments was not proved.

Table 4. Correlation matrix of Spearman coefficients for economic indicators and received subsidies of Slovak farms classified by area of cultivated land

Variable	Unit	Farms up to 1000 hectares			Farms with an area of over 1,000 hectares		
		Total subsidies	Non-investment subsidies	Investment subsidies	Total subsidies	Non-investment subsidies	Investment subsidies
		€/ha	€/ha	€/ha	€/ha	€/ha	€/ha
Assets	€	0.253	0.187	0.306	0.162	0.087	0.196
Sales of own products and services	€	0.067	0.016	0.226	-0.046	-0.115	0.135
Economic result	€	0.023	0.01	0.038	-0.064	-0.114	0.042
Number of employees	z	0.336	0.314	0.226	0.362	0.357	0.171
Acquisition of tangible fixed assets	€	0.254	0.158	0.325	0.172	0.01	0.374
Assets / ha	€/ha	0.11	0.028	0.255	0.228	0.147	0.198
Sales of own products and services /	€/ha	-0.08	-0.152	0.174	-0.025	-0.093	0.113
Economic result / ha	€/ha	0.001	-0.01	0.001	-0.059	-0.112	0.04
Number of employees / 100 ha	n/100ha	0.266	0.23	0.189	0.474	0.493	0.139
Acquisition of tangible fixed assets /	€/ha	0.199	0.1	0.292	0.204	0.032	0.378

Source: Database of Information Letters of the Ministry of Agriculture and Rural Development of the Slovak Republic, own calculations.

The number of employees correlated positively with all types of payments in both small and large farms, and in particular the relationship of total and non-investment

subsidies to the number of employees per hectare in large farms was very significant.

The fourth criterion according to which we have divided legal entities was their profitability (Table 5). Assets and investments for acquisition of tangible fixed assets in absolute terms were demonstrably positively related to the intensity of all types of subsidies regardless of farm profitability. Relative indicators were in demonstrably positive relationship, especially with the intensity of investment and thus also with total subsidies, whether it was profitable or loss-making farm. On the other hand, neither the assets nor the investments for its acquisition correlated with the amount of non-investment subsidies per hectare of profitable farms.

In terms of sales, those in absolute and relative amounts correlated positively with the intensity of investment support in profitable and loss-making farms. On the other hand, there was a negative relationship between sales per hectare and the intensity of non-investment subsidies of profitable enterprises. The economic result in absolute amounts correlated negatively with the intensity of all types of subsidies in the case of loss-making farms.

The higher the intensity of all types of subsidies (especially non-investment and thus also the total), the higher the average number of employees in absolute and relative amounts, on loss-making and profitable farms. Especially in the case of loss-making farms, the positive correlations of employment and non-investment subsidies were relatively strong.

Table 5. Correlation matrix of Spearman coefficients for economic indicators and received subsidies of Slovak farms classified by profitability

Variable	Unit	Loss-making farms			Profitable farms		
		Total subsidies	Non-investment subsidies	Investment subsidies	Total subsidies	Non-investment subsidies	Investment subsidies
		€/ha	€/ha	€/ha	€/ha	€/ha	€/ha
Assets	€	0.343	0.307	0.322	0.191	0.111	0.331
Sales of own products and services	€	0.242	0.219	0.267	0.026	-0.048	0.28
Economic result	€	-0.164	-0.156	-0.18	0.018	-0.005	0.139
Number of employees	z	0.467	0.461	0.279	0.278	0.234	0.296
Acquisition of tangible fixed assets	€	0.333	0.253	0.373	0.219	0.101	0.402
Assets / ha	€/ha	0.163	0.101	0.247	0.146	0.049	0.238
Sales of own products and services	€/ha	0.072	0.027	0.178	-0.102	-0.19	0.165
Economic result / ha	€/ha	0.109	0.135	-0.042	-0.073	-0.094	-0.025
Number of employees / 100 ha	n/100ha	0.389	0.365	0.216	0.308	0.271	0.174
Acquisition of tangible fixed assets	€/ha	0.25	0.156	0.318	0.181	0.06	0.318

Source: Database of Information Letters of the Ministry of Agriculture and Rural Development of the Slovak Republic, own calculations.

