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ANALYSIS OF THE WORKING POOR POPULATION USING AN ALTARNATIVE METHOD FOR MEASURING POVERTY IN THE EUROPEAN UNION

Theses of PhD dissertation

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INTRODUCTION

Defining poverty as unemployment is a common misconception. We tend to assume that those who have a job are not at-risk-of poverty at all. This supposition, however, seems to be outdated and has proven incorrect. A Eurobarometer study conducted in 2009 gained views of EU citizens on the main causes of poverty. 52% of the respondents said poverty is caused by unemployment first of all, while 49% mentioned insufficient wages and salaries as one of the major factors. The issue of wages and salaries leads us to the problems facing the working poor.

The problems of the working poor became a central issue in a European context at the end of the 1990s. The fight against social exclusion and poverty has been given high priority in the Lisbon Strategy in 2000 aiming to make Europe a socially coherent and flourishing economy (EC 2000). The meetings of the European Council held in Lisbon, Nice and Stockholm all highlighted that increasing employment opportunities is an important tool to fight against poverty and social exclusion. Since then several European studies have concluded that the rate of the so-called working poverty is also high. According to Eurostat data, in 2012 the rate of the working poor represented 9.2% of the population above 18 years old in the EU27 member states and this rate has risen steadily from 8.2% in 2005. The figures above show that special attention should be paid to the problems of the working poor.

Research hypotheses

H1: Eurostat methods for the calculation of poverty fail to indicate the majority of the deprived or they classify non-deprived people as poor. Rather than indicating the poverty rate, these methods, in fact, are in correlation with income inequality indicators. As a result of these methodological problems, the Eurostat calculation method is not suitable for drawing valid and reliable conclusions on the situation of the poor and that of the working poor at a regional level.

H2: Eurostat calculation methods do not take into account the disparities in economic development between the old and new member states and therefore constitute a breach of the European principle of solidarity.

H3: The social layers most vulnerable to working poverty include women, young people, unskilled or low-skilled workers, people with large families and those living in rural areas.

H4: The factors causing working poverty significantly differ in terms of the EU15 and EU12 member states.

DATA AND METHODS

The database of my research comprises the cross-sectional data of the 2010 wave of the EU-SILC (European Union Statistics on Income and Living Conditions) survey. The database, first of all, includes data on social exclusion, living conditions, poverty, livelihood in the European Economic Area, as well as in the EU member states. EU-SILC is a data source providing detailed, representative, cross-sectional and longitudinal data at both household and individual levels. The major aim of the survey is to provide income-based Laeken indicators. The EU-SILC statistical database is expected to measure and compare the distribution of income and social exclusion at a European level. Data collection, which must meet strict requirements, is conducted through survey questionnaires.

The methodological background of the research is provided by the following mathematical-statistical methods:

Examination methods of income inequalities:
- Relative distribution method
- Decile distance method
- Decile ratio method
- Quintile ratio method
- Éltető-Frigyes index
- Robin Hood index
- Gini index

The analyses of my research paper are based on the following methods:
- Analysis of variance
- Cross-tabulation analysis
- Correlation and partial correlation
- Binomial logistic regression

RESULTS

Income poverty in Europe

In the EU-SILC database income poverty is defined at a household level, i.e. poverty refers to a condition in which people live in poor households. A household is defined as poor if its equivalised income[1] is lower than 60% of the national median income. Among the countries surveyed Hungary has the seventh lowest poverty rate. Even western-European countries, such as Great Britain, Germany, Belgium or Luxembourg have higher poverty rates. Table 1 below presents the data for comparison.

