A C T A U N I V E R S I T A T I S L O D Z I E N S I S
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SPATIAL DIVERSITY OF POVERTY IN POLAND

1. INTRODUCTION

Poverty is a major problem both in the individual and the social dimension. Defining it is essential for measuring the characteristics of poverty. In the literature, poverty is linked to the inability to meet certain requirements at the desired level (Panek 2011). This approach is widely accepted, but it is not sufficient to expressly identify poor households because it does not specify which needs should be taken into consideration and what level of meeting them is to be considered desirable.

Historically, the first widely-approved definition of poverty is the one elucidated in 1901 by S. B. Rowntree, who says that poverty is the inability to meet basic needs (Topińska 2008). The above definition reflects the concept of absolute poverty and was based on the works of the Material School of Poverty, which equated prosperity with income level (Panek 2011). This is why the approach to the understanding of poverty is considered to be a classical one. The existence of poverty in a given community is most often connected with the relatively highly diversified income or material situation of its members. Thus, a concept of understanding poverty as the excessive diversification of living conditions of the society's members has been formulated. In this perspective, poverty is based on comparing the level that individual needs are met to the level that the needs of other members of society are met. The proponents of this approach were P. Townsend (1979) and A. B. Atkinson (1983). Poverty in relative terms is, therefore, the result of different levels of meeting needs in society, and its measurement is primarily a measurement of inequality.

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Critics of the relative approach suggests that it does not allow the establishment of a permanent reference point to analyse poverty changes in time and space, and thus greatly complicates the assessment of the effectiveness of social policies aimed at combating poverty. On the other hand, the absolute approach creates conceptual and methodological problems associated with choosing a set of needs which are to be met, specifying the desired level of meeting them and their valuable estimate (Wolf 2009). The advantages and disadvantages of both approaches to understanding of poverty have been pointed out by scholars such as J. E. Foster (1998) and S. Subramanian (2004).

The adoption of one of the above attitudes to its understanding is only the first step in the process of assessing a society's impoverishment. In the second step, the measurement method should be determined. Again, in the classical view of poverty (the extent to which needs are satisfied) this is measured objectively, i.e.: based on premises independent of the personal evaluation of the people who assess how needs are satisfied. The subjective approach developed since the 1960s assumes that the individual evaluates the level at which his or her needs are satisfied. The wide reading of the subjective approach to the measurement of poverty can be found in Ravallion (2012). Obviously, both the advantages and disadvantages of the two methods of measuring poverty can be shown, but the outlook on the issue of the impoverishment of society will be holistic only when both approaches are considered.

In order to determine the level of a society's impoverishment, one should first adopt the criteria of poverty, i.e. the measures used to assess the impoverishment of the society (its individual members). In the classical view, monetary ratios (income or expenses of individuals or households) are used. However, since the 1970s, other (non-monetary) factors that are symptoms of poverty have been considered. In this way, the analysis of poverty was initiated from the multi-dimensional perspective. More about multidimensional poverty can be found in Neff (2013).

This paper is aimed at evaluating the level and diversification of poverty in Poland territorially (provinces and classes of places of residence) and at identifying factors that influence the risk of poverty if varied levels of the poverty line are assumed. A classical approach based on determining the poverty threshold, as well as the approach using the function of belonging to a poverty zone based on the theory of fuzzy sets[1] were both used for this purpose. In both cases, poverty was considered from the monetary perspective.

[1] The fuzzy sets theory was proposed by L. A. Zadeh (1965).

2. DATA AND RESEARCH METHOD

To assess the degree of the poverty risk, individual data from the household budget research conducted by the Central Statistical Office (GUS) in 2012 will be used. The full data set included observations of 37 427 households. The budget research covered issues related to both the income and expenditure of households and their characteristics and characteristics of the household members. On this basis, there may be taken an attempt to determine the scope and depth of the impoverishment of society in its various sections by means of the classical and fuzzy approach.

