

INCOME DIFFERENTIATION OF AGRICULTURAL HOUSEHOLDS IN REGIONS OF CZECH REPUBLIC

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Received: November 30, 2011

Abstract

PROCHÁZKOVÁ, Z., PEPRNÝ, A., PRESOVÁ, R.: *Income differentiation of agricultural households in regions of Czech Republic*. Acta univ. agric. et silvic. Mendel. Brun., 2012, LX, No. 2, pp. 285–292

The Czech Republic has recently experienced phases of economic growth and periods of economic crisis. This fact affects the standard of living and household behaviour and affects the formation of life-style. This paper deals with the income situation of households. The main source of data is EU SILC survey from the years 2005 to 2008. The result of the enquiry and processing of primary data is information about the average income per household member, the poverty level and the number of households at risk of poverty. For the formulation of income differentiation is used Gini coefficient. Attention is paid to factors that affect income inequality (the number of household members, social group, and age). The analysis and subsequent problem solving of income inequality may be contributed with further analysis of empirical data of this type. Household income is one of the decisive factors determining the style of family life, their priorities, meeting their needs, and ensure-time activities. Differences between regions determine preferences and identify opportunities.

agriculture, income, differentiation of households, region, at-risk of poverty households, poverty line

Strategy for securing intelligent, sustainable and inclusive growth so called the Europe 2020, announced by the European Commission in early 2010 relates to the impact of recent global economic crisis and reveals the structural weaknesses of the European economy. It is related to the access to risky income groups and at risk of poverty.

The Commission provided all in all 5 goals to ensure the development, where one of them is an absolute reduction in the number of inhabitants at-risk of poverty.

An effective fight against poverty and social exclusion needs prevention at the level of reduction number of people at-risk of poverty, as well as mitigation, which means taking those who are already poor, out of poverty. Target group of this article, or agriculture households, represents this part of population, that has been at-risk of poverty for a long period of time / or by material deprivation and / or they have lived in a household with low work intensity. (Frazer, Marlièr, Nicaise, 2010). It is needed to result from the definition of measurable indicator already in the process of targets setting for

national and regional level. For the goal of regional and social inclusion, there is proposed a poverty indicator, which has a precise definition and methodology of the target group in the European Union and is used in this paper.

To monitor and compare the income situation and the population at-risk of poverty in different countries or regions, first it is necessary to quantify the extent of their poverty. It can be approached from two basic perspectives to quantify the poverty. In terms of assessing the availability of a certain minimum income level or minimum level of expenditures that are necessary for ensuring living standard needs of the population (Zelinsky, 2010).

The basic unit, when generating analysis related to assessments of the economic situation, is in most cases the household rather than individual subject. The main character of households is the high degree of income and expenditure sharing. Household represents bigger purchasing power; it means that the assessment at household level makes more sense than to measure the incomes of individuals separately (Hill, 2000).

The aim of this paper is to determine whether the income of agricultural households is dependent on the region to which agriculture household belongs or it is not. And also whether the region in which the agriculture household is situated, affects the income situation of households.

MATERIALS AND METHODS

For analysis of the income situation of agricultural households was used a survey called Living Conditions, which is a national modification of the all-European survey EU-SILC. Living Conditions Survey allows obtaining long-term comparable data on the social situation of households in each country and also the results of comparisons among EU Member States due to a unified methodology.

Data were collected in all regions. The sample plan was based on a random two-stage selection for each region, so the total number of households was selected proportionally to the size of individual regions.

The sampling unit is a flat and a person, which was resident in the apartment during the research. In the first step the census districts¹ were randomly selected, from which were subsequently chosen the apartments in some of them.

The main concern of this paper is the income derived from household living conditions of agriculture households, those households whose householder was employed or run business in the agrarian sector. These two are the variables following the characteristics of the EU-SILC:

1. Householder's Occupation
2. Householder's Employment sector.

Specific values of the variables defining the agricultural household are as follows:

Variable 1: Householder's Occupation

Values:

- technicians in the field of biology, health and agricultural professionals in related fields,
- skilled workers in agriculture, forestry, fishing, hunting,
- workers gaining the living in agriculture and fisheries (self-supplier),
- assistant and unqualified workers in agriculture, forestry, fisheries and related fields.