The last criterion for the classification of farms were natural conditions (Table 6). The production area was represented by the Nitra and Trnava regions; the less-favoured area (LFA) was represented by the Žilina and Prešov regions. Assets and investments for acquisition of tangible fixed assets (in absolute and relative terms) correlated positively in both areas with the intensity of all types of subsidies (the only exceptions were non-investment subsidies and asset acquisition that did not correlate in the LFA area). Particularly strong were the dependencies of investments and the intensity of investment subsidies, as well as the assets and intensity of total subsidies in production areas.

Interesting are the results of sales correlation, which in both natural areas were positively related not only to the intensity of investment and total subsidies, but also to non-investment subsidies (with the exception of relative sales in LFA areas). This suggests that previous findings about the negative relationship between the intensity of non-investment subsidies and sales might have been due to the

fact that farms in LFA areas receive higher non-investment subsidies, but largely due to natural conditions, lower sales are achieved. Even in this case, the relationship between the economic result in absolute terms and the intensity of subsidies was not proved.

The economic result per hectare in the LFA areas also did not correlate with the intensity of subsidies, but on the other hand, its negative relationship with subsidies in production areas has been demonstrated. As in previous cases, the absolute and relative number of employees correlated positively with the intensity of all types of subsidies, especially in terms of non-investment and total subsidies in production areas.

Table 6. Correlation matrix of Spearman coefficients for economic indicators and received subsidies of farms classified by natural conditions

Variable	Unit	Farms of production area			Farms of LFA area		
		Total subsidies	Non-investment subsidies	Investment subsidies	Total subsidies	Non-investment subsidies	Investment subsidies
		€/ha	€/ha	€/ha	€/ha	€/ha	€/ha
Assets	€	0.4	0.377	0.299	0.26	0.206	0.282
Sales of own products and services	€	0.368	0.374	0.274	0.164	0.115	0.234
Economic result	€	-0.069	-0.056	-0.065	0.076	0.069	0.03
Number of employees	z	0.474	0.479	0.306	0.278	0.266	0.172
Acquisition of tangible fixed assets	€	0.33	0.237	0.406	0.234	0.144	0.31
Assets / ha	€/ha	0.326	0.273	0.188	0.282	0.198	0.298
Sales of own products and services /	€/ha	0.338	0.334	0.154	0.145	0.076	0.221
Economic result / ha	€/ha	-0.113	-0.107	-0.11	0.086	0.083	-0.015
Number of employees / 100 ha	n/100ha	0.442	0.437	0.213	0.4	0.383	0.12
Acquisition of tangible fixed assets /	€/ha	0.25	0.134	0.327	0.186	0.09	0.268

Source: Database of Information Letters of the Ministry of Agriculture and Rural Development of the Slovak Republic, own calculations.

Analysis of differences in indicators between farms in production and LFA areas

We have also compared economic indicators of legal entities in Slovak agriculture, which in 2018 operated in regions with prevailing production area (Nitra and Trnava regions) with legal entities that were operating in regions with predominantly less-favoured natural conditions (Prešov and Žilina regions). Farms operating in less-favoured natural conditions received significantly higher non-investment subsidies thanks to LFA payments, which could be another factor that had an impact on the economic indicators of agricultural companies, in addition to different natural conditions.

To test the significance of differences in economic indicators between farms in production and LFA areas, we used the non-parametric Wilcoxon-Mann-Whitney test. The test results are summarized in Table 7. The data in the "Area" columns indicate which farm group had on average higher values of the given economic indicator. The "PRO" value refers to farms operating in regions with a predominant production area, while the "LFA" value refers to farms located in regions with predominantly less-favoured natural conditions.

