ACTA UNIVERSITATIS AGRICULTURAE ET SILVICULTURAE MENDELIANAE BRUNENSIS

Volume LX 44 Number 7, 2012

ANALYSIS OF DISTRIBUTION IMPACT OF SUBSIDIES WITHIN THE COMMON AGRICULTURAL POLICY ON FIELD PRODUCTION BUSINESSES IN THE CZECH REPUBLIC

G. Trnková, Z. Malá

Received: September 18, 2012

Abstract

TRNKOVÁ, G., MALÁ, Z.: *Analysis of distribution impact of subsidies within the Common Agricultural Policy on field production businesses in the Czech Republic.* Acta univ. agric. et silvic. Mendel. Brun., 2012, LX, No. 7, pp. 415–424

The article deals with the analysis of inequality in the distribution of the economic result in businesses engaging in field production in the Czech Republic, by way of the assessment of the impact of subsidies on the said inequality and by defining the effect of the size of the business on the economic result as well as inequality. The methodical tool is the quantification of the Gini coefficient and its elasticity. The data basis consists of panel data of 140 agricultural businesses focusing on field production for the period of the years 2005–2010.

The main results of the submitted article substantiate a high inequality in the distribution of the economic result for the accounting period among field production businesses. The said inequality is not generally caused by the differing size of the analyzed businesses, and the associated volume of subsidies obtained, but is affected by other factors, such as the management quality, the investment activity of the business, or exceptional events. Subsidies do contribute to the more equal distribution of the economic result, but their impact is very small. Out of the individual categories of subsidies, the ones with the main redistribution effect are direct payments, as a result of the high proportion of total subsidies that they comprise.

farm profit, farm loss, inequality, Gini coefficient, subsidy, arable farming, Czech Republic

One of the main goals of Common Agricultural Policy (CAP) is the preservation of or increase in the income of agricultural households and businesses. Such goal is fulfilled by a whole spectrum of instruments, from direct payments within the first pillar of CAP, to various agro-environmental subsidies within the second pillar. Such instruments, besides affecting the total income of households or the profit of companies, also affect the level of agricultural production and costs, prices, as well as farm structure (Henningsen *et al.*, 2011; Malá *et al.*, 2011).

Witzke and Noleppa (2006) emphasize that two basic variables, which measure the effectiveness of public policy, is the rate of allocation and redistribution effects. Allanson (2004) considers the redistribution effect of agricultural policy to be the difference between the rate of inequality in income including subsidies and the rate of inequality in income after the deduction of subsidies. In terms of the development of CAP, according to Schmid *et al.* (2006b) the introduction of direct payments, which replaced price subvention, and their gradual separation from production, meant a shift from allocation policy toward a redistribution policy.

Payments of an operative nature provided to farmers in the Czech Republic are currently largely comprised of a revenue subsidy that is provided per hectare of land. Such payment is separated from production and Schmid *et al.* (2006) state that

payments that are separated from production have a minimal allocation effect or none at all and that they can be considered an instrument of purely redistributionary policy. On the other hand, revenue subsidies that are on a per animal basis or a unit of production basically intervene in the market and affect the allocation of resources.

The question thus is whether subsidies within CAP, as instruments of predominantly redistributionary policy, truly contribute to the reduction of inequalities in income of agricultural businesses or not.

A whole range of studies focus on the issue of the impact of the distribution of subsidies within CAP, and such studies may be divided up into two groups. The first group only focuses on the matter of the distribution of agricultural subsidies, e.g. according to geographical areas (Alfaro-Navarro, 2011; Schmid *et al.*, 2006a). The second group of publications focuses on the impact of subsidies under Common Agricultural Policy on the distribution of income (Keeney, 2000; Frawley and Keeney, 2000; Schmid *et al.*, 2006a, 2006b; Witzke and Noleppa, 2006; Benni and Finger, 2012).

As far as the issue of unequal distribution of subsidies is concerned, the literature shows that the majority of payments go to the largest businesses, generally to the largest land users. Schmid *et al.* (2006a) state that in 2001, in the average for 14 EU countries, 80% of direct payments went to only 20% of businesses.

In terms of the impact of subsidies on the distribution of the income of agricultural households or businesses, the results vary significantly. For example, Keeney (2000) conducted a decomposition of the Gini coefficient of the income of agricultural households in Ireland into two components – direct payments and income generated by the market. Keeney reached the conclusion that the introduction of direct payments by way of MacSharry's reform contributed to the more balanced income distribution of agricultural households. Authors such as Mishra *et al.* (2009), Moreddu (2011) or Benni and Finger (2012), for example, also reach the conclusion that subsidies contribute to a reduction in the inequality of income of agricultural households.

Schmid *et al.* (2006b) analyzes the income of agricultural households included in the FADN accounting data network for the period of 2001–2003. However, Schmid reaches the conclusion that payments for natural disadvantage only have a minimal effect on the level of absolute income inequality in Austria. While direct payments and agro-environmental subsidies increase absolute income inequality, because primarily direct payments grow proportionally to their size. Schmid emphasizes that businesses of a larger size have a double advantage, with subsidies growing proportionally with their size, as well as with savings from economies of scale.