Variable 2: Householder's Employment sector

Values:

- agriculture, hunting and related activities,
- forestry, logging and related activities,
- fishing, fish farming and related activities within fishing.

It may lead to discussion, whether forestry and fishing are also agriculture. Because according to the OKEČ these are a different group of activities. According to the ČSÚ and its theory², which is due to the EU-SILC project binding, forestry and fishing are really in agriculture. Therefore, the authors of the article decided to analyse also industries including these professions.

From the above mentioned summary of data, there were qualified 190 agricultural households in 2005 and 424 agriculture households in 2008.

Disposable household income is used, in accordance with Eurostat methodology, for the purposes of international comparisons and for calculating poverty indicators. In terms of methodology used in the paper, there is one type of disposable income: equalised disposable income. Equalised disposable income is an indicator that respects the distribution according to the uniform size of household, i.e. for the first adult member a coefficient 1 is calculated, for second and other members of the household it is a coefficient 0.5, for children under 14 years a coefficient 0.3.

One of the main analyses is the analysis of income deciles, which was used in this paper. It is a method of determining the income situation of households and is based on comparing the income characteristics of the upper and lower deciles. The poverty line is based on theoretical knowledge of the income variables distribution, namely lognormal division, which allows estimating the proportion of income at risk of poverty such as median value of 0.6.

One of the main analyses is the analysis of income deciles, which was used in this paper, which is a method of determining the income situation of households and is based on comparing the income characteristics of the upper and lower deciles. The poverty line is based on theoretical knowledge of the distribution of income variables, namely lognormal division, which allows estimating the proportion of income at risk of poverty population such as median

1 Census district – in the first step were randomly chosen census districts within each region so that the number of chosen flats was proportional to the size of particular regions.

2 The term agriculture refers to a summary of A. all biological production (plant and livestock), and B. the direct processing of its products (agricultural industry). This duality, the production and the processing of primary products, appears in groups of terms subordinated to term of agriculture, that is: I. in agriculture, which is the cultivation of fields, meadows and pastures, and livestock production;
II. in forestry;
III. in horticulture, vegetable growing, fruit growing and viticulture;
IV. in the sliding sector, i.e. in the fish (or hunting), wildlife, furry animals, bees and silkworms breeding.

value of 0.6. In general, the share of income of at risk of poverty households (PPOD) is expressed as:

$$PPOD = \int_0^{0,6Med} \frac{1}{\sigma\sqrt{2\pi}} \exp\left\{-\frac{(\ln x - \mu)^2}{2\sigma^2}\right\} 2xdx.$$

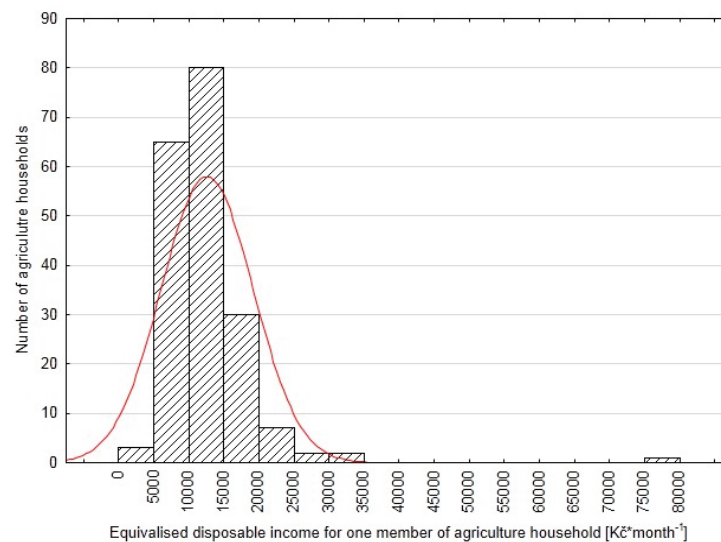
Where the essential indicator used to determine the reporting of income inequality is the Gini coefficient. To express its values mathematically, there is used relationship, where x_i is the cumulative value of the population variable and d_i is the income

