Consequences of supports to the economic situation of farms with respect to their size

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Abstract: The article is dealing with an issue of subsidies granted to agricultural enterprises arising from the Common Agricultural Policy (CAP). The aim of the paper is to quantify the effects of the individual subsidies that were used by agricultural enterprises according to their profits, losses and revenues. The size structure of agricultural enterprises in the Czech Republic is taken into account for more detailed measures of the subsidy impact. The article uses key data such as financial statements of agricultural enterprises and subsidies that were received by companies over the years 2007–2011. The analysis was performed by using the fixed effect model. An evaluation of current economic situation of these enterprises including the structure of drawn subsidies was carried out before the analysis. Different impacts of subsidies on the company´s management have been proved. The subsidies influence the medium and large enterprises significantly and positively. A negative impact of subsidies was observed on profits and revenues of small businesses. Detailed results are described in the article.

Keywords: agriculture enterprises, economic situation, fixed effect model, subsidies

The Common Agricultural Policy (CAP) belongs among major factors which affect the development of the EU agriculture as well as the rural development. The significance of subsidies arising from the CAP is increasing due to the fact that the efficiency and productivity of Czech agriculture is very low (the share of agriculture in GDP was 1.57% in 2013). According to the FADN survey, the Czech Republic (CR) is a country with the highest operating aid for an average agricultural enterprise (almost 2 mil. CZK) while the average agricultural enterprise in the EU-27 is given 270 thousands CZK. In average, 914 856 CZK per enterprise SAPS payments are allocated to agricultural enterprises in the CR, the average in the EU-27 is 26 786 CZK per enterprise (Ministry of Agriculture 2013). The reason for this is a specific area of agricultural enterprises (again the largest in the EU). According to the Eurostat data, it is 152 ha, while the average EU-27 is 14 ha. There were some significant changes in 2010 when comparing the structure of agricultural enterprises in the Czech Republic according to the utilization of land. Over 40% of agricultural enterprises were farming the area

smaller than 2 ha in 2003, before the CR entered the EU. Overall, there was a decline of enterprises which farm the area smaller than 10 ha. In average, 60% of subsidies in the CR are formed by the gross value added comparing to the EU-27 where this ratio is 31%. According to Boháčková and Hrabánková (2011), subsidies are the most important instrument of the CAP which regulates the agricultural product market and encourages farmers to grow the subsidized crops. On the other hand, farmers leave the land that had been used for years. This development takes place in the background of globalization that integrates production and consumption but it also focuses on decision-making in the European or world centres. Both of the authors see the major change in the re-orientation of the CAP agricultural subsidies to rural development. The common characteristic for these opinions are the negative impact of subsidies on the economic performance of enterprises and on the whole sector as well as a little incentive of farmers for their growth. In practise, the approach of the Community to agriculture raises discussion about the financial demands of this industry, about the usefulness of

subsidies in agriculture and future changes which are necessary in the area of agricultural subsidies.

The evaluation of the impact of the CAP, respectively of the grants, was solved by many authors. Authors like Kroupová and Malý (2010) examined the effects on the economic results of organic farms. A negative effect on production, profit and technical efficiency was found and also the dependence on this kind of aid was confirmed. Offermann et al. (2009) were dealing with the role of the aid in the financial situation of organic farms. They compare them with the dependence of conventional farms on direct payments. The results show that direct payments play an important role in the financial situation of organic farms, mainly in their profitability. The importance of subsidies increased when entering the EU. According to the authors, raising the grant support increases the growing dependence of organic farms on the grants and lowers their response to the market signals. Szabo and Grznár (2013) assumed that the level of subsidy reflects positively on the performance of agricultural enterprises. However, their hypothesis was not confirmed. According to the authors, subsidies reduce losses and improve the social status of farmers. Banse et al. (1999) evaluated the impact of subsidies on the performance of agricultural enterprises. The result of their evaluation was that there is a negative correlation between subsidies and the performance of Hungary. Chrastinová and Burianová (2012) dealt with the economic efficiency of agricultural enterprises in the Slovak Republic. According to them, there has been an increase of the farm income after adopting the CAP, the production efficiency has decreased and the structure of production has changed. The results of the authors Bernini and Pellegrini (2011) point to a higher growth of production, employment, fixed assets at subsidized business, but less growth in the total factor productivity than in the non-subsidized enterprises.