Table 1: Poverty threshold and poverty rate

Country	Real poverty threshold(€)	Poverty threshold, PPP (€)	At-risk-of-poverty rate
AT	12 371	11 036	12.1%
BE	11 678	10 244	14.6%
DE	11 278	10 491	15.6%
FR	12 036	10 521	13.3%
HU	2 544	4 276	12.3%
LU	19 400	16 100	14.5%
UK	10 263	10 494	17.1%

Source: own calculations, SILC2010

The real poverty threshold is presented in the table only to provide further information but it is much more important to take the PPP (Purchasing Power Parity) threshold into account, as it as adjusted to the price standard of a given country. Hungary and Austria have approximately the same poverty rates, however, it is noticeable that the real poverty threshold in Hungary is two and a half times higher than in the neighbouring Austria even if PPP is taken into account. Is it really the case that the same proportion of the population is poor in Hungary and Austria? The most outstanding case is Luxembourg, where the poverty threshold based on PPP is nearly four times higher than in Hungary, while its poverty rate is still 2%

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[1] The equivalised income is calculated by dividing the household's total income from all sources by its equivalent size, which is calculated using the modified OECD equivalence scale. This scale attributes a weight to all members of the household: 1.0 to the first adult; 0.5 to the second and each subsequent person aged 14 and over and 0.3 to each child aged under 14.

higher than in our country. This shows that the Eurostat calculation method provides controversial findings regarding who is considered poor. In Eurostat surveys the same poverty definition applies to the working poor. As a result, estimates of the working poor are not valid.

Consequently, the second part of H1 hypothesis is proven, i.e. because of the methodological problems, the Eurostat calculation method is not suitable for drawing valid and reliable conclusions on the situation of the poor and that of the working poor at a regional level.

Examination of income inequality indicators

The aim of my analysis was to study the relationship between at-risk-of-poverty rate and income inequality indicators. My thesis statement is that the increase of income inequalities causes the poverty rate to rise and vice versa. Table 2 presents the correlation coefficients of poverty rate and 8 different income inequality indicators.

Table 2: Correlation coefficients of poverty rate and income inequality measures

	Relative St.D.	Decile distance	Decile ratio	Quintile ratio	Decile distribution	Éltető-Frigyes	Robin-Hood	Gini
At-risk-of-poverty rate	0.615^{**}	-0.944^{**}	0.748^{**}	0.908^{**}	-0.770^{**}	0.887^{**}	0.892^{**}	0.851^{**}

**. $p<0,01$ (2-sided test). N=29

Source: own calculations, SILC2010 and Eurostat

Regarding the 29 EEA (European Economic Area) countries, income poverty shows a strong significant linear relationship with each of the examined income inequality indicators ($p<0.01$). According to my interpretation, seven of the correlation coefficients show strong relationship ($r>0.7$), while one shows medium strong relationship ($r=0.615$). Based on the findings above it can be concluded that the Eurostat at-risk-of-poverty rate could rather serve as an income inequality indicator as it does not provide reliable information on the extent of poverty. In order to provide a graphical demonstration, I introduce a consolidated income inequality index, which includes the eight indicators mentioned above in a standardised form. This way income inequality index becomes an indicator without a dimension, the numerical

value of which can range from 0 to 1. The values closer to 0 represent low income inequality, while the values closer to 1 show high income disparities.

Analysing the correlation between the new income inequality index and teh at-risk-of-poverty rate, the results show a strong positive relationship ($p<0.01$; $r=0.838$; $N=29$), which means the higher the value of the index is, i.e. the more uneven the income distribution is, the higher is the poverty rate in a given country.

In order to assess the real correlation between poverty rate and the poverty threshold, the effects of income inequalities must be controlled for. Using partial correlation analysis I examined the relationship between poverty rate and the poverty threshold at PPP by controlling for the income inequality index. The relationship, which appeared significant ($p=0.006$) in the beginning, declined considerably ($p=0.101$), to such an extent that the linear relationship cannot be proven. This means that according to the Eurostat method the relationship between poverty threshold and poverty rate is generated by income inequalities. Consequently it can be concluded that using the Eurostat method the expected relationship, namely that the higher the income level of a country is, the lower is the number of its poor, is not proven. Therefore the Eurostat at-risk-of-poverty rate applies to the income inequalities within nations rather than assess poverty or real deprivation. By means of the analyses above I proved a part of H1 hypothesis, namely that the Eurostat calculation methods are related to income inequality indicators and fail to indicate the real number of the deprived.