$$\text{variable: Gini} = 0,5 - \int_0^1 F(x,d)dx.$$

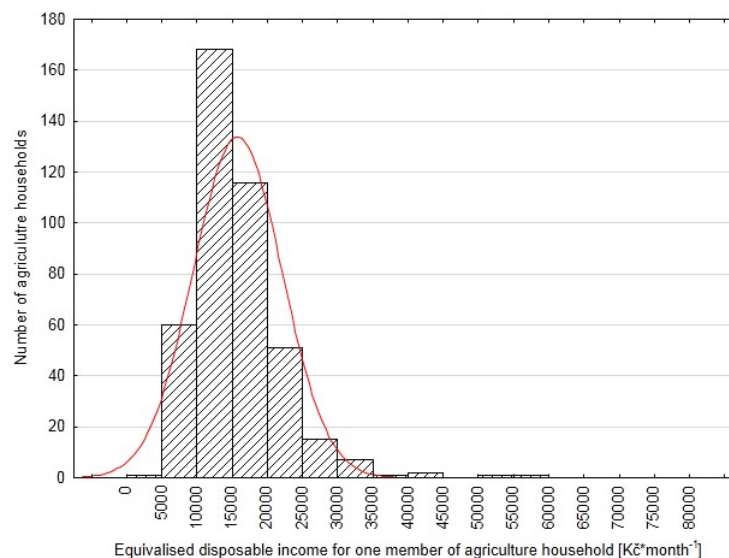
RESULTS AND DISCUSSION

The share of agricultural households in the total number of surveyed households was therefore 4.36 % in 2005 and 3.75 % in 2008. It corresponds to the data of the Czech Statistical Office on the share of agricultural labour in the total number of active labour.

The largest proportion of agricultural households was in the Vysočina Region in 2005 and in Plzeňský Region in 2008, the lowest proportion of agricultural households in the total number of agriculture households in both years was in the region of Prague. This characteristic thus indicates which of the regions in terms of households can be considered as the most represented agricultural households.



1: Division of income variable in 2005



2: Division of agriculture household income variable in 2008

A schematic overview of the income intervals in which the agricultural households operate, provide the following histograms in Fig. 1 and Fig. 2. Histograms show the average distribution of their monthly income, where the y-axis indicates the number of households ranked into particular interval of monthly income on one equalised member of household. Mostly the average income is in the interval 5 000–10 001 CZK (42 % in 2005 and 40 % in 2008). Income over 25 000 stated 1.6 %, resp. 5.3 % of households.

Agricultural households' income as well as income of households regardless the industry ranked mostly in both monitored periods the income interval 5 001–10 000 CZK. In 2008 agriculture households did not reach higher income than 25 000 CZK in the amount as the households regardless the industry did. On the other hand in 2008 greater volume of agriculture households reached the income higher than 25 000 CZK comparing to households regardless the industry.

Calculations of poverty indicators show that 9 % of agriculture households live in poverty, which in 2005 was 6,802 CZK per month and 7 % of households in 2008, which meant 8 736 CZK. It is listed in Tab. I. For comparison, 7 % in 2005, resp. 6 % of households in 2008 regardless the industry of householder, lived below the poverty line, which was 6 300 CZK per month in 2005 and in 2008 it was 7 679 CZK per month. The poverty line at the agriculture households was in both periods higher absolute value of poverty line in Czech Crowns per month, respectively in CZK per year to households regardless the industry. From relative terms there is a perceptible fact regarding the households at risk of poverty. In the examined period exists a higher amount of households at poverty risk comparing in households where they receive agriculture incomes to households regardless the industry.

From all the above mentioned indicators is evident a decline in number of agriculture households at poverty risk. During 2005 to 2008 declined the number of households at risk of poverty by 2 %.