The predominant portion of the literature analyzes the impact of subsidies on the income of agricultural households, but Witzke and Noleppa (2006) also examined the impact of subsidies on the profit of German businesses (legal entities). However, their analysis, which also utilizes FADN data, is not based on individual data, but on average values for groups of businesses, which were arranged according to the profit per business indicator. Witzke and Noleppa (2006), similarly to Keeney (2000), decompile the absolute inequality measured by the Gini coefficient into direct payments and profit generated by the market, or, in other words, profit after the deduction of direct payments. The authors reach the conclusion that the majority of businesses (legal entities) would generate a negative profit in the absence of direct payments, subsidies comprise a significant part of their profit, and thus their absolute contribution to the overall inequality is significant – approximately ¾ of the overall inequality.

The main objective of the submitted article is to analyze the inequality in the distribution of the economic result among businesses engaging in field production in the Czech Republic and to assess the impact of subsidies on the said inequality, as the economic activity of field production businesses is significantly affected by subsidies provided within CAP in view of their ties to agricultural land. A partial objective is the assessment of the effect of selected factors on the economic result and its distribution.

MATERIALS AND METHODS

In reference to the said objectives and research publications, the following working hypotheses were derived:

H_1: Inequality in the distribution of the economic result of field production businesses is high (the value of the Gini coefficient exceeds 0.6), see Witzke and Noleppa (2006).

H_2: The hectare area of farmed land, i.e. the size of the business, has an effect on inequality in the economic result.

H_3: Direct payments do not contribute to more equal distribution of the economic result (Schmid *et al.*, 2006).

H_4: Subsidies for the support of less favorable areas, agro-environmental subsidies and subsidies for the support of the common organization of the market reduce the inequality in the economic result, as they compensate the production limitation or market limitation of the business.

The main methodical apparatus of the submitted article is the quantification of the Gini coefficient, which is a commonly used measure of inequality in research focusing on income inequality in society. Stuart (1954) proposed the quantification of the said relative rate by way of covariance between the income level y_1, …, y_n and the cumulative distribution function of income F(Y) with the

ascending arrangement of households according to the amount of their income, see formula No. 1.

$$G = \frac{2\,\mathrm{cov}(Y, F(Y))}{\overline{Y}}. \tag{1}$$

For a non-negative income, the Gini coefficient quantified by way of the above formula attains values within the interval of <0.1>. However, in the case of the occurrence of a negative income within the analyzed data set, the Gini coefficient quantified in the above manner overvalues inequality and achieves a value of more than 1, see Chen *et al.* (1982). For example, such a situation occurs in the analyses of income inequality of private individual farmers, or in the examination of inequality in the economic result of legal entities.

The problem of a negative variable (income, profit, etc.) can be dealt with by way of the adjusted Gini coefficient (G*) proposed by Chen *et al.* (1982) and later modified by Berrebi and Silber (1985):

$$G^* = \frac{\left(\frac{2}{n}\right)\sum_{j=1}^{n} j y_j - \frac{n+1}{n}}{\left[1+\left(\frac{2}{n}\right)\sum_{j=1}^{m} j y_j\right] + \left(\frac{1}{n}\right)\sum_{j=1}^{m} y_j \left[\frac{\sum_{j=1}^{m} y_j}{y_{m+1}} - (1+2m)\right]}, \tag{2}$$

$$y_j = \frac{y_j}{n\overline{Y}}, \tag{3}$$

$$\overline{Y} = \frac{\sum_{j=1}^{n} Y_j}{n} > 0. \tag{4}$$

In formulas No. 2, No. 3 and No. 4, n is the total number of examined subjects, j indicates a j-th subject and marks the position of the subject within the set arranged in an ascending manner according to the analyzed variable, Y_j is the value of the analyzed variable within the j-th subject, y_j is the share of the value of the analyzed variable of the j-th subject in the total value of the analyzed variable within the set. Further, m is the number of subjects for which the cumulative sum of the analyzed variable is negative, whereby for $m+1$ the cumulative sum of the analyzed variable is already positive. The above applies in the case of the ascending arrangement of subjects according to the values of the analyzed variable.

Mishra *et al.* (2009) add that in the absence of a negative variable within the analyzed data set, the adjusted Gini coefficient achieves the same value as its standard version. In the case of a negative variable, $G^* \leq G$.

Mishra *et al.* (2009) further points out the disadvantages of the adjusted Gini coefficient, which are the inability to decompose inequality according to the components of the relevant variable (e.g. types of income, revenues, costs) and the associated problematic calculation of the elasticities of inequality, which measure the impact of a relative change in a component of the analyzed variable on inequality. Boisvert and Ranney (1990) deal with the issue of the quantification of elasticities on the basis of simulation calculations, where, in the first step, they quantify adjusted Gini coefficients for an increase in the relevant component by 1%. In the second step, they quantify elasticity according to formula No. 5:

$$E = \frac{G_1^* - G_0^*}{G_0^*}, \tag{5}$$

where is the value of the adjusted Gini coefficient after a change of the relevant component and is the value of the adjusted Gini coefficient before the given change.