Numerous articles are dedicated to the issues of technical efficiency in relation to subsidies. Kumbhakar and Lien (2010) examined the impact of subsidies on the farm productivity and efficiency. Their study shows that the subsidies negatively affect the productivity of farms and positively affect the technical efficiency. Subsidies may increase the technical efficiency of farms in case they bring the investment options and an approach to new technologies for the farmer. Technical efficiency can be also reduced with the growing amount of subsidies – if the farmer prefers more leisure time and a higher

subsidy income. Zhu and Lansink (2012) analysed the impact on technical efficiency of grain-growing farms (through the output distance function) in Germany, the Netherlands and Sweden. Subsidies have a negative impact on technical efficiency in Germany, positive in Sweden and insignificant in the Netherlands. The share of subsidies in the total income of agricultural businesses has a negative impact on technical efficiency in all of these countries. Zhu et al. (2012) investigated the technical efficiency of dairy farms further in Germany, the Netherlands and Sweden. Their research has also confirmed the negative relationship between the efficiency of the farms and subsidies. There is a low incentive for farmers to work more efficiently if they were proven to be more dependent on subsidies as a source of income. Other authors who have demonstrated the negative impact of subsidies on productivity are Guan and Lansink (2006), Bezlepkina and Lansink (2006). The positive relationship between efficiency and subsidies (direct payments) has been found by Kleinhanss et al. (2007) at Spanish and German dairy farms. However, the average efficiency decreases or stagnates if the share of direct payments is increased in the total farm income. According to O'Neill et al. (1999), direct payments, which form the main scheme of the CAP, have a negative impact on the efficiency of the resource use. The reliance on direct payments also brings less flexibility to respond to the changes. Rizov et al. (2013) also evaluated the impact of the CAP subsidies on the farm productivity. They used the structural advantage of the semi-parametric estimation algorithm directly incorporating the effect of subsidies into a model of unobserved productivity. Their results identified a negative impact of subsidies on the farm productivity in the pre-reform period when decoupling was introduced in 2003. After this reform, the authors note the positive effects of subsidies (in several countries). Galanopoulos et al. (2011) highlight the significant impact of subsidies on the technical efficiency of small farms in Greece.

The aim of this article is to assess the impact of subsidies on the profit and sales of agricultural enterprises with a focus on the different size structure of enterprises.

MATERIAL AND METHODS

The article works with the data of agricultural enterprises. These accounting data were obtained

from the database of companies and institutions Albertina within the period 2007–2011 and the data about the structure of the funds were obtained from the Registry of Grant Recipients of the Ministry of Agriculture CR. Complete data from 214 agricultural businesses were obtained after editing the data file. The economic situation of the individual business categories was assessed on the basis of the accounting data. The amount and purpose of drawn funds from the European Union and the Czech Republic was determined for every single agricultural farm. These data were used as an input for the estimation of the fixed effect model. The sample is not random.

The enterprises were categorized according to the acreage into size categories. Due to the specific size of the Czech farms, where the average size of a farm is 152 ha (according to the Eurostat), the categorization was carried as in Table 1.

The original size structure included an extra category of businesses ranging from 50 to 100 hectares. Due to the insufficient sample (only 4 companies), this group was removed into the category of small enterprises.

Five financial indicators have been used for the evaluation of business operations according to Novák (2005): return on assets (ROA), return on equity (ROE), return on cost (ROC), total debt to total assets (TDTA), current ratio (CR) and assets turnover (AT). The indicators were calculated for each year. However, the mean values, median and standard deviation of indicators were used for the purpose of the article.

The indicators used to evaluate the performance in agriculture have been also used: value added, revenues (revenues from own products and services, revenues from sold goods), production consumption, labour costs (wages including social and health insurance), operating profit (operating revenues minus operating expenses), operating expenses (expenses on sold goods, production consumption, personnel expenses, taxes and fees, depreciations of intangible and tangible assets, net book value of operating rev-

Table 1. Size structure of agricultural farms

Hectare (ha)	Category of enterprise	Number of enterprises in the file
up to 100	small	24
100.1–500	medium	62
500.1–1000	large	66
1000.1 and more	very large	62

Source: own processing

enues deposed fixed assets and materials, change in operating reserves and adjustments and the complex deferred costs, other operating expenses) and operating revenues (revenues from sold goods, production, revenues from disposals of fixed assets and materials, other operating revenues), profit (profit/loss of the current accounting period) and the amount of grants received. The indicators are recalculated per hectare of agricultural land. A simple analysis of the companies' dependence on subsidies was also made by comparing the generated output to costs related to its realization.

The structure of the drawn subsidies was evaluated by the size of enterprise. The grants were divided according to their intended use to the SAPS, TOP-UP, grants from the Rural Development Programme (RDP) (Axis I, Axis II Axis III), the National Subsidies (NS), the Support and Guarantee Agricultural and Forestry Fund (SGAFF), subsidies under the Common Market Organisation (CMO) and the common categories of grants involving separate sugar payments, payments for tomatoes and energy crops. The abbreviation (STE) was used in the text.