In the monetary dimension, it should be determined whether the poverty risk analyses are to be based on household income or expenditure. In the case of household budget research in Poland, the observation period for household income and expenditure is one month. The short duration of the survey favours the more frequent registration of unusually high or low income of a household with respect to its permanent income. This causes disorder in the identification process of poor households. In this situation, it seems more appropriate to use the total expenditure of households in the monetary dimension of this poverty analysis. Households execute expenses primarily in relation to their permanent income, not transitory income, although, in this case, extraordinary expenses in a month can also be noted.

In this tract, total expenditure will be used to capture the monetary poverty risk of individual households and their groups. An equivalence scale (according to the Engel method) was set on this basis and on the basis of food expenditures, allowing for the conversion of the total expenditures of a household with a given number of members to the level of a single person household expenditure. The food expenditure method was also used to determine the poverty line value in the classical sense. The basic values of the extent and depth of poverty indicators obtained in this way became a reference for the relevant indicators in the fuzzy approach.

In terms of the monetary dimension of the fuzzy approach, a theoretical Burr XII distribution was used to estimate the distribution of equivalent expenditures.[2] On the basis of this theoretical distribution,[3] a monetary poverty sphere membership function was estimated using the integrated, fuzzy

[2] An extensive study of the theoretical income and expenditure distributions can be found in the work of Kleiber and Kotz (2003).

[3] The estimation of parameters of the Burr XII distribution allows the calculation of the distribution values of descriptive statistics as well as the value of the cumulative distribution function and Lorenz function.

and relative approach proposed by G. Betti, B. Cheli, A. Lemmi and V. Verma (2006). This function for the *i*-th household is as follows:[4]

$$\lambda_i(y^e) = (1 - F_i^{MI})^{\alpha-1}(1 - L_i^{MI}), i = 1, 2, ..., n, \tag{1}$$

with the empirical approach:

$$(1 - F_i^{MI})^{\alpha} = \left(\frac{\sum_{\gamma=i+1}^{n} w_\gamma}{\sum_{\gamma=2}^{n} w_\gamma} \right)^{\alpha}; (1 - L_i^{MI})^{\alpha} = \left(\frac{\sum_{\gamma=i+1}^{n} w_\gamma y_\gamma^e}{\sum_{\gamma=2}^{n} w_\gamma y_\gamma^e} \right)^{\alpha}, i = 1, 2, \ldots, n,$$

where: F_i^{MI} is the value of the equivalent income distribution function $F(y_i^e)$ for the *i*-th household; L_i^{MI} is the value of the Lorenz equivalent income distribution function $L(F(y_i^e))$ for the *i*-th household; w_γ and y_γ^e are respectively the value and the equivalent income of a household of γ rank in the equivalent income distribution in ascending order, and α is the parameter. In the case of applying a Burr Type XII distribution with the distribution function:

$$F(y) = 1 - \left(1 + \exp\left(a + b \ln y\right)\right)^{-c}, \tag{2}$$

where *a*, *b* and *c* are distribution parameters, the value of the Lorenz function is calculated based on the formula:

$$F(y) = 1 - I_x\left(c - \frac{1}{\gamma_1}, 1 + \frac{1}{\gamma_1}\right), \tag{3}$$

where $I_x(p,q)$ is an incomplete Beta function calculated in point $x = [1 - F(y)]^{1/c}$.

The aggregation of Function (1) leads to the monetary poverty risk range rate formula (Fuzzy Monetary Incidence – *FMI*):

[4] All formulas for various measures of poverty sphere membership relating to the multidimensional approach were taken from the works of Panek (2010; 2011).

$$FMI = \frac{\sum_{i=1}^{n} \lambda_i(y^e) w_i}{\sum_{i=1}^{n} w_i}, \tag{4}$$

where: w_i is the weight of the i-th household.

Parameter α mentioned above may be determined arbitrarily or calculated so that the *FMI* value for the tested community is equal to the poverty rate determined in the classical way. Both measures are similar and indicate the degree of poverty (danger of monetary poverty). Parameter α takes values higher or equal to the unit, and an increase in its value leads to a greater weight of the poorest households (with the lowest income or expenses).