In the submitted article, the primary focus of examination was the inequality of the economic result for the accounting period, which achieves a negative value in many businesses, and thus the analysis of inequality was based on the adjusted Gini coefficient. The impact of subsidies on the inequality of the economic result was subsequently assessed with the utilization of elasticities quantified according to formula no. 5. The said Gini coefficients were first quantified for individual years of the data set on the basis of the values of the economic result in CZK thousands per business and according to the values of the economic result in CZK thousands per hectare. The purpose was to assess the distortion of the results while not taking into consideration the varying size of the analyzed businesses. This assessment was subsequently also conducted for the values of elasticities of the effect of subsidies overall on the inequality of the economic result.

Subsequently, four business size categories were defined and inequality within the individual categories was examined. The criterion for the inclusion of a business into the relevant category was the size of farmed agricultural land, whereby the categories were segmented as follows:

- 0–500 ha – small businesses,
- 501–1000 ha – mid-size businesses,
- 1001–2000 ha – large businesses,
- over 2001 ha – largest businesses.

For the said categories, inequality of the economic result for the accounting period was once again quantified according to formula No. 3. In the same methodical manner, inequality in the operating economic result was also quantified. For a more detailed analysis, the Gini coefficient of services and service consumption was added, which was quantified according to formula No. 1. In order to

assess the factors affecting the economic result and its inequality, average values of selected indicators of the first and last quartile, determined according to the values of the economic result for the account period in the year 2009, were defined for the said categories of businesses.

The impact of subsidy policy on the inequality of economic result was analyzed with the utilization of the adjusted Gini coefficient quantified for the economic result adjusted to not include the subsidy payment for the support of farming in less favorable areas, as well as for the economic result without agro-environmental subsidies and for the economic result without subsidies for the common organization of the market. Elasticities were also quantified for the said three categories of subsidies according to formula No. 5. The elasticity of the Gini coefficient was also quantified according to the said formula for a change in total subsidies and direct payments.

Inequality in the drawing of subsidies itself was also analyzed, specifically for the categories of total subsidies, direct payments, agro-environmental payments, subsidies for the support of less favorable areas, subsidies for the support of the common organization of the market and subsidies drawn from the Rural Development Program with the exception of those previously mentioned. Because the said categories achieve exclusively positive values, Gini coefficients were quantified for them according to formula No. 1.

The conducted analysis was based on panel data from approximately 140 agricultural businesses that engage in the growing of grains, legumes and oilseeds, i.e. field production. The data set was created on the basis of accounting data from the Creditinfo Company Monitor database and from the database of the State Agricultural Intervention Fund. From a time perspective, the said data basis represents the operation of the said agricultural businesses within the years 2005–2010.

The data from the accounting statements were also supplemented with the volume of acquired subsidies categorized as follows:

- direct payments (PP) – comprising a sum of SAPS and TOP-UP payments and separate payments for sugar and tomatoes,
- agro-environmental subsidies (AEO) – paid out on the basis of both HRDP as well as RDP,
- subsidies for the support of less favorable areas (LFA) including NATURA 2000 areas (on agricultural land),
- support of the common organization of the market including intervention storage (SOT),
- subsidies for the support of rural development paid out from the Horizontal Rural Development Plan and the Czech Rural Development Program for the years 2007–2013 (RDP).

Further, there was an addition of the size of agricultural land, which was determined as the proportion of the sum of SAPS payments over their annual rate. The number of employees was determined as the proportion of wage costs of individual entities and the average wage in agriculture as attained according to the database of the Czech Statistical Office in the region where the analyzed businesses was located.

Further, the data acquired in the manner as stated above were adjusted to account for incomplete and remote observations, detected with the utilization of graphic analysis. The resulting data set used for analysis contained 927 observations from approximately 140 agricultural businesses. According to the Agrocensus from the year 2010, 686 legal entities engaged in the growing of grains, legumes and oilseeds, i.e. field production, in the Czech Republic. The set of businesses thus comprises approximately 20.4% of the basic set.

All calculations were conducted in MS Excel.

RESULTS

Characteristics of the Set of Businesses

The average hectare area of a business engaging in field production is 794 hectares. Just under 19% of businesses draw a subsidy for an LFA area. In terms of the regional structure, the South Moravian (37%) and Central Bohemian (18.9%) regions are represented the most. The above shows that the analysis comprises businesses operating primarily in favorable, fertile areas. The average value and rate of growth of the selected characteristics of the analyzed agricultural businesses is shown in Tab. I.

Tab. I shows that the hectare area of businesses increased at a moderate rate among the first three size categories, while a decline in hectare area of just under 6% occurred among the largest businesses. The assets per hectare indicator attains the greatest value among small businesses, while the largest businesses achieve the lowest value. A significant decline in the value of assets converted to a per hectare basis occurred among the largest businesses.

Commercial activity, as a supplementary source of income, is engaged in the most by small businesses. Among the largest businesses, the business margin is almost zero when converted to a per hectare basis. The value of the services per hectare indicator is the highest in the small size category, whereas services per hectare are the lowest among the largest businesses. Growth in business services occurred among businesses of all size categories with the exception of mid-size businesses, where there was a slight decline of 1.8%. With the exception of small businesses, there are no great differences among the categories for the indicator of service consumption per hectare.