The Fixed Effects Model was used for the analysis of the farm's profit, revenues (including revenues from sold goods and revenues from own products and services) and dependency on subsidies. Thus assuming the fixed effects over individuals, we can propose the following panel data regression model, also known as the fixed effects model, i.e.

$$y_{it} = \alpha + x'_{it}\beta + u_{it} \qquad i = 1, \dots, N; \quad t = 1, \dots, T$$

where i denotes the cross-section dimension and t the time-series dimension. Henceforward let i be a slower index. Therefore, y_{it} is an observation of the dependent variable for i-th unit in time t; α is a scalar common to all entities; x'_{it} is it-th row of $NT \times K$ matrix X, which contains the observed values of K regerssors; β is a K-dimensional parametric vector; and for u_{it} we can write

$$u_{it} = \mu_i + v_{it}$$

When μ_i is an unobservable and time-independent individual specific effect, or fixed effect, for the i-th unit and v_{it} is an iid disturbance term with mean zero and variance σ. The above stated regression is possible to estimate through a least squares dummy variables (LSDV) estimator, see for example the Baltagi (2008). Diagnostics of the fixed effect model include the Chow test for poolability (Chow 1960), the Hausman test for consistency of GLS estimates in a random

effects variant (Hausman 1978), the Wooldridge test for serial correlation in residuals (Wooldridge 2002) and the Wald test for groupwise heteroskedasticity, in this case see for example Greene (2012). In some of the regressions below, we used also dummy variables for modelling the time specific effects and their significance test by the classic Wald test.

The fixed effects model augmented by the dummy variables can be written as follows

$$y_{it} = \alpha + x'_{it}\beta + \sum_{j=1}^{T-1} \gamma_j d_j + u_{it}$$

where $d_j = \begin{cases} 1 & \text{for } j = t \\ 0 & \text{otherwise} \end{cases}$

Therefore γ_j signifies the *j*-year specific effect.

RESULTS AND DISCUSSION

The economic situation

The first part of results is related to the analysis of the economic situation of agricultural farms and their comparison among other size categories of enterprises that have been assessed by the indicators of financial analysis and performance indicators.

Table 2 shows the results of financial indicators divided into the categories of enterprises. Within the liquidity ratio, the impact of stock was eliminated. Their high level is typical for agricultural enterprises. Small businesses have a low liquidity ratio, under the value 1, and therefore are less able to pay their liabilities (the recommended range is according to Knápková et. al (2013) 1.5 to 2.5). The low values of liquidity in small businesses are achieved despite a high proportion of the financial funds but, on the other hand, also because of the lowest proportion of current assets (after subtracting the amount on the stock which is also very high in small businesses). The medium, large and very large enterprises are even above the recommended levels (above 2.5). Bounding the financial funds in current assets may seem as an advantage in the terms of attracting new financial resources, it gives guarantees of returning the funds. Excessive liquidity reduces profitability because the funds are not deposited in a more lucrative form of assets. Differences are obvious when looking at the results of the profitability. Small businesses may be evaluated as unprofitable because of a negative profit in the long term as well as negative results of the ROA and ROE. The highest return on assets and equity are reached by very large businesses. Their profitability was at the level of 0.087 CZK per each crown of their property. Very large companies reach the highest profits due to their size and the scale of production possibilities. Medium-sized businesses also reach very good results in profitability. A lower share of the equity capital, the total assets and profits comparable to large enterprises help them to achieve better results. Vice versa, the growth of equity may have a negative impact on their profitability decline. Small and medium sized enterprises show a similar amount of debt moving at 48.7–50%. The diversity

Table 2. Indicators of financial analysis (averages for the time period 2007–2011)

Size category of the business	Descriptive statistics	ROA (CZK)	ROE (CZK)	ROC (CZK)	TDTA (%)	CR (CZK)	AT (times)
	mean	−0.03	−0.02	0.13	48.72	0.82	0.80
Small	median	−0.02	−0.02	0.11	46.30	0.45	0.84
	standard deviation	0.11	0.47	0.18	31.44	0.94	0.34
	mean	0.07	0.11	0.06	50.06	3.62	0.62
Medium	median	0.05	0.09	0.09	46.02	0.93	0.52
	standard deviation	0.13	0.74	0.23	36.01	7.74	0.45
	mean	0.05	0.17	0.11	67.17	2.98	0.57
Large	median	0.07	0.09	0.11	43.78	1.12	0.53
	standard deviation	0.27	0.83	0.21	17.02	7.56	0.36
	mean	0.09	0.09	0.12	37.23	3.20	0.53
Very large	median	0.08	0.10	0.13	33.94	1.75	0.52
	standard deviation	0.08	0.63	0.16	22.06	5.24	0.25

Source: own processing

is evident at the large and very large enterprises. The results show a relatively low value (the lowest one within the categories of businesses) of the total debt of very large enterprises, i.e. 37.2%. Contrary, the most indebted enterprises (average indebtedness 67.1%) are large companies (the recommended range according to Knápková et al. (2013) is 30–60%). The factor that significantly influenced the lower value of this indicator for very large enterprises is not the declining share of liabilities but the nearly two times higher share of the assets of the company. Very large companies use higher amounts of liabilities than large enterprises, however, the value of their total assets pushes down the debt indicator. A higher proportion of the assets may be the result of a higher scale production of these enterprises associated with the adequate property amenities.

According to Knápková et al. (2013), businesses should be able to turn their assets at least once a year, which is not applied in any of the size categories of farms below. The small businesses are approaching it the most, because they turn their assets 0.8 times per year. There is a rule for other businesses – the larger the size, the lower their turnover.