The depth of monetary poverty risk rate (Fuzzy Monetary Depth – *FMD*) and the severity of the monetary poverty risk rate (Fuzzy Monetary Severity – *FMS*) can be determined in the same way. The poverty gap index (for *FMS* – poverty gap squared) calculated for every household is a starting point for the calculation of *FMD*. This requires the poverty threshold to be determined. Most frequently, the poverty line calculated according to the classical approach is used for this purpose and is another element that combines classical and fuzzy approaches. The further procedure of calculating the mentioned ratios in the fuzzy approach is the same as in the case of *FMI*.

Identifying poor households in the classical approach and determining the function of poverty risk in the fuzzy approach constitute the basis for analysing the impoverishment of local communities, e.g.: by provinces or classes of the household's location. This enables the identification of the factors that determine the danger of poverty in Poland. The level of poverty diversification by province will be determined based on the Gini coefficient and the Theil index. Factors that influence the development of poverty will be determined using the logit model.

3. EMPIRICAL RESULTS

As a result of the food expenditure method used to estimate the equivalence scale for total expenditure, an elasticity of scale was obtained due to the number of 0.704 individuals per household. On this basis, the total household expenditure for different compositions was determined so as to compare them with the expenditure of a single person household. In a further step, assuming that the limit share of food expenditure in total expenditure amounted to 28.08%,

32.39% and 35.17%, three poverty lines were determined for this household. These shares are associated with the evaluation of the households' income situation: for the first poverty line, this is expressed by the statement, "*we have enough money to cover the daily expenses, but we must save for more serious shopping*"; for the second line, that the household income situation is such that they must economise on a daily basis; and in the case of the third poverty line, income does not suffice to fully meet even basic needs. Ultimately, the line for single person households amounted to PLN 1 128.79 for first line, PLN 929.62 for the second and PLN 809.06 for the third poverty line. It was on this basis, in the classical approach, that the poverty rate, poverty depth and poverty severity for the society in general were counted. The values of these measures were used to assess poverty sphere membership function parameter vis-à-vis the extent, income gap and squared income gap in terms of monetary factor. In this way, poverty sphere membership function values can be determined for each household in terms of the range, depth and severity in the monetary factor dimension, which in turn allows for the aggregation of these values for social groups by the poverty range, depth and severity indicators. The results of the procedure described above regarding poverty for Polish households in provinces are presented in the Tables 1 and 2.

Table 1. Poverty in Poland by province in 2012 – classical approach

Specification	*HCR* Line 1	*HCR* Line 2	*HCR* Line 3	*HPG* Line 1	*HPG* Line 2	*HPG* Line 3
Dolnośląskie	0.349	0.214	0.149	0.091	0.051	0.031
Kujawsko-Pomorskie	0.476	0.318	0.216	0.135	0.078	0.050
Lubelskie	0.494	0.341	0.246	0.144	0.086	0.055
Lubuskie	0.404	0.260	0.168	0.105	0.056	0.033
Łódzkie	0.375	0.237	0.153	0.100	0.056	0.036
Małopolskie	0.412	0.247	0.158	0.102	0.053	0.031
Mazowieckie	0.290	0.181	0.125	0.077	0.044	0.028
Opolskie	0.359	0.203	0.133	0.088	0.047	0.030
Podkarpackie	0.488	0.323	0.221	0.134	0.075	0.045
Podlaskie	0.504	0.350	0.262	0.155	0.097	0.066
Pomorskie	0.395	0.269	0.195	0.117	0.071	0.047
Śląskie	0.347	0.208	0.129	0.086	0.046	0.028
Świętokrzyskie	0.503	0.355	0.255	0.149	0.088	0.055
Warmińsko-Mazurskie	0.554	0.384	0.281	0.170	0.105	0.071
Wielkopolskie	0.456	0.311	0.212	0.130	0.074	0.046
Zachodniopomorskie	0.372	0.236	0.161	0.098	0.054	0.032
Grand total	0.401	0.260	0.178	0.110	0.062	0.039

HCR – head count ratio; *HPG* – head poverty gap.