Deprivation

The Eurostat deprivation index examines the financial difficulties of households and their access to durable consumer goods. An individual is regarded as deprived if at least three of the nine deprivation factors are typical of his/her household. The EU-SILC database provides all the necessary data for calculation.

I find it essential to examine to what extent the at-risk-of-poverty rate and the rate of the deprived overlap. The aim of this analysis is to study the credibility of the at-risk-of-poverty indicator. The study can be carried out by using cross-tabulation analysis. According to Table 3 there is a significant difference between at-risk-of-poverty rate and the rate of the deprived, as 56.9% of the income poor is not deprived and 60% of the deprived is not regarded as poor by taking their income into consideration in 29 European countries.

Table 3: Cross-tabulation of people at-risk-of-poverty and deprivation

			DEDPRIVATION		
			Not deprived	Deprived	Total
AT-RISK-OF-POVERTY	Not poor	N (million people)	*361.0*	*51.6*	*412.6*
		Row percent (%)	87.5	12.5	100.0
		Column percent (%)	88.9	60.0	83.8
	Poor	N (million people)	*45.3*	*34.3*	*79.6*
		Row percent (%)	56.9	43.1	100.0
		Column percent (%)	11.1	40.0	16.2
Total		N (million people)	*406,3*	*85.9*	*492.3*
		Row percent (%)	82.5	17.5	100.0
		Column percent (%)	100.0	100.0	100.0

Yates test: $p < 0{,}01$, $\phi = 0{,}297$

Note: estimated N, based on personal cross-sectional weights (RB050)

Selected countries: EU27 + NO, IS

Source: own calculations, SILC2010

This finding justifies the second part of H1 hypothesis, namely that the Eurostat calculation method fails to measure most of the deprived and at the same time it regards people as poor who are not deprived. I managed to prove this by comparing the above mentioned findings to the results of the deprivation-type poverty calculation. The hypothesis includes several statements, which are logically interrelated.

Based on the findings above it can be stated that H1 hypothesis is justified, i.e. the Eurostat calculation method fails to measure the majority of the deprived, and it regards people as poor who are not deprived. In fact, the method is in close correlation with income inequality indicators rather than represent the real rate of the poor. Because of the methodological problems of the Eurostat method, it is not suitable for drawing valid and reliable conclusions on poverty and the working poor at a regional (EU, EGT) level.

Introduction of a new poverty calculation method

First of all, I thoroughly examined the official Eurostat deprivation indicator and I completed it with the factors I regarded essential to gain valid results. According to the EU2010 deprivation index, an individual is regarded as deprived whose household is characterised by at least three of the EU2010 deprivation factors, i.e:

$$D_{EU2010}(d_{hous}, d_{heat}, d_{hyg}, d_{arr}, d_{food}, d_{car}, d_{dur}, d_{liv}, d_{hol});$$

where:

d_{hous} = housing condition
d_{heat} = adequate heating of the house
d_{hyg} = availability of indoor sanitary facilities
d_{arr} = arreas on utility bills
d_{food} = access to adequate food
d_{car} = ability of the household to afford a car
d_{dur} = ability of the household to afford durable consumer goods (computer, television, washing machine, telephone)
d_{liv} = is the income sufficient to make a living
d_{hol} = ability of the household to cover holiday and unexpected expenses

In my view, Europe is relatively so small due to the free movement of capital and workforce that it is not realistic to examine the European nations as independent systems and to compare the citizens belonging to different nations. Advocates for measuring poverty threshold compared to the national median income claim that this method can be justified by the relative interpretation of poverty. However, relative interpretation is difficult to apply with regard to the territories of the member states without borders while due to the mobility of workforce within the European Union (as well as in the European Economic Area) the differences between the standards of living in different member states are obvious. Therefore the Eurostat relative poverty calculation method, as it was mentioned before in my research paper, fails to measure the real rate of the deprived families and individuals, and at the same time it regards households as poor which in reality do not face financial difficulties, at least from an Eastern European (or Hungarian) perspective.