Table 3. Indicators of economic performance, averages in period 2007–2011 (in CZK per hectare)

Indicator	Descriptive statistics	Small	Medium	Large	Very large
Value added	mean	3 828.82	4 546.57	4 727.97	5 715.90
	standard deviation	474.53	754.02	2 304.16	2 352.49
	median	3 094.96	4 339.29	5 625.85	6 962.95
Revenues	mean	13 380.44	17 664.21	26 344.60	25 738.84
	standard deviation	2 175.83	1 107.25	3 569.37	3 411.62
	median	12 983.76	17 575.88	27 136.18	26 332.44
Production consumption	mean	11 349.72	1 3701.61	21 655.86	20 069.25
	standard deviation	2 152.49	760.14	1 708.66	1 354.43
	median	11 348.55	1 3842.10	20 751.87	19 405.35
Production consumption/Revenues	mean	53.24	69.56	83.38	79.88
	standard deviation	4.62	5.63	6.20	4.68
	median	55.14	69.22	81.47	79.29
Personnel expenses	mean	4 941.59	8 998.93	11 058.82	11 728.18
	standard deviation	104.23	155.09	251.72	370.57
	median	2 537.17	4 516.96	5 445.38	5 833.03
Operating expenses	mean	23 581.91	23 778.04	33 449.10	32 750.83
	standard deviation	3 325.55	740.15	2 063.28	2 102.39
	median	23 807.54	23 761.81	32 494.67	3 2246.11
Operating revenues	mean	23 247.33	25 859.54	36 708.11	36 269.81
	standard deviation	3 330.93	1 310.43	3 273.26	3 005.60
	median	22 924.30	25 192.74	36 898.54	36 350.39
Operating profit/loss	mean	−334.58	2 081.49	3 259.01	3 518.98
	standard deviation	735.47	671.30	1 719.35	1 749.77
	median	86.25	1 818.81	3 759.84	3 603.60
Profit	mean	−623.49	1 589.58	2 621.35	2 712.20
	standard deviation	665.23	521.71	1 461.26	1 649.12
	median	−289.15	1 469.98	2 797.95	2 950.45
Subsidies	mean	14 491.12	10 110.44	7 665.20	7 653.53
	standard deviation	9 403.72	2 473.81	2 166.13	1 321.18
	median	16 012.66	9 878.13	7 421.99	7 059.04

Source: own processing

Table 3 expresses the revenues and costs of businesses. The results of the indicators are comparable for large and very large enterprises which achieve similar costs and yields. The situation is the same for small and medium enterprises (in the terms of sales and production consumption). Small businesses spend less for salaries than medium-sized enterprises, yet their management is unprofitable. The consumption of materials, energy and services for small enterprises creates 53% of the revenues from products and goods. For other companies, the share of production consumption in sales is nearly 70%, the largest share was recorded for large enterprises, it is 83%. Very large companies achieve higher profits thanks to savings on the production consumption. Regarding the subsidies drawn by enterprises, the small enterprises gain the maximum amount per hectare of agricultural land, that is 14 491.12 CZK, medium-sized enterprises get 10 110.44 CZK per hectare, large and very large ones gain the minimum amount of 7665.20 CZK and 7653.53 CZK. Lower amounts of the received grants by large and very large enterprises may be the result of the capping, which sets the maximum amount of direct payments and amounts above this limit are reduced.

An initial analysis was performed based on the business dependency on subsidies. The way of comparing the amount of the generated output with the sum of the production consumption and personnel costs was used to determine whether the companies are able to cover their costs by their production. Neither category of businesses is able to pay these costs created by their production. If we add the amount of subsidies to the production, then the costs will be covered. Based on the analysis above, we can say that the subsidies contribute to stabilize the economic situation of farms, because without the drawn funds to support agriculture businesses they would not be able to make any profit and would cumulate losses.

According to the evaluation of the economic situation, the results have been confirmed by Bojnec and Latruffe (2012). The productivity of business is positively related to its size. Small businesses are too small to achieve savings and midsize businesses cumulate all the disadvantages relating to productivity, i.e. they are too small to be economically efficient. The authors also argue that the midsize businesses are too big to be profitable. However, this hypothesis

has not been confirmed in this article. According to the economic analysis, the midsize companies can be ranked as prosperous. Large agricultural enterprises use the economies of scale and scope and thus benefit from the access to markets of inputs and outputs (Johnson and Ruttan 1994; Clausen 2009). According to Davidova and Latruffe (2007) small businesses are not affected by the problems in relation to labour and organization. Family labour force is highly motivated by the profits of the farm. According to the economic analysis, in the case of small Czech farms, we cannot speak about the motivation for better results because of their unsatisfactory financial situation.

Analysis of subsidies

The following part of the article (Figure 1) presents the structure of drawn subsidies in all size categories of enterprises and their differences. The values represent the percentage of different kinds of subsidies in the total amount of grants received. Subsidies under the CMO and STE are not captured in Figure 1 due to the very low percentage representation in all size categories of enterprises. The proportion of the CMO ranges between 0.1–0.15% of the total subsidies and the STE is in the range of 1.08–5.38%.