Source: own calculations.

The poverty ratios by province presented in Table 1 allow for stating that, regardless of the poverty line level, the greatest percentage of poor households

are concentrated in the Warmińsko-Mazurskie Province and the next positions are occupied by the Podlaskie Province and the Świętokrzyskie Province. The Mazowieckie Province and provinces located in western Poland (Dolnośląskie, Opolskie and Śląskie) are in the best situation (lowest share of poor households). The general regularity observed is that the lower the poverty line, the lower the percentage of poor households.

The values of *HPG* index, which evaluates the depth of poverty among all households, are the measures of poverty elimination costs (in relation to the poverty threshold) that indicate the amount of equivalent income (measured as percentage of the poverty threshold) that should be transferred on average to each poor household so that the income of all examined households would not be lower than the poverty threshold. The highest costs of poverty elimination concern the Warmińsko-Mazurskie Province, the Podlaskie Province, the Świętokrzyskie Province and the Lubelskie Province. The higher the poverty line, the higher the costs. In case of Poland as a whole, 6.2% of income (Line 2) should be transferred from the well-off to poor people to liquidate poverty.

Table 2. Poverty in Poland by province in 2012 – fuzzy approach

Specification	***FMI*** **Line 1**	***FMI*** **Line 2**	***FMI*** **Line 3**	***FMD*** **Line 1**	***FMD*** **Line 2**	***FMD*** **Line 3**
Dolnośląskie	0.361	0.223	0.147	0.089	0.049	0.030
Kujawsko-Pomorskie	0.452	0.304	0.212	0.136	0.079	0.050
Lubelskie	0.465	0.318	0.226	0.148	0.087	0.055
Lubuskie	0.406	0.255	0.169	0.100	0.052	0.030
Łódzkie	0.387	0.242	0.161	0.100	0.057	0.037
Małopolskie	0.402	0.252	0.165	0.096	0.049	0.028
Mazowieckie	0.308	0.188	0.125	0.077	0.044	0.028
Opolskie	0.360	0.218	0.142	0.085	0.047	0.030
Podkarpackie	0.469	0.310	0.212	0.131	0.071	0.042
Podlaskie	0.477	0.333	0.242	0.166	0.104	0.071
Pomorskie	0.394	0.261	0.184	0.122	0.074	0.049
Śląskie	0.359	0.217	0.139	0.082	0.044	0.027
Świętokrzyskie	0.479	0.329	0.234	0.152	0.087	0.054
Warmińsko-Mazurskie	0.512	0.361	0.263	0.180	0.114	0.079
Wielkopolskie	0.439	0.293	0.204	0.130	0.074	0.046
Zachodniopomorskie	0.381	0.238	0.158	0.095	0.051	0.030
Grand total	0.401	0.260	0.178	0.110	0.062	0.039

FMI – Fuzzy Monetary Incidence; FMD – Fuzzy Monetary Depth.

Source: own calculations.

Similar conclusions can be drawn by analysing the poverty measures calculated using the fuzzy approach (Table 2). When comparing these two approaches, one may notice the greater share of poor households in the eastern provinces in the classical approach. This also entails higher costs of poverty

elimination. The hierarchy of provinces in terms of the range of poverty risk and costs in the two analysed variants is very similar (Spearman's rank correlation coefficient above 0.9).