Service consumption per hectare among mid-size, large and the largest businesses ranges at levels from CZK 20,000–23,000 per hectare, and at approximately CZK 30,600 per hectare among small businesses. In terms of growth in service consumption, which comprises the greatest portion

I: *Selected characteristics of agricultural businesses according to size categories*

	Small		Mid-size		Large		Largest	
	Average	Growth rate	Average	Growth rate	Average	Growth rate	Average	Growth rate
Number of businesses	53.5	x	44.5	x	32.17	x	9.33	x
Hectare area	302.69	5.89	762.40	3.09	1347.89	1.46	3038.33	-5.79
Number of workers	8.02	4.59	9.59	64.58	29.63	30.33	70.06	-12.51
Total assets (in thous. CZK/ha)	64.50	-7.31	42.69	21.01	58.86	38.12	48.44	-17.83
Business margin (in thous. CZK/ha)	1.94	-40.86	0.09	211.66	0.71	169.13	0.02	-28.65
Services (in thous. CZK/ha)	36.51	35.98	24.73	-1.80	30.07	12.86	26.80	5.50
Service consumption (in thous. CZK/ha)	30.58	29.57	20.00	-9.33	23.25	13.50	21.01	8.11
Added value (in thous. CZK/ha)	7.87	33.77	4.82	37.70	7.86	18.61	5.81	-2.59
Wage costs (in thous. CZK/ha)	4.98	-2.95	2.59	50.87	4.60	30.39	4.39	6.90
Depreciation (in thous. CZK/ha)	3.51	58.96	2.71	17.60	3.53	56.20	3.27	34.55
Operating ER (in thous. CZK/ha)	3.80	47.46	3.36	505.19	3.42	87.29	2.52	120.34
Financial ER (in thous. CZK/ha)	-0.46	29.71	-0.12	-318.50	-0.55	-8.54	-0.55	195.36
Total ER (in thous. CZK/ha)	2.65	50.94	2.65	488.04	2.79	65.31	1.46	72.57
VK (in thous. CZK/ha)	25.42	54.60	18.64	77.38	34.48	56.45	26.89	-29.85
Total subsidies (in thous. CZK/ha)	4.81	90.01	5.14	96.44	5.46	72.47	5.27	29.45
Direct payments (in thous. CZK/ha)	4.06	111.52	4.18	113.62	4.35	96.25	3.89	71.42
AEO (in thous. CZK/ha)	0.47	18.08	0.63	26.93	0.61	-23.25	0.66	-26.82
LFA (in thous. CZK/ha)	0.14	242.95	0.09	-14.08	0.14	2.55	0.25	-73.13
PRV (in thous. CZK/ha)	0.05	x	0.12	x	0.19	x	0.07	x
Revenue profitability with subsidies	3.93	-64.62	4.27	442.07	5.46	40.60	5.50	1116.79
Revenue profitability w/out subsid.	-10.35	161.83	-11.83	-4.70	-7.50	-36.22	-10.01	63.91
Indebtedness of businesses	72.88	-25.68	62.16	-26.48	51.85	29.97	46.62	7.76

Source: Own processing

of costs, small businesses were the hardest hit, with an increase in service consumption per hectare of almost 30%.

The highest added value per hectare was achieved among small businesses, followed by large businesses. The largest businesses, converted to a per hectare basis, achieve the lowest added value. Specifically this size category showed a decline in the added value converted to a per hectare basis. Wage costs range from CZK 2,600 per hectare among mid-size businesses up to CZK 5,000 per hectare among small businesses. Depreciation of long-term assets converted to a per hectare basis also decrease with the hectare area of land.

On the basis of the average values of cost items, such as service consumption, wages and depreciation, it may be stated that the largest businesses, as compared to small businesses, achieve savings through economies of scale. However, such fact is not reflected in the economic result. As the operating economic result when converted to a per hectare basis is the lowest among the largest businesses (CZK 2,500 per hectare) and the highest among the smallest businesses (CZK 3,800 per hectare). Therefore, the economic result per hectare goes down with growth in the hectare area. An increase in the operating economic result per hectare occurred among businesses of all size categories. The financial economic result is negative among businesses of all size categories. The total economic result per hectare is also the lowest among businesses with the largest hectare area, and ranges at a level from CZK 2,700 per hectare to CZK 2,800 per hectare among the other size categories.

Direct payments grew the most among small and mid-size businesses, whereas growth was slower among the large and largest businesses. The growth of agro-environmental subsidies was only among small and mid-size businesses, whereas there was a decline among the large and largest businesses. RDP subsidies besides the said payments are primarily utilized by the large and largest businesses. The profitability of assets ranges at levels from 3.9% among small businesses up to 5.5% among the large and largest businesses. Without taking into consideration subsidies, the profitability of assets goes into negative numbers.

Inequality in the Distribution of Economic Result

Field production businesses in the Czech Republic are characterized by a significant inequality in the economic result for the accounting period. The average value of the Gini coefficient, quantified from values of the indicator of the economic result for the accounting period (ERAP) in the CZK thousands per business, achieves a level of 0.84 points within the analyzed period. The value

of the Gini coefficient determined according to the economic result in CZK thousands per hectare then achieves 0.83 points, see Tab. II. Both confirms hypothesis H_1.

In terms of development in time, significant fluctuation of inequality is evident, with the lowest value of the Gini coefficient in the year 2007. For the analyzed period overall, the Gini coefficient shows a decline of 0.046 point for the economic result in CZK thousands per business. In the case of the Gini coefficient determined according to values converted to a per hectare basis, that decline is more substantial, specifically by 0.078 point.