The Single Area Payment Scheme per hectare of agricultural land (SAPS) has the dominant position in the medium, large and very large enterprises. The share of the SAPS in small business is in average 5.52%, it is 58.55% in large businesses and 57.26% in very large companies. The development of these payments is growing over the time, it corresponds to the increase of the SAPS from 2791.50 CZK per hectare in 2007 to 4686.50 CZK per hectare in 2011 (currently these payments are at the rate of 5997.23 CZK per hectare of agricultural land). Since the beginning of the CAP implementation, the first but very slight decline by 72 CZK/ha in the Single Area Payment Scheme has been recorded comparing to the year 2013. The modulation applied in 2011 limited the amount of direct payments drawn by the business to amounts higher than 300 000 EUR by 4%.

In the case of small enterprises, the SAPS and TOP-UP are not crucial (which logically results from the scale of their farming) but crucial are the payments within the national subsidies and the Axis I (RDP),

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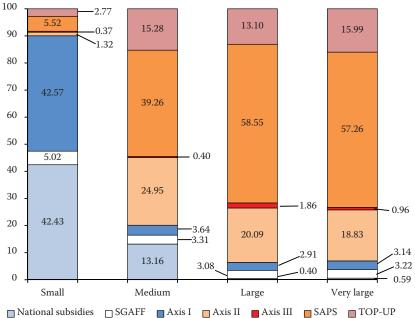[1]Principles of the Subsidies Granting and Allocation.

Figure 1. Structure of the drawn subsidies (average for the years 2007–2011), in %

Source: own processing

which are involved by 85% in income from subsidies. Within the national subsidies, the financial support of Principles[1] is drawn from the Animal Health Fund under the Ministry of Agriculture (especially to cover the costs associated with removal of animal carcasses and breeding sow rehabilitation support). Modernization of agricultural holdings is financed in the framework of the Axis I (RDP). Axis II finances the Agri-environment measures (AEM).

Midsize companies have received 25% of grants under the Axis II (RDP) from the total amount of drawn subsidies, i.e. the payments for improving the environment and landscape. 59% of these payments are the LFA payments, and 41% the AEM. National subsidies are at the level of 13% of the total amount of grants received, particularly funds to the Programme to the Support the Sanitation of Field and Specialty Crops (91%). The remaining share is to support the construction of drip irrigation and the Animal Health Fund.

Payments from the SAPS, TOP-UP form the major part for large and very large enterprises. Another significant share (in %) receive subsidies from the Axis II (RDP) – the payments LFA and AEM. The representation of the national aids is relatively low (0.4% resp. 0.59%). Large enterprises use funds from the national Animal Health Fund (removal of animal carcasses or sanitation of cattle from rhinotracheitis) and from the Programme to Support the Sanitation of Field and Specialty Crops. The great diversity of drawn support according to the Principles of Agriculture

is evident in very large enterprises, which also draw subsidies from the Animal Health Fund and Sanitation of Field and Specialty Crops. In addition, there are many supports for restructuring the fruit orchards, sanitation of sows or building drip irrigation. These companies use a special counselling.

According to the structure of the drawn subsidies, it is possible to suggest the focus of agricultural enterprises forming this file. The medium-sized businesses consist of companies which operate mainly in the LFA and focus on the crop production. Small businesses have the character of farms specializing in the livestock production in order to use funds from the Rural Development Programme for improving business performance and competitiveness. This may be a reflection of the unfavourable economic situation of these companies (see the results of financial indicators and performance indicators). According to the financial subsidies for large companies, it can be deduced that they focus on both the crop and livestock production. Very large companies diversify their activities more.

According to Busom (2000), larger and older companies are more likely to gain access to funding. Other studies from around the world (Wallsten 2000; Czarnitzki and Fier 2002; Almus and Czarnitzki 2003; Duguet 2004; Hussinger 2006) suggest that larger companies have a greater opportunity to be subsidized. In the case of the examined sample of enterprises, we cannot agree with the results of Almus and Czarnitzki (2003) who point out that the size of

the company obtaining grants is irrelevant whereas the analysed small businesses get more funds from subsidies (also see Table 3).

Fixed effect model

Different types of subsidies affect differently the profit and revenues of the selected size categories of enterprises. Detailed results are demonstrated in Table 4 and Table 5. In the parentheses, there are given the standard errors, in the square ones, there is the t-value, based on which the statistical significance of the parameter is assessed.