Table 3. Poverty in Poland by class of locality in 2012 classical approach

Specification*	***HCR*** **Line 1**	***HCR*** **Line 2**	***HCR*** **Line 3**	***HPG*** **Line 1**	***HPG*** **Line 2**	***HPG*** **Line 3**
City > 500K	0.181	0.088	0.049	0.037	0.017	0.010
City 200–499K	0.325	0.186	0.118	0.077	0.039	0.022
City 100–199K	0.346	0.210	0.130	0.086	0.046	0.028
City 20–99K	0.379	0.236	0.154	0.097	0.052	0.031
City <20K	0.411	0.265	0.183	0.112	0.063	0.039
Village	0.501	0.345	0.246	0.148	0.088	0.057
Grand Total	0.401	0.260	0.178	0.110	0.062	0.039
Village/>500K	2.77	3.92	5.02	4.00	5.18	5.70

* – K is a unit prefix in the metric system denoting multiplication by 1 000. *HCR* – head count ratio; *HPG* – head poverty gap.

Source: own calculations.

When analysing poverty ratios by residence place type, one can notice that the smaller the locality of a household, the greater the share of poor households. In the classical approach (Table 3), for the lowest poverty line, there are five times as many poor people in the countryside as in cities with a population of more than 500K. This disproportion is reduced simultaneously with the transition to a higher poverty line. When the fuzzy approach is used (Table 4), one can note lesser diversification among the analysed ratios, especially between large cities and the countryside.

Table 4. Poverty in Poland by class of locality in 2012 – fuzzy approach

Specification*	***FMI*** **Line 1**	***FMI*** **Line 2**	***FMI*** **Line 3**	***FMD*** **Line 1**	***FMD*** **Line 2**	***FMD*** **Line 3**
City > 500K	0.229	0.116	0.065	0.033	0.016	0.009
City 200–499K	0.336	0.199	0.125	0.070	0.035	0.020
City 100–199K	0.355	0.216	0.140	0.083	0.045	0.027
City 20–99K	0.384	0.238	0.156	0.092	0.049	0.029
City <20K	0.413	0.265	0.179	0.111	0.063	0.039
Village	0.473	0.325	0.231	0.153	0.091	0.059
Grand Total	0.401	0.260	0.178	0.110	0.062	0.039
Village/>500K	2.07	2.80	3.55	4.64	5.69	6.56

* – K is a unit prefix in the metric system denoting multiplication by 1 000. *FMI* – Fuzzy Monetary Incidence; *FMD* – Fuzzy Monetary Depth.

Source: own calculations.

When considering the *HPG* and *FMD* index values (Tables 3 and 4), one can note that differences in the costs of eliminating poverty in rural areas and in large cities are greater in the fuzzy approach than in the classical one.

For the purpose of the spatial diversification of poverty, the Gini coefficient was calculated for the spatial data (Table 5) (Suchecki 2010: 138-140).

Table 5. Gini index by poverty lines in the classical and fuzzy approaches

Specification	Line 1	Line 2	Line 3
Provinces			
Classical approach	10.56%	13.29%	15.00%
Fuzzy approach	8.16%	10.85%	12.78%
Class of locality			
Classical approach	14.05%	18.11%	21.03%
Fuzzy approach	10.79%	14.77%	17.75%

Source: own calculations.

In contrast to the fuzzy approach, in the classical approach diversification in terms of the share of poor households is higher both by province and class of residence locations. One can also notice increased diversification with the transition to a lower poverty line. This situation may mean that a lower-lying poverty line brings a greater diversification of the impoverishment of individual social groups of households. Poverty is concentrated among a limited group of people. Additionally, greater inequalities can be observed in the division of households by the class of the place of residence (regardless of the approach used). This means that poverty is more concentrated depending on the level of minimum subsistence level.

Table 6. The division of provinces in terms of their share of the poor

Specification	Line 2	
	Classical approach	Fuzzy approach
Group 1 (18–23%)	Dolnośląskie, Mazowieckie, Opolskie, Śląskie	Dolnośląskie, Mazowieckie, Opolskie, Śląskie
Group 2 (23–28%)	Lubuskie, Łódzkie, Małopolskie, Pomorskie, Zachodniopomorskie	Lubuskie, Łódzkie, Małopolskie, Pomorskie, Zachodniopomorskie
Group 3 (28–33%)	Kujawsko-Pomorskie, Podkarpackie, Wielkopolskie	Kujawsko-Pomorskie, Podkarpackie, Wielkopolskie, Lubelskie, Świętokrzyskie
Group 4 (33–39%)	Lubelskie, Podlaskie, Świętokrzyskie, Warmińsko-Mazurskie	Podlaskie, Warmińsko-Mazurskie

Source: own elaboration.