The difference between the values of the Gini coefficients is relatively low within the analyzed period. It fluctuates from 0.001 to 0.043 points. In averaging the values of the Gini coefficient for the individual years, the difference between the said indicators can be considered negligible.

The choice of indicator also just slightly affects the values of elasticities of the Gini coefficient, as seen in Tab. II on the example of the effect of total subsidies (TS) on the inequality of economic result for the accounting period.

Both methods lead to the conclusion that subsidies just very slightly contribute to a decline in the inequality of economic result. The use of the indicator quantified per hectare just slightly overvalues the effect of subsidies, but, nevertheless, the difference is, on average, only at a level of 0.0009 percentage points.

Thus, the effect of the size of the business on the inequality of the economic result does not appear to be significant. For further verification, the set of businesses was divided up into four size categories according to hectare area and the Gini coefficients of the economic result were calculated for each category separately, see Tab. III. In addition, the division into more homogenous groups enabled the

II: *Gini coefficients and elasticity of the effect of total subsidies on economic result*

	Gini Coefficients			Elasticity		
	ERAP per Business	ERAP per Hectare	Difference	TS per Business	TS per Hectare	Difference
2005	0.8778	0.9205	-0.0426	-0.0058	-0.0040	-0.0018
2006	0.8871	0.8569	0.0302	-0.0073	-0.0094	0.0021
2007	0.6722	0.6523	0.0199	-0.0070	-0.0104	0.0034
2008	0.8149	0.7749	0.0400	-0.0060	-0.0085	0.0025
2009	0.9550	0.9536	0.0014	-0.0058	-0.0048	-0.0010
2010	0.8318	0.8428	-0.0110	-0.0061	-0.0065	0.0004
Average	0.8398	0.8335	0.0063	-0.0063	-0.0073	0.0009

Source: Own processing

III: *Gini coefficient of analyzed categories*

	Small		Mid-size		Large		Largest	
	Average	Index	Average	Index	Average	Index	Average	Index
Economic result for the accounting period	0.890	1.011	0.797	0.800	0.700	0.916	0.786	1.271
Operating economic result	0.842	1.019	0.789	0.767	0.669	0.813	0.708	1.101
Services	0.498	1.198	0.308	0.780	0.396	0.886	0.344	0.631
Service consumpt.	0.426	1.283	0.262	0.671	0.328	0.980	0.323	0.660
Total subsidies	0.317	0.792	0.223	0.926	0.184	1.052	0.309	0.814
Direct payments	0.277	0.783	0.156	0.759	0.150	1.281	0.294	0.621
LFA subsidies	0.941	1.005	0.916	1.014	0.889	1.037	0.743	0.920
SOT subsidies	0.648	1.006	0.809	1.024	0.761	1.006	0.831	1.272
RDP subsidies	0.481	x	0.723	x	0.690	x	0.826	0.858
AEO subsidies	0.805	1.041	0.689	1.175	0.520	0.880	0.405	1.231
HV without LFA	0.902	1.020	0.812	0.800	0.722	0.909	0.775	0.966
HV without SOT	0.894	1.002	0.814	0.780	0.725	0.916	0.778	1.019
HV without AEO	0.930	1.010	0.873	0.836	0.786	0.829	0.839	0.992

Source: Own processing

Note: RDP subsidies were not drawn by the analyzed categories of businesses within the same period, and thus the average is determined and the index is quantified only for the category of the largest businesses, which had been drawing them since 2007.

definition of factors that could have a share in the given inequality.

Tab. III shows that even after the creation of size categories, the inequality in the distribution of profit remains relatively high. In the case of small businesses, it is actually even above the average for all businesses and the period (0.8398); the remaining categories are below this average. Of all of the analyzed categories, the average value of the Gini coefficient of the economic result for the economic period was the highest among small businesses. The said fact was a result of not only the operating activity of small businesses, but also the remaining area of financial and exceptional activities, for which it was not possible to quantify the Gini coefficient because of negative averages, however.

In terms of the operating area, the said category shows a slightly higher inequality of services than service consumption, whereby the inequality of both indicators within the analyzed period shows an increasing tendency. As compared to the other categories, the distribution of all subsidies has the least equal distribution. Small businesses differ the most in the drawing of payments for LFA and agro-environmental subsidies. The above is caused by a low representation of farms operating in less favorable areas. Out of the analyzed small businesses, only 16% farm on land in an LFA area.

Further, on the basis of Tab. IV, it can be stated that, among the category of small businesses, the inequality in the economic result is not affected by the hectare area, or by the volume of subsidies drawn, but by the ability of the business to generate added value, the average amount of which differs significantly between the first and last quartile. The unsubstantial effect of subsidies on the inequality of the economic result is also evidenced by the elasticities set out in Tab. V.