It is interesting to compare these calculated values of poverty line with citizens' opinion survey, denouncing the level at which they perceive poverty. According to a survey by the STEM is in the opinion of respondents poverty line for a four-member

household is at the level of total income 18 500 CZK (i.e. 4 500 CZK per household member).

Basic information about the income situation of households in the regions of the Czech Republic are shown in the table below, first the households regardless industry of the householder, between 2005 and 2008 by region.

All comments and other derived characteristics in this paper relate to disposable equalised household income, which also allows international comparison. The average value of disposable income of the physical person is shown for the possibility of comparison of both characteristics.

From the data in the Tab. II is clear, that average value of income per capita in 2005 was 12 232 CZK, in 2008 then 14 627 CZK. So there is increase of 19.5%. 4 regions were above the average value of income in the Czech Republic in 2005: Praha Region, Středočeský, Liberec and Plzeňský Region, in 2008 there were also 4 regions just with one change-Liberec region was substituted by Vysocina. Median from the examined period increased by 21.9%, which means more favourable conditions during the period. It means that higher number of households reached the average value. In addition, the table shows that the lowest average income per capita was achieved in the Olomouc and Zlín Region in 2005, in 2008 Karlovy Vary, Olomouc and Pardubice Region. Median value confirms the lowest incomes in Olomouc and Zlín Region in 2005 and in 2008 in Olomouc Region and Karlovy Vary. With low average incomes and medians corresponds poverty line Zlín Region 5 948 CZK and Olomouc Region 5 987 CZK in 2005 and Olomouc Region 7 393 CZK and Karlovy Vary Region 7 385 CZK in 2008.

Furthermore, Tab. III with the same income indicators characterizing the income situation of agricultural households in the Czech Republic by region in 2005 and 2008 per capita.

In terms of average income is evident that the highest income of household was reached in both years in the Prague Region. We can also observe a significant increase in values of average income, which in this region from 2005 to 2008 amounted to 2,784 CZK, which represents 17 % of its original value. The increase of the average value of agricultural households in the Czech Republic reached almost one third of respondents, namely 32%, which is even higher than the increase in

I: Poverty line of agriculture households in the Czech Republic

No industry year/indicator	Poverty line [Czk/month]	Poverty line [Czk/month]	At risk of poverty households rel. formulation [%]	Gini coeff.
2005	6 300	75 600	6.8	0.26
2008	7 679	92 148	5.5	0.23
Agriculture household year/indicator	Poverty line [Czk/month.]	Poverty line [Czk/month.]	At risk of poverty households [%]	Gini coeff.
2005	6802	81624	9.1	0.21
2008	8736	104832	7.1	0.20

Source: EU-SILC

II: Income situation of households regardless the industry per capita stated in CZK

Region	2005					
	average fyz. [Czk/month]	average ekv. [Czk/month]	median [Czk/ month]	poverty line [Czk/month]	nubmer of at risk of poverty agricultural households – relative formulation [%]	Gini coefficient
Hl. město Praha	12 314	15 730	13 756	8 254	3	0.28
Středočeský	9 776	13 086	10 504	6 302	6	0.27
Jihočeský	8 671	11 582	10 632	6 379	4	0.19
Plzeňský	9 568	12 573	10 877	6 526	4	0.24
Karlovarský	8 595	11 358	10 144	6 086	8	0.20
Ústecký	8 663	11 564	10 295	6 177	11	0.24
Liberecký	10 181	13 416	10 730	6 438	6	0.31
Královéhradecký	8 641	11 675	10 291	6 175	7	0.23
Pardubický	8 170	11 356	10 566	6 340	7	0.19
Vysočina	7 901	11 260	10 403	6 242	4	0.20
Jihomoravský	8 472	11 236	10 111	6 067	7	0.22
Olomoucký	8 380	11 531	9 978	5 987	8	0.23
Zlínský	8 055	11 034	9 914	5 948	10	0.22
Moravskoslezský	8 658	11 627	10 061	6 037	10	0.25
Czech Republic	9 152	12 232	10 500	6 300	7	0.26