Small businesses are positively influenced by the national subsidies (confirmed statistically significant correlation). These subsidies increase their profits, but also their sales. In particular, small businesses use funds for the activities that assist in healing their livestock (Animal Health Fund). These funds allow a partial reimbursement of the costs for actions related to the prevention of diseases spreading. They are called non-investment subsidies, i.e. a grant in profit or loss, in which they reflect positively. These subsidies have a negative impact on both revenues and profit in the case of medium-sized businesses. The file of these businesses consists primarily of enterprises engaged in the crop production and the support drawn from the Principles of Agriculture is concentrated mainly on the support of the sanitation crops. Yet this is another investment subsidy which allows the reimbursement of costs associated with the acquisition of medications. The sum of a grant for field crops is up to the 25% of costs. However, this support is associated with other costs relating to the application of funds which result in increasing the costs and decreasing revenues of the company. However, the statistical significance was not confirmed in midsize businesses. These national subsidies influence positively revenues and profits of large and very large companies, but it is not statistically significant.

The SGAFF supports positively affect the profits of small and medium-sized businesses. In the case of small enterprises, they reduce profit very slightly. Statistically significant is how the SGAFF support affects the profit of medium businesses (an increase of 1.4 CZK from each crown of subsidy.) These subsidies are supporting part of the interest on credits for the purchase of equipment and land, or a partial compensation for agricultural insurance, they reduces the costs of enterprises and have a positive impact on earnings.

Subsidies under the Axis I (RDP) lower the sales of small, large and very large enterprises. In the case of small businesses, it is a statistically significant relationship (every other crown from grants will reduce revenues by 7 CZK for small businesses). The profit is increased by about 0.6 CZK in the medium sized businesses from CZK subsidy (insignificant parameter). The drawn funds under the Axis I are formed by the majority of investments into the modernization of enterprises.

The support from the Axis II (RDP) has a positive effect on profit and sales of medium and large enterprises. There is a statistically significant relationship in the case of the impact on earnings within listed categories of enterprises. However, these subsidies negatively affect both sales and profits of small businesses (statistically insignificant). All categories of businesses draw subsidies mainly within the AEM and LFA payments. The possibility of obtaining grants from the AEM is subject to the requirements of the Cross Compliance (including the GAEC – Good agricultural and environmental condition and the SMR – Statutory Management Requirements). Meeting these requirements may initially increase the costs of the company and thus reduce the revenues and earnings (see the case of small businesses). When the requirements are not met, the payments are reduced. To be specific, it is required to meet the regulations about the environment, animal health, and animal welfare (for more details see the European Commission 2015). The poor economic situation of these enterprises clearly reflects on the factors. The management of other categories of enterprises can be evaluated positively, that is why the implementation of the requirements for them can be easier and financially more manageable and ultimately brings profit. There is favourable impact of the Axis II on earnings for the medium-sized businesses. Every CZK of subsidy brings 1.8 CZK of profit (0.6 CZK for large enterprises).

In the case of analysed companies, the subsidies under Axis III (RDP) are mainly formed by investment subsidies spent on the diversification of activities on non-agricultural activities (in the case of large enterprises the subsidy is spent on business set ups as well as its development). That, of course, initially reflects in the increase of business costs, which reduce the profits of small, large and very large enterprises (in the case of small and large businesses it is a statistically significant relationship). For medium-sized enterprises are these subsidies formed essentially by

Table 5. Estimated parameters of the fixed effects models for profit (LSDV estimator), in CZK

Subsidy	Small	Medium	Large	Very large
intercept	−10 573.40	135.37	1 111.77	6 558.09
	(4 192.07)	(781.84)	(1 065.84)	(1 604.30)
	[−2.5220]	[0.1731]	[1.0430]	[4.0880]
NS	1.9079	−0.8346	9.0753	3.4127
	(0.6188)	(0.5044)	(4.5092)	(3.2035)
	[3.0830]	[−1.6540]	[2.0130]	[1.0650]
SGAFF	3.3681	1.3810	−0.5875	0.6407
	(7.5342)	(0.3840)	(1.9737)	(2.1228)
	[0.4470]	[3.5960]	[−0.2977]	[0.3018]
CMO	15.4386	1.0645	6.1915	−1.1120
	(13.7267)	(0.1778)	(1.7921)	(2.5242)
	[1.1250]	[5.9870]	[3.4550]	[−0.4405]
Axis-1	0.4940	0.5729	−0.0903	−0.3807
	(0.4193)	(0.2781)	(0.2128)	(0.3567)
	[1.1780]	[2.0600]	[−0.4244]	[−1.0670]
Axis-2	−8.9737	1.7979	0.5621	0.7455
	(19.0577)	(0.5580)	(0.2070)	(0.3301)
	[−0.4709]	[3.2220]	[2.7160]	[2.2580]
Axis-3	−5.5552	0.2809	−0.2504	−0.0825
	(2.6806)	(0.2436)	(0.0408)	(0.0990)
	[−2.0720]	[1.1530]	[−6.1420]	[−0.8339]
SAPS	−10.7322	−1.1937	−0.1476	−0.6203
	(3.3038)	(0.4552)	(0.3971)	(0.2824)
	[−3.2490]	[−2.6220]	[−0.3716]	[−2.1960]
TOP-UP	−0.4044	1.3335	0.9421	−0.1465
	(9.0275)	(0.8327)	(0.5612)	(0.7269)
	[−0.0448]	[1.6020]	[1.6790]	[−0.2016]
STE		−1.7306	0.2207	1.7926
		(2.5196)	(1.4955)	(1.6871)
		[−0.6869]	[0.1475]	[1.0620]
Dummy-2	−4 468.91	355.27	−776.13	−1 743.92
	(3 191.67)	(310.77)	(354.04)	(945.30)
	[−1.4000]	[1.1430]	[−2.1920]	[−1.8450]
Dummy-3	10 350.00	493.06	−2317.63	−2571.70
	(2 487.41)	(566.38)	(999.53)	(1623.96)
	[4.1610]	[0.8706]	[−2.3190]	[−1.5840]
Dummy-4	6 431.58	776.64	−179.53	−2107.09
	(2 678.49)	(521.71)	(741.12)	(1347.43)
	[2.4010]	[1.4890]	[−0.2422]	[−1.5640]
Dummy-5	3 151.22	1 905.98	1 695.30	2 799.98
	(3 574.17)	(685.41)	(956.75)	(2 209.05)
	[0.8817]	[2.7810]	[1.7720]	[1.2680]
Wald test for common significance of time dummy variables	19.0353	14.4457	28.4961	33.4409
	{0.0008}	{0.0060}	{< 0.0001}	{< 0.0001}
Chow test for poolability	7.1542	10.1786	4.5106	2.8418
	{< 0.0001}	{< 0.0001}	{< 0.0001}	{< 0.0001}
Hausman test for consistency of GLS estimates in REM	29.3412	93.8637	33.7617	83.9960
	{0.0003}	{<0.0001}	{< 0.0001}	{< 0.0001}
Wooldridge test for first-order serial correlation	0.5599	4.3467	2.2579	2.9090
	{0.4574}	{0.0385}	{0.1345}	{0.0898}
Wald test for groupwise heteroskedasticity	2 510.64	52 303.00	4 006.96	24 647.80
	{< 0.0001}	{< 0.0001}	{< 0.0001}	{<0.0001}