Despite significantly lower total and non-investment subsidies, as well as slightly lower area of agricultural land, in almost all economic indicators, farms operating in Trnava and Nitra regions have achieved better results compared to farms located in Žilina and Prešov regions. Their assets, liabilities, revenues, sales of own products and services, total costs, economic result, added value and acquisition of tangible fixed assets were statistically significantly higher, both in absolute and intensive form, as well as equity expressed in € / ha. The only indicator where significant differences between regions with different natural conditions has not occurred, was the absolute and relative number of employees. These results indicate that farms in LFA regions, despite the higher subsidies

received, were not able to cope economically with farms in production areas due to worse natural conditions. On the other hand, subsidies could have contributed to maintaining employment in these regions.

Table 7. Results of Wilcoxon-Mann-Whitney tests of the compliance of economic indicators of farms operating in production and LFA areas

Variable	Unit	Area	P-value	Unit	Area	P-value
Agricultural land	ha	LFA	0.213			
Assets	€	PRO	0.001	€/ha	PRO	0.000
Equity	€	PRO	0.068	€/ha	PRO	0.000
Liabilities	€	PRO	0.000	€/ha	PRO	0.000
Total revenues	€	PRO	0.000	€/ha	PRO	0.000
Sales of own products and services	€	PRO	0.000	€/ha	PRO	0.000
Total costs	€	PRO	0.000	€/ha	PRO	0.000
Economic result	€	PRO	0.000	€/ha	PRO	0.000
Added value	€	PRO	0.000	€/ha	PRO	0.000
Number of employees	number	LFA	0.203	n/100ha	PRO	0.691
Acquisition of tangible fixed assets	€	PRO	0.018	€/ha	PRO	0.000
Total subsidies	€	LFA	0.001	€/ha	LFA	0.000
Non-investment subsidies	€	LFA	0.000	€/ha	LFA	0.000
Investment subsidies	€	PRO	0.741	€/ha	PRO	0.757

Source: Database of Information Letters of the Ministry of Agriculture and Rural Development of the Slovak Republic, own calculations.

CONCLUSIONS

The results of analysing the dependence of total, non-investment and investment subsidies per hectare with the amount and intensity of selected economic indicators, using the Spearman correlation coefficient, show that the level of all types of subsidies was in positive relation to the area of agricultural land and partly with a large majority of economic indicators expressed in absolute terms. When analysing intensity indicators, the situation was less clear.

Non-investment subsidies per hectare were in the strongest positive relationship with the number of employees and this support contributed to maintaining employment in the agricultural sector. When analysing subgroups of legal entities, this relationship was particularly visible in cooperative farms, larger farms, loss-making farms and farms operating in regions with prevailing favourable natural conditions. The intensity of assets, equity and investments also positively correlated with non-investment subsidies. On the other hand, sales and value added of legal entities per hectare were negatively related to the intensity of these payments.

This indicates that farms receiving higher non-investment subsidies were not so compelled to increase their sales and generate higher added value, because subsidies were a substantial source of their income. However, a positive correlation between the intensity of non-investment subsidies and sales per hectare in a separate analysis of farms operating in regions with prevailing favourable and in regions with prevailing less-favoured conditions shows that different negative environmental conditions could be the cause of the negative relationship. Non-investment subsidies were significantly higher because of LFA payments in regions with unfavourable conditions, but farms naturally achieved lower sales.

Investment-related subsidies positively correlated with almost all intensive economic indicators, especially with investments in the acquisition of tangible fixed assets. In separate analyses this relationship was mainly reflected in cooperatives and farms with predominant crop production.

Using the Wilcoxon-Mann-Whitney test, we examined the existence of differences in values of economic indicators between farms in regions with prevailing favourable and disadvantaged conditions. Despite substantially lower total and non-investment subsidies, as well as slightly smaller area of agricultural land, farms operating in Trnava and Nitra regions achieved better results in almost all economic indicators. Compared to farms in Žilina and Prešov regions, their assets, liabilities, revenues, sales, costs, profit, equity, added value and investments for the acquisition of tangible fixed assets were significantly higher, both in absolute and intensity terms.

Significant differences between regions with different natural conditions did not occur only in absolute and relative numbers of employees. These results indicate that farms in LFA regions, despite the higher subsidies received, were not able to compete economically farms located in production areas due to worse natural conditions. On the other hand, this support payments probably contributed to maintaining employment in these regions.

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