In the case of mid-size businesses, a decline in the inequality of the economic result occurred within the analyzed period, see Tab. III. As compared to the other categories, there is very little inequality here among businesses in terms of their services and service consumption. Additionally, a trend of gradual convergence can be seen here. Subsidies are also characterized by balanced distribution, primarily in the case of direct payments. The greatest inequality, just as in the case of the previous

IV: *Characteristics of analyzed categories in quantile segmentation in the year 2009*

			ERAP [CZK thous.]	Number of workers	Land area [ha]	Fixed assets [CZK thous.]	Current assets [CZK thous.]	Added value [CZK thous.]	Total subsidies [CZK thous.]
Small	I.	Average	-1467.9	4	328.7	9068.2	6617.2	-401.9	1999.2
		Direct. Deviation	1208.0	4	97.9	10662.9	4115.8	1878.1	1253.1
	IV.	Average	3554.5	20	307.5	19710.9	20966.3	7408.8	1950.6
		Direct. Deviation	3716.8	40	103.9	26962.4	23051.2	17614.4	1867.0
Mid-size	I.	Average	-2902.5	8	720.9	17735.1	13121.2	-740.2	4379.6
		Direct. Deviation	2162.6	12	168.9	22101.3	5765.5	4773.4	1610.1
	IV.	Average	5247.6	16	738.0	23350.4	18362.0	4049.7	4421.2
		Direct. Deviation	2725.7	12	126.6	12518.8	10361.8	3880.6	2337.1
Large	I.	Average	-4967.5	31	1212.3	44247.5	37092.8	832.0	7782.6
		Direct. Deviation	4239.1	26	217.3	44017.1	20932.7	14152.5	1982.3
	IV.	Average	7642.1	53	1526.1	74546.4	58373.3	22127.3	11075.2
		Direct. Deviation	3870.5	86	221.0	76219.3	18975.7	33817.5	6672.6
Largest	I.	Average	-3533.0	49	2142.1	56346.0	37398.7	153.0	8711.1
		Direct. Deviation	1609.2	45	127.7	46472.0	14502.5	1357.0	8623.3
	IV.	Average	3364.5	130	4953.0	141984.0	113356.0	23230.0	25726.0
		Direct. Deviation	1453.1	69	204.1	119658.0	84551.6	29728.2	6107.2

Source: Own processing

V: *Average values of elasticities of the Gini coefficients of the economic result*

	Small	Mid-Sized	Large	Largest
Total Subsidies	-0.00464	-0.00873	-0.01009	-0.01220
PP	-0.00396	-0.00729	-0.00805	-0.00824
AEO	-0.00046	-0.00111	-0.00124	-0.00185
LFA	-0.00014	-0.00020	-0.00028	-0.00135
SOT	-0.00005	-0.00013	-0.00025	-0.03094

Source: Own processing

category, is seen in the case of subsidies for LFA. In terms of the effect of hectare area and the volume of subsidies paid, similar conclusions can be stated as in the case of small businesses. The above disproves hypothesis H_2. Neither is the difference between the average value of the analyzed quartiles significant among indicators of fixed and current assets. In terms of the factors of production, the businesses are relatively similar to one another, but, nevertheless, they generate a different added value, likely as a result of a differing level of success in the assertion of the created production on the market.

Large businesses can be characterized as having the lowest inequality of the economic result of all of the size categories, see Tab. III. Services and service consumption among large businesses are not as equally distributed as among mid-size category businesses. A greater dissimilarity is also evident in the area of land farmed, as well as in the total assets, see Tab. IV. For the said category, we thus see the increasing effect of the hectare area and volume of drawn subsidy resources on inequality in the distribution of the economic result. The growing effect of subsidies on the reduction in inequality of the economic result is also evidence by the values of elasticity in Tab. V.

The largest businesses, as compared to the large ones, show a greater inequality in the distribution of economic result, but with a lesser inequality of services as well as service consumption. However, the factors of production utilized within them differ significantly. Inequality is thus seen as a consequence of a differing level of compensation of the factors of production, management as well as investment activity.

The effect of subsidy policy on reducing inequality is the most significant in the said category. Here, subsidies for the support of the common organization of the market, which are utilized the most specifically by the largest businesses in view of their availability of storage space, appear to be the most effective.

Overall, in terms of the effect of subsidies on economic activity, it may be stated that subsidies contribute to a reduction in inequality in the distribution of economic result, see Tab. V. However, their effect is very small, although it does grow along with the increasing size of the business. In all size categories of businesses, direct payments contribute to a reduction of inequality in economic result, specifically, most significantly out of the analyzed categories of subsidies. Hypothesis H_3 is thus dismissed. The strength of the effect of direct payments is likely given by their high proportion among the received subsidy payments.

Of the other categories, agro-environmental subsidies contribute more significantly to reducing inequality than do LFA subsidies. The smallest effect on reducing inequality is had by subsidies for the support of the common organization of the market, but with the exception of the category of the largest businesses. The above confirms the H_4 hypothesis.

DISCUSSION

The distribution of the economic result among the analyzed field production businesses is significantly unequal. The Gini coefficients for the economic result indicator converted to a per business basis and converted to a per hectare basis achieve values of 0.84 and 0.83 points. Similar conclusions were also reached by Witzke and Noleppa (2006), who conducted an analysis of the inequality in the economic result of 481 businesses (legal entities) in Germany. If, on the basis of the construction of income from agricultural activity according to FADN, we proceed from the similarity of the categories of profit and agricultural income, then Severini and Tantari (2012) also reach similar conclusions. This conclusion is not surprising. The economic result is not only strongly affected by the size of the business, the ability of the management, and the investment activity of the business, but also by the weather and exceptional events.