In order to solve the above mentioned assessment problems, I aimed to develop an indicator which does not compare poverty to the relative poverty threshold measured within a nation. I believe this method gives a more realistic description of the real situation in Europe than applying poverty rate compared to the national median income. Thus, without changing the basic concept of poverty threshold and only adapting its context to measuring poverty, I set the poverty threshold at 60% of the EU27 median income. Currently the EU27 median income is €14560 (PPP), 60% of which is €8736 (PPP). Households whose per capita income is lower than this value can be regarded as poor. Due to the price-level effect Hungarian incomes are almost doubled; the real value of the annual income of €8736 is €5202 in Hungary. Depending on the exchange rate it equals to approximately HUF130000 per capita monthly income. From now on I am going to refer to my new poverty calculation method as EU (income) poverty.

An important feature of this new poverty index is that it assesses EU income poverty and the deprivation index at the same time. Using this method it is possible to exclude individuals with very high incomes from the deprived. However, this definition still fails to assess some households which should be regarded as deprived due to their very low income. When creating a final definition of poverty I aimed to determine the parameters of poverty in the most reliable way. My analyses revealed that 23.9% of the poor in the EU is not characterised by any of the deprivation factors. Consequently, my aim is to set an EU poverty threshold by means of which this rate can be reduced. In order to solve this problem, I introduce a new income threshold, namely 30% of the EU27 median income (PPP). Using this method the above mentioned rate could be reduced to 15.3%. According to the final definition, an individual is regarded as poor if he/she has a very low income, or deprived, but his/her income is moderate. Namely where the following condition is met:
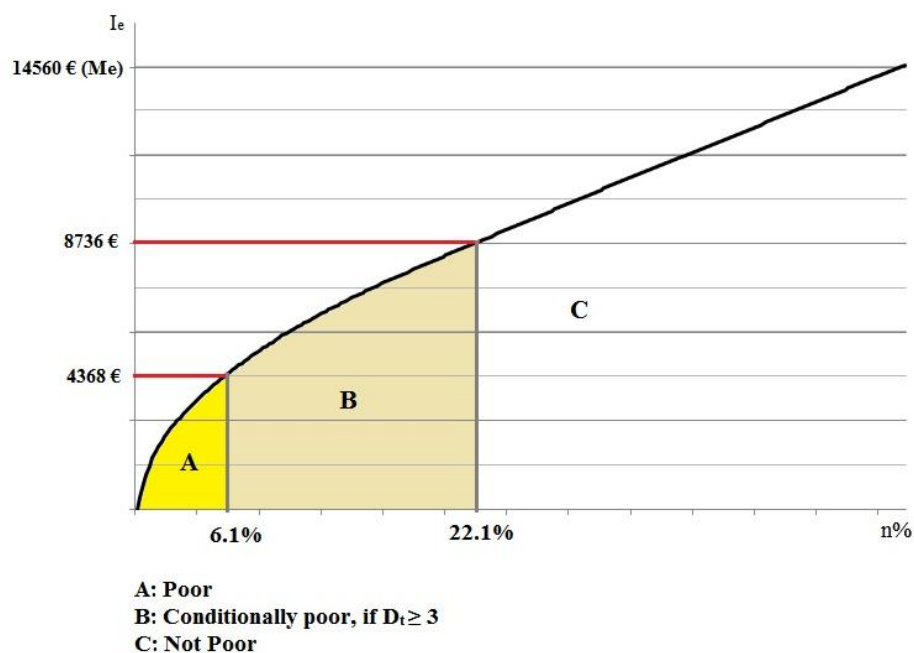
$$I_e < 0,3 \cdot Me_{EU}$$

or

$$D_t \geq 3 \quad and \quad I_e < 0,6 \cdot Me_{EU}$$

where:

$D_{\ddot{o}}$= total deprivation score of a household; $0 \leq D_t \leq 9$

I_e= annual per capita income of a household (PPP)

Me_{EU}= EU27 median income (PPP)

A: Poor
B: Conditionally poor, if $D_t \geq 3$
C: Not Poor

Graph 1: Definition of poverty

Source: own edition

By using the new poverty definition I intended to eliminate the inaccuracies that the EU poverty indicator includes, namely that comparing the national median incomes fails to provide reliable and valid figures on poverty in Europe. In my view, applying a calculation method which takes living conditions into account gives a more realistic description of the poverty level in Europe. However, it was important to exclude households with a very high income from the deprived. Another inaccuracy of the deprivation method is that it does not regard households with very low incomes poor if they otherwise lack any deprivation factors. In order to eliminate this inaccuracy, I regard households with very low incomes poor, as well.