Parenthesis are used in the following form, (•) for standard errors, [•] for t-ratios and {•} for probabilities

Source: own processing

Table 5. Estimated parameters of the fixed effects models for revenues (LSDV estimator), in CZK

Subsidy	Small	Medium	Large	Very large
intercept	215 912.00 (13 044.40) [16.5500]	12 615.50 (4 302.23) [2.9320]	19 172.10 (2 454.54) [7.8110]	35 526.10 (4095.56) [8.6740]
NS	10.4629 (3.1013) [3.3740]	−2.3001 (1.3498) [−1.7040]	5.8949 (11.1004) [0.5311]	6.5832 (4.9296) [1.3350]
SGAFF	−81.6282 (61.9046) [−1.3190]	3.6436 (3.3131) [1.1000]	−1.8315 (4.2013) [−0.4359]	11.5073 (4.9466) [2.3260]
CMO	−128.0140 (41.8768) [−3.0570]	0.6174 (0.7107) [0.8688]	−9.9793 (2.7752) [−3.5960]	−3.2669 (5.0022) [−0.6531]
Axis-1	−6.9600 (1.7124) [−4.0650]	0.2061 (0.6954) [0.2964]	−0.3765 (0.2540) [−1.4820]	−1.5255 (1.6882) [−0.9036]
Axis-2	−87.9091 (103.9040) [−0.8461]	1.7268 (2.6441) [0.6531]	0.4010 (0.3771) [1.0630]	1.8113 (1.0333) [1.7530]
Axis-3	−132.3780 (25.1683) [−5.2600]	0.4628 (0.9047) [0.5116]	0.1254 (0.0668) [1.8770]	0.2482 (0.1688) [1.4700]
SAPS	14.1691 (18.2543) [0.7762]	−0.4031 (1.2417) [−0.3246]	0.0398 (0.7154) [0.0557]	−0.2090 (0.6626) [−0.3154]
TOP-UP	64.0924 (44.5479) [1.4390]	7.4700 (2.6540) [2.8150]	0.6627 (1.0993) [0.6028]	−0.0181 (0.8308) [−0.2018]
STE		−1.6339 (6.8716) [−0.2378]	−0.7944 (2.4699) [−0.3216]	−1.2860 (3.5353) [−0.3638]
Dummy-2		684.87 (817.35) [0.8379]	1776.97 (641.53) [2.7700]	1799.34 (1901.96) [0.9460]
Dummy-3		−880.98 (1525.88) [−0.5774]	−3138.63 (2106.59) [−1.4900]	−4865.25 (4725.26) [−1.0300]
Dummy-4		1883.26 (1 324.64) [1.4220]	−509.49 (1 145.78) [−0.4447]	−2923.71 (3 208.97) [−0.9111]
Dummy-5		4 908.42 (2 003.82) [2.4500]	3 169.86 (1 449.14) [2.1870]	4 406.28 (3 644.02) [1.2090]
Wald test for common significance of time dummy variables	1.1470 {0.8867}	14.9653 {0.0048}	35.8476 {<0.0001}	17.7878 {0.0014}
Chow test for poolability	87.3852 {< 0.0001}	72.1217 {< 0.0001}	30.8962 {< 0.0001}	13.8404 {< 0.0001}
Hausman test for consistency of GLS estimates in REM	294.1250 {< 0.0001}	40.3509 {< 0.0001}	152.0860 {< 0.0001}	167.6770 {< 0.0001}
Wooldridge test for first-order serial correlation	4.1975 {0.0449}	19.4873 {< 0.0001}	24.4024 {< 0.0001}	17.4957 {< 0.0001}
Wald test for groupwise heteroskedasticity	3.05×10^6 {< 0.0001}	274486.00 {< 0.0001}	4533.95 {< 0.0001}	58093.80 {< 0.0001}