Region	2008					
	average fyz. [Czk/month]	average ekv. [Czk/month]	median [Czk/ month]	poverty line [Czk/month]	nubmer of at risk of poverty agricultural households – relative formulation [%]	Gini coefficient
Hl. město Praha	14 177	18 442	15 417	9 250	3	0.28
Středočeský	11 554	15 445	12 866	7 720	6	0.26
Jihočeský	10 660	14 515	13 271	7 963	4	0.21
Plzeňský	11 070	14 785	13 394	8 036	4	0.20
Karlovarský	10 254	13 699	12 308	7 385	8	0.21
Ústecký	10 993	14 476	12 522	7 513	9	0.25
Liberecký	10 353	14 031	12 783	7 670	5	0.21
Královéhradecký	10 363	14 228	12 646	7 588	4	0.21
Pardubický	10 089	13 779	12 416	7 450	4	0.20
Vysočina	10 512	14 614	13 062	7 837	4	0.21
Jihomoravský	10 298	13 931	12 458	7 475	7	0.22
Olomoucký	10 264	13 715	12 324	7 394	8	0.22
Zlínský	10 148	13 970	12 481	7 489	6	0.21
Moravskoslezský	10 498	13 918	12 611	7 567	6	0.21
Czech Republic	10 901	14 627	12 798	7 679	6	0.23

Source: EU-SILC

households regardless the industry for the whole Czech Republic, where it reached 16%. The increase of average income value for agricultural households can be seen in all regions, ranged from 12 to 19 percentage points.

Four regions of agricultural households reached above average income (CZK 12,513) across the Czech Republic in 2005: Prague, Pilsen, Karlovy Vary and Moravia. In 2008, there were also 4 regions: Prague, Central Bohemia, Pilsen, and South Bohemia. Only two regions were above the average income value in

both years – Prague and Pilsen. A significant change can be noticed at Karlovy Vary Region where was above the average in 2005, but in 2008 it belonged to those regions with the lowest relative income expression in relation to the whole Czech Republic (86%).

The median for reporting period increased by 28%, which is favourable situation during the reporting period and it means that the average value was reached by more households. It is evident from Tab. IV that the lowest equalised income per capita

III: The income situation of agricultural households in the CR in CZK per capita

Region	2005					
	average fyz. [Czk/month]	average ekv. [Czk/month]	median [Czk/ month]	poverty line [Czk/month]	number of at risk of poverty agricultural households – relative formulation [%]	Gini coefficient
Hl. město Praha	12 641	16 241	17 217	10 330	22	0.184
Středočeský	8 654	12 242	12 847	7 708	27	0.261
Jihočeský	8 930	12 492	11 499	6 899	5	0.145
Plzeňský	11 076	16 250	12 019	7 211	0	0.302
Karlovarský	10 415	12 977	13 647	8 188	0	0.107
Ústecký	7 409	11 042	10 734	6 440	25	0.233
Liberecký	7 950	11 330	10 291	6 175	0	0.167
Královéhradecký	8 060	12 097	10 840	6 504	0	0.142
Pardubický	8 146	12 179	10 542	6 325	0	0.170
Vysočina	7 559	11 063	11 027	6 616	17	0.170
Jihomoravský	7 627	10 633	9 099	5 459	0	0.250
Olomoucký	9 191	12 866	12 270	7 362	10	0.286
Zlínský	7 760	10 961	10 425	6 255	15	0.303
Moravskoslezský	9 269	12 771	11 867	7 120	4	0.133
Czech Republic	8 859	12 513	11 337	6 802	9	0.218