Not surprisingly, the poverty rates gained by the new calculation method are closely related to the results of the deprivation indicator. However, the new poverty index and the Eurostat at-risk-of poverty rate show no correlation, these values are independent of each other. The Eurostat at-risk-of poverty rate fails to reflect any differences between countries with regard to their level of economic development.

Consequently, my H2 hypothesis is justified, i.e. the Eurostat poverty calculation method does not take into account the disparities in economic development between the old and new member states and therefore constitutes a breach of the European principle of solidarity.

The working poor in Europe

The definition and measurement of poverty have been presented in detail in my research paper. When examining the working poor I intend to use the new calculation method to assess poverty. However, the definition of employment cannot be created at a household level. Therefore I switch to apply individual observation but taking the definition of poverty at household level into account at the same time. When defining employment I apply the Eurostat definition stating that an individual is considered employed if he/she is employed for at least six months in the year of the reference period. This includes self-employment, full-time and part-time employment, as well.

Profile of working poor

In this chapter I present a brief overview of some demographic and other individual features of the working poor. According to previous European statistics (e.g. EUROFOUND 2000), working poverty mainly affects male employees. My research findings also confirm this statement: male workers are more threatened by poverty than female employees. This trend can be seen in both the EU15 and EU12 countries. This situation is mainly due to the fact that women of working age are more likely to become temporarily or constantly inactive (e.g. due to child-care leave), which considerably affects the livelihood of the household and which also means that male members of the household get below the poverty threshold, too.

Table 4: Gender of working poor and all workers, %

	Working poor		*All workers*	
	Male	Female	Male	Female
EU15	60.0	40.0	54.3	45.7
EU12	57.4	42.6	54.6	45.4
EU27	58.1	41.9	54.3	45.7
HU	55.8	44.2	54.3	45.7

Source: own calculations, SILC2010

Table 4 presents that the effect of gender is more significant in the old member states: while the rate of male employees is 54.3%, the rate of male working poor is 60%. The differences in the chances of activity are also larger here (HORVÁTH 2008). The difference in the chances of activity is the largest in Hungary compared to European countries: a Hungarian woman has four times lower chances to become employed compared to men. Even if the difference is slight, we can state that rate of the male working poor is higher (24.46%) than the female rate (23.01). According to the findings of EUROFOUND (2010), working poverty most affects the youth (age of 18-24). My research findings partly confirm this statement.

Table 5: Rate of working poor within the age categories, %

	16-29 years	*30-49 years*	*50-59 years*	*60 years or over*
EU15	2.47	2.88	2.43	2.93
EU12	27.19	27.51	24.14	23.03
EU27	7.96	7.84	6.81	5.70
HU	26.08	25.47	20.41	10.01

Source: own calculations, SILC2010

We can see a difference between the old and new member states, as it is shown in Table 5. In the new member states (EU12) the 30-49 age group is the most threatened with a working poverty rate of 27.5%. In the old member states (EU15) the employees over the age of 60 are affected by working poverty the most. These results can be explained in part by the fact that the family safety net has weakened in economically developed western countries and that households where several generations live together are less common in these countries (GÁBOS–KOPASZ 2008). Another factor which can also explain this situation is that the human capital of the older generation is more likely regarded as obsolete, which also means lower incomes.

However, I cannot confirm the statement that working poverty is less typical as the age of employees is rising. Hungary is one of the exceptional examples where the higher the age of an employee is, the less likely is the chance of becoming working poor. Of the 29 examined countries this statement is true only of Cyprus, Denmark and Poland.