If one divides the provinces according to the percentage of poor households, it can be verified which group of provinces has the greatest influence on general inequality. For this purpose, the provinces were arbitrarily divided in terms of

the share of poor households (poverty line level – Line 2) into four groups, both in the classical and fuzzy approach (cf. Table 6).

Considering the division of provinces into four groups (Table 6), the Theil index was calculated with spatial weights taken into account (Suchecki 2010: 146-147). The percentage impact of inequalities in individual groups on the general Theil index is presented in Table 7. Inter-group inequalities between provinces characterised by the lowest share of households (Group 1) have the greatest impact on general inequalities while the lowest impact is observed among provinces with the greatest share of the poor (Group 4). A considerable influence of inter-group inequalities on general inequalities can also be noticed, but in the classical approach this influence is greater than in case of the fuzzy approach.

Table 7. Theil index by classical and fuzzy approach

% impact of the group on the Theil index	Line 2	
	Classical approach	Fuzzy approach
Group 1	46.91	47.59
Group 2	22.44	22.77
Group 3	5.62	12.70
Group 4	6.32	0.63
Intergroup inequalities	18.71	16.31

Source: own calculations.

The situation in which a household is poor can be described using the dummy variable, which takes the value of 1 or 0, where 1 means a poor household and 0 otherwise. The probability of this event was described with a set of exogenous variables based on the logit model (Maddala 2006: 367-375), and this allowed for determining potential factors affecting the risk of poverty. The model was estimated with the maximum likelihood method.

The parameters of logit models were estimated both in the classical and fuzzy approach.[5] The following characteristics of the head of household were adopted as exogenous variables in each variant:

– age (four dummy variables – persons up to the age of 35 were taken as a reference group),
– education (five dummy variables – reference level: at least lower secondary education)

and household characteristics:

– number of members (six dummy variables – reference group: one-person household),
– class of the place of residence (three dummy variables – reference group: households in the countryside),

[5] The logit transformation of the dependent variable was used in the case of fuzzy approach, so the estimation of the model was performed using OLS.

– social and economic group (six dummy variables – reference group: households of working people),
– low education level (dummy variable: 1 – persons with low education level in the household, 0 – no persons with low education level in the household),
– unemployed (dummy variable: 1 – unemployed persons in the household, 0 – no unemployed persons in the household),
– disabled (dummy variable: 1 – disabled persons in the household, 0 – no disabled persons in the household).

The estimation results of mentioned above models for two chosen (extreme to each other) poverty lines was presented in Tables 8 and 9.

Table 8. Results of the estimation of the parameters of the logit model for the variable describing the probability of the risk of poverty (classical approach)

Specification	Line 1		odds ratio	Line 3		odds ratio
	parameter	p-value		parameter	p-value	
Constant	0.259	0.000	1.295	-1.040	0.000	0.353
Town	-0.115	0.000	0.891	-0.199	0.000	0.820
City	-0.419	0.000	0.658	-0.612	0.000	0.542
Self-employed	-0.465	0.000	0.628	-0.531	0.000	0.588
Farmer	-0.002	0.964	0.998	-0.012	0.852	0.988
Retiree	0.327	0.000	1.387	0.162	0.002	1.176
Pensioner	0.664	0.000	1.942	0.633	0.000	1.883
Unearned sources	0.984	0.000	2.676	1.346	0.000	3.843
Basic vocational	-0.427	0.000	0.652	-0.418	0.000	0.658
Secondary	-1.040	0.000	0.354	-1.106	0.000	0.331
Tertiary	-2.083	0.000	0.125	-2.332	0.000	0.097
35-44	-0.161	0.000	0.852	-0.135	0.007	0.874
45-54	-0.411	0.000	0.663	-0.425	0.000	0.654
>55	-0.451	0.000	0.637	-0.349	0.000	0.705
2 persons	-0.082	0.025	0.922	0.024	0.622	1.024
3 persons	0.263	0.000	1.301	0.310	0.000	1.363
4 persons	0.636	0.000	1.889	0.564	0.000	1.758
5 persons	0.845	0.000	2.328	0.853	0.000	2.346
6 and more persons	1.079	0.000	2.943	1.048	0.000	2.851
Disabled person	0.141	0.000	1.151	0.072	0.043	1.075
Unemployed	0.895	0.000	2.448	0.912	0.000	2.489
Low education	0.193	0.000	1.213	0.189	0.000	1.208
χ^2	$\chi^2(21)$=6 687.2; p=0.0000			$\chi^2(21)$=5 668.7; p=0.0000		