Parenthesis are used in the following form, (•) for standard errors, [•] for *t*-ratios and {•} for probabilities

Source: own processing

grants to promote tourism. Subsidies for the diversification of activities on non-agricultural activities are reflected positively on profit and revenues of medium-sized enterprises i.e. the development of agri-tourism promotes sales of local specialties. Every 1 CZK of these subsidies reduces the profits of small businesses by 5.6 CZK and the profit of large enterprises by 0.25 CZK. According to Sharpley (2002), rural tourism has been widely promoted as an effective source of income and employment. But he identified high development costs, low returns and low demand. Long-term financial support is essential if tourism is to play an effective rural development role.

Direct payments SAPS participate negatively on the profits (in the case of SMEs, it is a statistically significant relationship). The higher is the amount of direct payments that company achieves, the greater impact it can have on the efficiency and economic performance of farms using their resources. Economic performance may decrease when increasing proportion of these subsidies on farm income. A high proportion of these payments on income in small businesses can be assumed. There is a decline within small enterprises by 10.7 CZK of profit from each CZK subsidy, for medium-sized enterprises the decrease is by 1.2 CZK.

TOP-UP payments are statistically significant factors for medium-sized farms, every crown of subsidies will bring growth of sales by 7.5 CZK. However, in this given dataset these subsidies have a negative impact on earnings (statistically insignificant) of small and very large enterprises and sales of very large enterprises. Separate payments for sugar and tomatoes, energy crops (STE) are not statistically significant for profits or revenues of enterprises.

Subsidies under the Common Market Organisation are made only by payments for restructuring and transforming vineyards. Changing vine varieties of vineyards or moving vineyards up the slope and meeting the requirements of Cross Compliance may be costly at first and therefore it is negatively involved in sales and statistically significant for small and large companies at the same time. Retrospectively paid funds participate positively (and statistically significant) in the profits of medium and large enterprises.

Kroupová and Malý (2010) and Rizov et al. (2013) reported a negative impact of subsidies on the profits of farms and their production. Lososová and Zdeněk (2014) confirm profit dependence on subsidies. However, this article has shown different effects of subsidies. A negative impact of subsidies (SAPS) on

profit of small and medium-sized enterprises has been found as well as the negative impact of Axis III on profit of large companies. National subsidies reflect positively in the profit of small businesses, SGAFF for medium-sized enterprises, Axis II for medium-sized, large and very large farms.

In the case of direct payments, Offermann et al. (2009) confirm the important role of direct payments in relation to the profitability of these businesses. According to the authors, the increasing grant support causes a growing dependency on support and a lower response to market signals. According to the results of the model, direct payments are statistically significant factors reducing profit for small and medium-sized enterprises.

CONCLUSIONS

The funds provided by the EU represent a major role in the viability of agricultural enterprises. In some cases, the funds may have a negative impact on the economic performance of enterprises and can be some kind of resource for achieving profitability and securing the favourable economic result. The article has showed the differences in the economic situation of the categories of enterprises based on the economic analysis. The greater size structure enterprises have achieved better economic results while the small businesses have a loss. The differences in the impact of subsidies on profit and sales of the farms have been also found. A statistically significant factor that positively affects the earnings of small businesses are only the national subsidies, the SAPS have a negative impact. National subsidies significantly and positively affect their revenues. Payments under the Common Market organisation, the Axis I and Axis II affect them negatively. Therefore, these businesses are mostly negatively affected by subsidies, both in relation to sales and their profits. The profit of medium-sized enterprises is significantly affected by the SGAFF, CMO and Axis II payments. Only the SAPS affects the profit negatively. There is a positive effect of payments under the TOP-UP. Medium-sized businesses are mainly positively influenced by subsidies. The profits of large enterprises are significantly influenced by the CMO (but it has a significantly negative effect on the sales of businesses) and the Axis II. They are negatively influenced by supports from the Axis III. The overall average effect of subsidies on sales of these companies is negative, although it

is positive on earnings. Profits and sales of very large enterprises are not affected by subsidies significantly. The European agricultural model is based on small and medium-sized enterprises, respectively family farms. Since the aid for enterprises of this size structure (according to the results) does not help to improve their economic results and the support drawn by very large enterprises is not a significant factor, this analysis may provide ideas for the creators of agricultural policies and their own targeting.

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