In my research I examined education according to the ISCED (International Standard Classification of Education) levels defined by UNESCO (2011). It can be clearly seen that in the EU27 countries the rate of the working poor is rising as education levels of the employed are getting lower. Therefore it is generally true that the higher an employee's education level is, the less likely he/she becomes a working poor. Education increases individuals' productivity, which is reflected in their higher salaries as well as in their low poverty rate. An exception to this statement is education level ISCED2 in the EU12 countries, where individuals with a lower education level (ISCED1) show a lower working poverty rate.

Table 6: Rate of working poor within the educational categories, %

	ISCED1	ISCED2	ISCED3	ISCED4	ISCED5
EU15	9.8	5.0	2.0	1.4	1.3
EU12	57.2	65.8	27.6	18.7	6.8
EU27	15.9	12.4	9.1	5.6	2.1
HU	64.9	52.4	25.7	15.2	5.5

Source: own calculations, SILC2010

As it is shown in Table 6, 6.8% of graduates are considered poor in EU12 countries, while this rate is much lower in the EU15 countries, with 1.3%. This means that in the old member states a graduate is not likely to become working poor. The likelihood of graduates becoming working poor is the highest in Bulgaria (14%), Romania (13%) and Latvia (14%). However it is not true that in these countries the rate of graduates is generally higher among

the employed. In Hungary the rate of the working poor among graduates is 5.5%, which is the sixth highest rate in Europe. In Hungary 60% of individuals without elementary qualification is poor, while in the EU15 countries this rate is below 10%. It can also be seen that the poverty rate of employees without elementary qualification is not falling significantly in Hungary (52.4%).

Examining labour market factors it is also essential to assess what occupations the working poor have. The EU-SILC database provides information regarding this issue (except for Romania) with its ISCO-88 classification according to nomenclature, which is a variable used in the 2010 wave of SILC. I conducted my analysis using this classification in terms of the EU15 and EU12 member states. Table 7 presents the findings regarding the old and new member states, the EU27 countries and Hungary.

Table 7: Rate of working poor within the ISCO-88 categories, %

	EU15	EU12	EU27	HU	EU15*	EU27*
Legislators, senior officials and managers	2.2	3.7	2.4	3.9	1.2	1.5
Professionals	0.6	3.0	1.0	3.9	0.5	0.9
Technicians and associate professionals	0.7	4.8	1.2	8.4	0.5	1.1
Clerks	0.7	6.3	1.3	6.9	0.5	1.2
Service workers and shop and market sales workers	1.9	13.4	3.7	15.7	1.5	3.6
Skilled agricultural and fishery workers	4.2	21.0	9.3	13.3	3.7	9.4
Craft and related trade workers	2.1	12.3	4.4	15.1	1.8	4.4
Plant and machine operators and assemblers	1.3	11.8	3.7	15.8	0.9	3.6
Elementary occupations	2.7	16.1	5.1	18.4	2.2	5.0

*Without Spain
Note: without Romania due to missing data
Source: own calculations, SILC2010

It can be concluded that in both groups of countries the rate of the working poor is the highest in the fields of agriculture and forest management, including crop production, animal husbandry, forest and wildlife management and fishing (later referred to as those working in agriculture). In both the EU15 and the EU12 countries the second most threatened group is

those with simple, unskilled jobs (later referred to as unskilled workers), such as cleaners, packing workers, kitchen staff, unskilled industrial, construction industry, agricultural workers etc. Surprisingly, in the EU15 member states the third most threatened is the group of economic, administrative, advocacy group managers, lawmakers (later referred to as managers) with a working poverty rate of 2.2%. However, in the EU12 member states the third most threatened is the group of employees working in commerce and services, e.g. shop assistants, or those working in catering (waiters, chefs, confectioners etc.). Regarding these occupations in the EU12 member states the poverty rate is 13%. Managers are in a much more favourable position in both the EU12 countries and in Hungary. In the EU15 member states the next threatened group includes those working in industry and construction industry (food, light, metal, electrical, handicraft and construction industry) (later referred to as those working in industry). Unlike the EU trend, however, the rate of the working poor is the highest (18%) among those with unskilled jobs. The rate of the working poor is approximately the same – with only a slight difference - among those working as machine operators, or working in commerce and industry; those working in agriculture belong only to the fifth most threatened group. Table 7 presents the findings with no data on Spain. The reason for not including Spain is that in this country the group of economic, administrative, advocacy group managers and lawmakers has an outstandingly high working poverty rate. After removing the data on Spain the group of managers still does not reflect the expected tendency in the EU15 countries as it is still an occupation category with the fifth highest working poverty rate. In the whole of the EU, excluding the data on Spain, we can find the lowest working poverty rate among the occupations requiring higher education qualification.