Source: own calculations.

Table 9. Results of the estimation of the parameters of the model for the variable describing the risk of poverty (fuzzy approach)

Specification	Line 1		Line 3	
	parameter	p-value	parameter	p-value
Constant	-0.230	0.000	-3.636	0.000
Town	-0.044	0.083	0.034	0.567
City	-0.435	0.000	-0.893	0.000
Self-employed	-0.033	0.504	-0.094	0.413
Farmer	-0.629	0.000	-1.529	0.000
Retiree	0.478	0.000	1.226	0.000
Pensioner	0.790	0.000	1.746	0.000
Unearned sources	1.141	0.000	1.938	0.000
Basic vocational	-0.361	0.000	-0.558	0.000
Secondary	-1.059	0.000	-2.012	0.000
Tertiary	-2.329	0.000	-5.200	0.000
35-44	-0.176	0.000	-0.428	0.000
45-54	-0.439	0.000	-0.993	0.000
>55	-0.444	0.000	-1.004	0.000
2 persons	-0.014	0.638	-0.034	0.625
3 persons	0.435	0.000	1.063	0.000
4 persons	0.849	0.000	2.003	0.000
5 persons	1.080	0.000	2.429	0.000
6 and more persons	1.249	0.000	2.623	0.000
Disabled person	0.194	0.000	0.464	0.000
Unemployed	0.914	0.000	1.727	0.000
Low education	0.255	0.000	0.569	0.000
Adjusted R^2	0.268		0.288	

Source: own calculations.

Based on the estimated parameters of the logit models, it can be stated both in the classical and fuzzy approach (Tables 8 and 9) that the likelihood of being poor decreases with an increase of the size of the class of the place where the household is located.[6] The risk of poverty is definitely the lowest in the group of households located in cities with the population of more than 100 000. The risk of poverty also decreases with an increase in the level of education and age of the head of household. This means that in comparison to the reference households, those where the head has higher education and is older than 55 are characterised by the lowest risk of poverty. The poverty risk of households distinguished due to the social and economic group considered with reference to the households of working people is considerably higher than in case of the households of pensioners or people making a living from non-profit sources. In the classical approach (Table 8), households of farmers do not

[6] It should be noted that the poor matching of models to empirical data is connected with the use of individual data. Just like in case of income or payroll, poverty is difficult to grasp using the econometric model.

differ considerably from households of working people and households of people who earn a living are in a lesser danger of poverty than households of working people. In the fuzzy approach (Table 9), farming households are not so much in danger of poverty as households of working people while the households of people who earn a living do not differ considerably from households of working people.

The risk of poverty increases with an increase in household size (Tables 8 and 9). This situation results from the fact that households with many members are usually large families where most members do not work. Households in which at least one person is unemployed are in a much greater risk of poverty in comparison to households with no unemployed members. Poverty risk also rises in households with members who have low education level or who are disabled, yet this influence is relatively lower than in case of unemployment. The direction of the influence of the analysed social and economic factors on poverty risk is the same, regardless of the poverty line level and the adopted approach (classical, fuzzy). It should be also noted that the impact of social and economic factors on the risk of poverty is greater in case of lower poverty lines.