The finding that subsidies have a slight share in the reduction of inequality of income contradicts the publication of Schmid *et al.* (2006) and, on the other hand, supports the conclusions of Benni and Finger (2012) or Severini and Tantari (2012). The authors also reach the conclusion that direct payments paid out within the first pillar reduce inequality in income. The reason is that the inequality in the distribution of subsidies is lesser than the inequality in the distribution of income that is generated by the market itself. They also state that their effect on the balancing of income is derived from the fact that they have little correlation to income level.

In terms of subsidies within the second pillar (LFA and agro-environmental subsidies), Severini a Tantari (2012) reach the conclusion that they have a much more unequal distribution and also that they have a lesser share in the total income of the business. Their effect on income inequality is therefore negligible. They emphasize that any reduction in direct payments within the first pillar will bring about an increase in inequality in the distribution of income. Also, transfers of resources from the first pillar to the second pillar do not have to lead to a greater balance in income.

CONCLUSION

The submitted article defined a high inequality in the distribution of the economic result among field production businesses in the Czech Republic. However, a direct correlation between the size of the business and the size of the economic result was not established here. The account data shows that although the largest businesses achieve savings through economies of scale, they are not able to convert them into subsequent profit. Despite the fact that the average amount of the economic result

of small and the largest businesses in values per business and per hectare thus differs significantly, it is not possible to define significant differences among the quantified values of the Gini coefficients. Therefore, in further analyses, the results of the Gini coefficients from values per business and values per hectare can be considered comparable. The effect of size was not positively established even on the basis of the quantification of the Gini coefficients for homogenous groups of businesses in terms of hectare area, because even businesses with a comparable hectare area showed significant differences in economic result. The disparity in the economic result is thus not based on the variability of the factors of production that the businesses have available, but rather on the ability of their management.

CAP instruments in the form of subsidies do not have a significant effect on the distribution of economic result either. The quantified elasticities do show a positive redistribution effect, but, nevertheless, its strength is very low. Primarily the effect of direct payments appears to be surprising, as they, despite being primarily comprised of subsidies tied to farmed land, contribute to the balancing of economic result. The effect of the analyzed subsidy titles grows stronger along with the growing size of the analyzed businesses, and thus it may be expected that setting any ceilings for direct payments will have a negative effect on the distribution of economic result within businesses of over 1000 hectares. The specific impact requires a more detailed analysis, which will be the subject of further research.

SUMMARY

The goal of the submitted article is to analyze inequality in the distribution of the economic result among businesses engaging in field production in the Czech Republic and to assess the impact of subsidies on the said inequality. A partial goal is the assessment of the effect of selected factors on the economic result and its distribution. Last but not least, the article also deals with the distortion of the rate of inequality as a result of a failure to take into consideration the size heterogeneity of the analyzed businesses. From a methodical perspective, the assessment of inequality is based on the quantification of the Gini coefficient and its adjusted version. The effect of subsidies on the distribution of the economic result is analyzed with the utilization of the elasticity of the Gini coefficient. The data basis are the accounting data of 140 agricultural businesses that engage in field production, acquired from the Creditinfo Company Monitor database and database of the State Agricultural Intervention Fund for the period of the years 2005–2010.

The results evidence a high inequality in the distribution of the economic result among field production businesses in the Czech Republic. The Gini coefficient for the analyzed period shows an average level of 0.84 points. The conducted analysis shows that the said inequality is not a result of the differing size of individual businesses, nor of the variability of the other factors of production that businesses have available, but rather of the ability of their management. CAP instruments in the form of subsidies do not have a significant effect on the distribution of the economic result either. The quantified elasticities do show a positive redistribution effect, but, nevertheless, its strength is very low. The elasticity of all of the analyzed subsidies on average in the analyzed period only achieved a value of –0.0063%. Evidently surprising is primarily the effect of direct payments, which, despite the fact that they primarily consist of subsidies tied to farmed land, contribute to the balancing of the economic result. The effect of the analyzed subsidy titles grows stronger with the growing size of the analyzed businesses. The largest businesses show a 0.0043 percentage point higher elasticity of direct payments than small businesses. From the said viewpoint, it may be assumed that any ceilings set for direct payments will have a negative effect on the distribution of the economic result within businesses of over 1000 hectares.

Acknowledgement

The knowledge contained in the article arose out of MSM 6046070606 "The Economy of Resources in Czech Agriculture and Their Effective Utilization within Multifunctional Agricultural-Food Systems".

REFERENCES

ALFARO-NAVARRO, J. L., MONDÉJAR-JIMÉNEZ, J., VARGAS-VARGAS, M., GÁZQUES-ABAD, J., JIMÉNEZ-GUERRERO, J. F., 2011: The Effects of The Distribution of Agricultural Direct Payments. *Review of Business Information Systems*, 15, 5: 25–30. ISSN 1534-665X.

ALLANSON, P., 2003: CAP Reform and the Distribution of Farming Income in Scotland. In: *Working Paper No 147.* Dundee: Department of Economic Studies, University of Dundee. ISSN 1473-236X.