Of the characteristic features of households, let me present household composition. Concerning this factor we also find differences between the EU15 and EU12 countries. In the EU15 countries the most threatened is a household with a single parent and one or several dependent children. In such households the poverty rate is 5.1%. Surprisingly, in new member states we find a different situation: the most threatened are large families with two adults and three or more dependent children.

Table 8: Rate of working poor within the household type categories, %

	One person household	2 adults, no dependent children	Single parent household, one or more dependent children	2 adults, one dependent child	2 adults, two dependent children	2 adults, three or more dependent children	3 or more adults with dependent children	Other
EU15	3.3	1.9	5.1	2.5	3.0	3.7	4.1	0.4
EU12	27.8	20.3	40.4	22.9	26.8	41.5	36.1	16.5
EU27	5.6	5.5	9.8	6.6	7.3	9.6	16.8	8.8
HU	28.8	16.9	48.0	24.2	24.6	40.9	28.0	0.0

Source: own calculations, SILC2010

Hungary does not follow the EU12 trend, as in our country the most threatened group is a household with a single parent and one or several dependent children, followed by the group of large families. A single parent with one or several dependent children is especially threatened if he/she has a low income, too. Consequently single parents with dependent children and large families need special attention and must be assisted by means of family support tools. The least threatened household type in Europe is one without children, where two or more adults live together. This is the most common household type in Europe, 38.8% of the employed live in this type of household. The data clearly show that the number of children has a significant effect on the situation of the working poor. The poverty rate is 22.9% among the employed with one dependent child, while this rate is as high as 41.5% among families with three dependent children in the EU12 countries. In Hungary the birth of a second child does not have a significant effect on working poverty rate, however, families with three or more dependent children have a three times higher chance to become working poor. This effect is less considerable in the EU15 countries.

Based on the analyses above, I can state that my H3 hypothesis, i.e. the social layers which are the most threatened by working poverty include women, the youth, employees with a low education level, unskilled workers and large families, is only partly justified.

Examination of individual effects by logistic regression

By logistic regression it is possible to demonstrate what effect of an independent variable of a model has on the odds of becoming working poor, while it controls the effect of other variables. In the specification of the binary dependent variable of the logistic regression

model I generated a variable, the value of which is 1 if an individual is working poor and 0 if an individual is working but not poor. My model therefore estimates the likelihood of becoming poor with regard to the working population. As a first step I examine the employees of the 27 EU countries together. I do not intend to present the findings of this research in full. As a conclusion, however, we can state that the logistic regression model used to assess the total working population of the EU shows several differences compared to the findings of the former analysis. I did not include the occupation category (ISCO-88) variable in the basic model, as data on Romania are not available. In my view, excluding the Romanian working poor from the logistic regression model reduces the validity of the whole model. Nevertheless, occupation is a significant influencing factor which should be taken into account in assessing the chances of becoming working poor as it is confirmed by other research articles. Therefore I studied the effect of this factor in a separate model. During this observation, however, I had to exclude all the Romanian working poor. Furthermore, this study did not include data on Spain for the reasons mentioned before in the chapter covering the working poverty profile. Comparing the model including the occupation categories to the basic model, it is clear that in the new model poverty risk decreased only due to what member state was being investigated, but still it remained a significant influencing factor. Another important difference can be seen with regard to education, where the poverty risk which can be attributed to the occupation decreased significantly after including the occupation factor. The other variables of the basic model do not show further significant differences or changes in the new model. However, examining the results of the new variable, it can be seen that those with unskilled jobs have the highest odds ratio of becoming working poor (e=5.55). This contradicts the results of the former analysis, where agricultural workers proved the most threatened. This is probably due to the exclusion of the effect of factors such as living in a rural area, education or other variables. The regression model revealed an approximately identical odds ratio with regard to those working in commerce and services (e=3.46) as well as to those working in industry (e=3.41). This shows a difference compared to the former analyses, where those working in industry had the highest working poverty rate.