Region	2008					
	average fyz. [Czk/month]	average ekv. [Czk/month]	median [Czk/ month]	poverty line [Czk/month]	number of at risk of poverty agricultural households – relative formulation [%]	Gini coefficient
Hl. město Praha	14 348	19 025	18 805	11 283	11	0.159
Středočeský	11 569	16 587	14 936	8 962	6	0.202
Jihočeský	10 367	15 069	14 529	8 717	7	0.176
Plzeňský	13 023	17 797	15 883	9 530	5	0.216
Karlovarský	9 814	14 195	13 123	7 874	0	0.234
Ústecký	11 138	15 388	13 132	7 879	11	0.262
Liberecký	12 156	16 554	13 990	8 394	0	0.310
Královéhradecký	9 974	14 191	14 316	8 590	4	0.174
Pardubický	10 077	15 029	14 751	8 851	17	0.156
Vysočina	10 389	15 559	14 587	8 752	3	0.197
Jihomoravský	9 917	14 280	13 190	7 914	4	0.193
Olomoucký	9 445	14 179	14 326	8 596	9	0.188
Zlínský	10 918	16 215	15 876	9 526	12	0.165
Moravskoslezský	11 566	16 173	15 138	9 083	12	0.193
Czech Republic	10 950	16 537	14 560	8 736	7	0.202

Source: EU-SILC

was reached in Usti nad Labem and Zlín Region in 2005 and in Karlovy Vary, Hradec Králové, Olomouc and South Moravia in 2008.

From the analysis results of the paper results that the average income values according to equalised member of households with the agriculture income, developed similarly as in the case of households regardless the industry of householder. In terms of the income situation of agricultural households but also households regardless the industry of householder can be said that in each region of the

Czech Republic there are areas that can be classified as areas with permanently higher and areas with consistently lower incomes above/below the average.

From the comparison of household income regardless the industry and agricultural households income in different regions results that regions of the capital city of Prague, Central Bohemia and Pilsen had incomes above the average (regardless industry or agricultural activities) during the reporting period.

The households with the lowest incomes during the reporting period are in regions of Olomouc, Zlin and Carlsbad, again irrespective to agriculture household or household regardless the industry. From the analysis examining the segment data is evident that the income may be affected not only by the industry, from which flows the income to the householder, but also by the region and its dependence on it.

In accordance with Bartosova, the dependence of income amount and possibly of the risk-of-poverty rate depends on various factors of described household.

Its assessment is based on the results of multidimensional design risk models of monetary poverty in the Czech Republic and Slovak Republic. One of the factors that stand at the heart of EU countries interest is the detection of differentiation (or polarization) among the individual regions based on the construction of models that belong to a group of fixed parameters characterizing the individual households also a random factor - the region. To design risk of poverty models with one random and several fixed factors, there was used logistic regression with mixed effects. To design risk of poverty models of Czech households, there was used Generalised Linear Mixed Model (Cullagh, Searle, 2001). Specifically, it was Logistic Mixed Effect Model. Results are sorted in ascending order, i.e. from the region, which reduces the most the country risk of poverty (cf. = 1) up to region that means the greatest risk of poverty for the households. The following table shows how the ranking of regions gradually changed in this four-year period (Bartosova, 2010).

From the results inducted in Tab. IV is evident, that the situation in the Czech Republic was very stable on the both sides of spectrum in the period

2005–2008. According to expectations, the most positive one was in Prague Region. Pilsen Region had also very good influence on standard of living. Pilsen Region even exceeded Prague in 2008 when modelling random effects due to GLMM. (Prague was on the 4th place) Olomouc Region was the least positive during the 4 years period. Moravia-Silesian Region occurred steadily on the unfavourable side of spectrum (usually on the semi last place). Authors of the paper reached the same results using the methodology, where for life standard determination of household was used the poverty line. The poverty line comes out of theoretical division knowledge of income variable, particularly from the lognormal division. It allows to assess an income risk share of the population as 0,6 of median value.

From the result of income level dependence analysis of households with region random factor due to GLMM arises the region influence on the households' standard of living acc. to Bartosova. For households at poverty risk in the Czech Republic was used Generalised Linear Mixed Model (Cullagh, Searle, 2001) with mixed effects. The results come from the specification of regional differences, despite the fact that the characteristics of households and individuals living in them are determinant for their differences.

The differences among regions exist especially due to the diverse social policy, specifics of regional labour markets or because of particularity of their structure. On one hand these differences should be explained by relations between income poverty and deprivation of multiple indexes, on the other hand the transformation of these differences leads to cooperation enforcement and coordination of some regional policy in order to ensure the certain level of equality (Aylal, Jurado, Pérez, 2011).