BENNI, E. N., FINGER, R., 2011: The effect of agricultural policy reforsms on income inequality

in Swiss agriculture [online]. In: *Contributed paper at the EAAE 2011 Congress "Change and Uncertainty"*, Zurich. [cit. 2012-20-08]. URL: <http://ageconsearch.umn.edu/bitstream/114346/2/El%20Bennin_Nadja_548.pdf>.

BERREBI, Z. M., SILBER, J., 1985: The Gini Coefficient and Negative Income: A Comment. *Oxford Economic Papers*, 347, 3: 525–526. ISSN 0030-7653.

BOISVERT, R. N., RANNEY, C., 1990: Accounting for the importace of non-farm family income inequality in New York. *Northeastern Journal of Agricultural Economics*, 19: 1–11.

DEPPERMANN, A, GRETHE, G., OFFERMANN, F., 2010: Farm Level Effects of EU Policy Liberalization: Simulations Based on an EU-Wide Agricultural Sector Model and a Supply Model of the German Agricultural Sector [online]. In: *Contributed paper at the 114th EAAE Seminar "Structural Change in Agriculture"*, Berlin. [cit. 2012-20-08]. URL: <http://ageconsearch.umn.edu/bitstream/61083/2/deppermann.pdf>.

FRAWLEY, J. P., KEENEY, M., 2000: The Impact of Direct Payments on Farm Income Distribution [online]. In: *Project Report (Project No. 4656).* [cit. 2012-25-08]. URL: <http://www.teagasc.ie/research/reports/ruraldevelopment/4656/eopr-4656.pdf>.

HENNINGSEN, A., KUMBHAKAR, S., LIEN, G., 2011: Econometric Analysis of the Effects of Subsidies on Farm Production in Case of Endogenous Input Quantities [online].. In: *Contributed paper at the EAAE 2011 Congress "Change and Uncertainty"*, Zurich. [cit. 2012-25-08]. URL: <http://ageconsearch.umn.edu/bitstream/114548/2/Henningsen_Arne_654.pdf>.

CHEN, CH.-N., TSAUR, T.-W., RHAI, T.-S., 1982: The Gini Coefficient and Negative Income. *Oxford Economic Papers*, 34, 3: 473–478. ISSN 0030-7653.

KEENEY, M., 2000: The distributional impact of direct payments on Irish farm incomes. *Journal of Agricultural Economics*, 51, 2: 252–265. ISSN 1477-9552.

MALÁ, Z., ČERVENÁ, G., ANTOUŠKOVÁ, M., 2011: Analysis of the Impact of Common Agricultural Policy on Plant Production in the Czech Republic. *Acta Universitatis Agriculturae et Silviculturae Mendeleianae Brunensis*, LIX, 7: 237–244. ISSN 1211-8516.

MISHRA, A., EL-OSTA, H., GILLESPIE, J. M., 2009: Effect of agricultural policy on regional income inequality among farm households. *Journal of Policy Modeling,* 31: 325–340. ISSN 0161-8938.

MOREDDU, C., 2011: Distribution of Support and Income in Agriculture [online]. In: *OECD Food, Agriculture and Fisheries Working Papers*, 46, OECD Publishing. [cit. 2012-18-08]. URL: <http://dx.doi.org/10.1787/5kgch21wkmbx-en>.

SEVERINI, S., TANTARI, A., 2012: How direct payments and thein reform have affected farm income inequality in Italy? [online]. In: *1st AIEAA Conference „Towards a Sustainable Bio-economy: Economic Issues and Policy Challenges.* [cit. 2012-20-08]. URL: <http://ageconsearch.umn.edu/bitstream/124099/2/Severini Tantari_How%20direct%20payments%20and%20their%20reform%20have%20affected%20farm%20income%20inequality%20in%20Italy.pdf>.

SCHMID, E., SINABELL, F., HOFREITHER, M. F., 2006a: *Direct payments of the CAP –distribution across farm holdings in the EU and effects on farm household incomes in Austria* [online]. [cit. 2012-21-08]. URL: <http://franz.sinabell.wifo.ac.at/papers/DP-19-2006.pdf>.

SCHMID, E., HOFREITHER, M. F., SINABELL, F., 2006b: *Impacts of CAP Instruments on the Distribution of Farm Incomes – Results for Austria.* In: *Diskussionspapier*, 13. [online]. [cit. 2012-25-08]. URL: <http://franz.sinabell.wifo.ac.at/papers/DP-13-2006.pdf>.

STUART, A., 1954: The Correlation Between Variate-Values and Ranks in Sample from a Continuous Distribution. *British Journal of Statistical Psychology*, 7: 37–44. ISSN: 2044-8317.

VON WITZKE, H. and NOLEPPA, S., 2006: *Distributive Effects of Direct Payments in German Agriculture under the New Common Agricultural Policy of the European Union* [online]. [cit. 2012-26-08]. URL: <http://www.agrar.hu-berlin.de/fakultaet/departments/daoe/ihe/Veroeff/GMF_final_Engl_Distr.pdf>.

Address

Ing. Gabriela Trnková, Ph.D. Katedra ekonomiky, Provozně ekonomická fakulta, Česká zemědělská univerzita v Praze, Kamýcká 129, Praha 6, 165 21, Česká republika, e-mail: trnkovag@pef.czu.cz