4. CONCLUSIONS

The conducted research suggests a greater share of poor households in the eastern provinces and in locations with smaller populations. They are also characterised by higher costs of poverty elimination. In the case of higher poverty lines, the values of these measures increase. The use of inequality measures with spatial weights confirms the spatial diversification of poverty in Poland. The lower the poverty line the greater this diversification. This may mean that lower poverty lines cause greater diversification of the poverty of individual social groups. The calculated measures also suggest a relatively high share of inequalities between groups of provinces distinguished due to the share of poor households in general inequalities.

Based on the results of the logit model, it can be stated that the likelihood of being poor decreases with an increase in the size of the class of localities where the household is located and with the increase of the education level and age of the household head. Households with many members and those with the unemployed, poorly educated or disabled members are more exposed to poverty. The influence of these factors is greater if the lower poverty line is taken into consideration.

Research into poverty using the classic approach and based on the theory of fuzzy sets simultaneously is not a new approach to the problem. We can find such results for Poland e.g. in Panek (2011); more broadly, the relation of fuzzy approach to the classical approach can also be found in an earlier work by Lemmi and Betti (2006). It was indicated there that the fuzzy approach is better than classical approach in the study of movements from poverty to non-poverty and vice-versa. It seems that the fuzzy approach gives more research possibilities (as it is more flexible in identifying the poor individuals), especially in the case of studies on the multidimensional nature of poverty. However, in the unidimensional study of poverty risk of society groups, both approaches give comparable results.

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ABSTRACT

Studies on poverty have a long tradition. In Poland, the issue acquired special significance with the beginning of the economic transition. Additionally, Poland's accession to the European Union, particularly the need to implement the EU Strategy for Social Cohesion, imposed new requirements for the study of this phenomenon.

The aim of the study is to assess the level and composition of poverty in the provincial system, and additionally, in cross-sectional of towns and villages in Poland and the identification of factors affecting the risk of poverty assuming different levels of the poverty line. In order to achieve these objectives, classical approach were used – based on the determining of the poverty line and the approach with the usage of a belonging function to the sphere of poverty based on the theory of fuzzy sets. In both cases, the monetary poverty is considered. Identification of potential factors affecting the risk of poverty was carried out using the logit model.

To accomplish the purpose of the research an individual statistical data from the Central Statistical Office household budget survey in 2012 has been used.

PRZESTRZENNE ZRÓŻNICOWANIE UBÓSTWA W POLSCE

ABSTRAKT

Badania nad problemem ubóstwa mają wieloletnią tradycję. W Polsce problematyka ta nabrała szczególnego znaczenia wraz z rozpoczęciem transformacji ustrojowej. Dodatkowo przystąpienie Polski do Unii Europejskiej, a zwłaszcza konieczność wdrożenia unijnej Strategii Spójności Społecznej, narzuciło nowe wymagania w zakresie badania tego zjawiska.

Celem opracowania jest ocena poziomu i zróżnicowania ubóstwa w układzie wojewódzkim oraz dodatkowo w przekroju miast i wsi w Polsce oraz identyfikacja czynników wpływających na ryzyko ubóstwa przy założeniu różnych poziomów linii ubóstwa. Dla realizacji powyższego celu wykorzystano podejście klasyczne – oparte na wyznaczeniu linii ubóstwa oraz podejście wykorzystujące funkcję przynależności do sfery ubóstwa oparte o teorię zbiorów rozmytych. W obydwu przypadkach rozważano ubóstwo od strony monetarnej. Identyfikację potencjalnych czynników wpływających na zagrożenie ubóstwem przeprowadzono za pomocą modelu logitowego.

Do realizacji celu opracowania wykorzystano indywidualne dane statystyczne pochodzące z badania budżetów gospodarstw domowych realizowanego przez Główny Urząd Statystyczny w 2012 r.