The Czech Republic (further CR) has experienced a long term practises with a region division which led to the equality of regions in CR. However, there exist some differences on the level of regions (NUTS III), especially between Prague and the other regions of the Czech Republic. These differences, especially in the economic capacity, have increased within last few years. The region differences topic gained ground of many authors interest due to the fear of differences deepening in individual regions considering the economic capacity. Authors differ in individual approaches to the economic capacity of regions, their indicators and factors, which influence this capacity. From this reason the authors of article present a solution proposal aimed at key success determination, which influences the economic capacity of regions in the Czech Republic. The contribution of this solution is the determination of key factors influencing economic capacity of regions, creation of economic capacity assessment method thanks to general index and evaluation of economic capacity of individual regions (NUTS III) in the Czech Republic. The proposed solution will be a subject of further authors' examination.

IV: The order of regions influence at the risk of monetary poverty of households in the Czech Republic in 2005–2008

CZ	Region	2005	2006	2007	2008
11	Hl. město Praha	1	1	1	4
21	Středočeský	5	5	4	8
31	Jihočeský	3	8	5	7
32	Plzeňský	4	2	2	1
41	Karlovarský	7	10	8	11
42	Ústecký	10	13	10	9
51	Liberecký	2	6	9	3
52	Královéhradecký	9	4	3	2
53	Pardubický	11	9	11	5
61	Vysočina	8	7	7	6
62	Jihomoravský	6	11	6	13
71	Olomoucký	14	14	14	14
72	Zlínský	12	3	12	10
81	Moravskoslezský	13	12	13	12

Source: The Comparison of monetary region poverty in the Czech Republic and Slovakia (Bartošová, 2010)

CONCLUSION

The article deals with the issue of agriculture households' income differentiation in individual regions of the Czech Republic. The analyses itself are related to previous contemplation about emergence and dynamics of income disparities in our country. They focus on the method of interviewers' determination, characteristics of the group with the stress on the income variable.

The goal of the article is to analyse the main indicators generated by the SILC project, reflecting household income situation in the individual regions. The second goal is focused on the development comparison and determination of specifications or income development differences of agriculture households and households regardless the industry in the individual regions where the income flows to the householder.

From the analysis results of assumed article implies that according to the average income value per equalised householder, the household income developed similarly in the individual countries as it was at households regardless the industry of householder. From the income situation of agriculture households' point of view, but also considering the households regardless the industry

of householder in individual regions, it is possible to assume that in the Czech Republic exist areas which may be classified as higher income areas as well as lower income areas over the average value. These results, where in order to set the standard of households' living, authors come from knowledge of theoretical income variable division, that influences the assessment of the income share of population at risk as 0.6 of median value, are compared in the article with the results of income level dependence analysis of households and with random region factor through the design of multidimensional risks of monetary poverty models acc. to Bartosova.

When comparing the results using the above mentioned methodological apparatus and the results of GLLM analysis acc. to Bartosova, it is possible to assess the region influence on the standard of living of households regardless the industry providing the income to a householder.

The results flowing from regional differences division, despite the fact that characteristics of household or individuals, living in them are determinant for their differences, the differences among the regions exist. It is because of their diverse social policy, specification of regional labour markets or through their particularity of the structure.

SUMMARY

Nowadays the share of agriculture households on the total number of households in the Czech Republic represents 4%. These households have lower incomes and they are one of the household types, which can be at risk of poverty. The analysis of particular groups and their income situation is the subject of interest of many institutions. The aim of this article was to determine the income situation of agriculture households in the particular regions of the Czech Republic, in order to compare their situation with the households regardless the industry providing the income to a householder in the particular regions. And due to this comparison to ascertain whether the income situation of agriculture households in particular regions developed similarly as at the households regardless the industry or it did not. By this ascertainment the authors of the article want to emphasize the relevance of regional differences and their influence on the households' living standard despite the fact that the characteristics of households and individuals living in them are determinant for their differences.

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