Since previous analyses revealed considerable differences between the EU15 and EU12 countries, I also conducted an analysis on the two groups of countries. The findings of the applied binomial logistic regression are presented in Table 9.

Table 9: Working poor in EU15 and EU12 (results of the logistic regression general model)

	EU15				EU12			
	B	S.E.	Sig.	Odds ratio	B	S.E.	Sig.	Odds ratio
Gender (Female)								
Male	0.016	0.001	0.000	1.016	0.044	0.001	0.000	1.045
Age (60 years or over)			0.000				0.000	
16-29 years	0.822	0.003	0.000	2.276	0.742	0.002	0.000	2.101
30-49 years	0.510	0.002	0.000	1.666	0.580	0.002	0.000	1.787
50-59 years	0.234	0.002	0.000	1.263	0.373	0.002	0.000	1.452
Education (ISCED 5)			0.000				0.000	
ISCED 0-1	2.172	0.002	0.000	8.777	2.767	0.002	0.000	15.903
ISCED 2	1.375	0.002	0.000	3.954	3.069	0.002	0.000	21.528
ISCED 3	0.450	0.002	0.000	1.568	1.562	0.001	0.000	4.767
ISCED 4	0.021	0.004	0.000	1.022	1.075	0.002	0.000	2.931
Marital status (Other)								
Divorced/widowed	0.040	0.002	0.000	1.040	0.419	0.001	0.000	1.520
Household type (2 or more adults, no dependent children)			0.000				0.000	
One person household	0.851	0.002	0.000	2.341	0.617	0.002	0.000	1.854
Single parent household, 1 or more dependent children	1.343	0.003	0.000	3.831	1.194	0.003	0.000	3.300
2 adults, 1 dependent child	0.419	0.002	0.000	1.520	0.359	0.001	0.000	1.432
2 adults, 2 dependent children	0.572	0.002	0.000	1.771	0.528	0.001	0.000	1.696
2 adults, 3 or more dependent children	0.798	0.002	0.000	2.221	0.965	0.002	0.000	2.624
3 or more adults with dependent children	0.537	0.002	0.000	1.711	0.589	0.001	0.000	1.801
Other	-1.560	0.031	0.000	0.210	-0.084	0.005	0.000	0.920
Employment status (Employed)								
Self-employed	1.699	0.001	0.000	5.469	0.629	0.001	0.000	1.876
Country of birth (Same country)								
Other country	0.928	0.001	0.000	2.530	-0.231	0.004	0.000	0.793
Degree of urbanisation (Intermadiate area)			0.000				0.000	
Densely populated area	0.153	0.001	0.000	1.165	0.479	0.001	0.000	1.614
Thinly populated area	0.378	0.001	0.000	1.460	0.961	0.001	0.000	2.615
Constant	-5.990	0.003	0.000	0.003	-4.289	0.003	0.000	0.014

EU15
n= 119266
-2 LOG Likelihood= 32599410
Pseudo R^2 (Nagelkerke)=0.159

EU12
n= 77485
-2 LOG Likelihood= 40105359
Pseudo R^2 (Nagelkerke)=0,255

Source: own calculations, SILC2010

Comparing the two groups of countries no significant difference can be seen in terms of gender, therefore it can be stated that based on the two odds ratios, male employees have the same odds of becoming deprived both in the old and new member states. In terms of age

the youngest age group (16-29 years) is the most threatened in both groups of countries, however, this trend is even stronger in the old member states, i.e. young people are relatively less exposed to working poverty in the new member states. However, the older age groups of employees (30-49 years and 50-59 years) have a higher chance of becoming poor in the new member states. The findings clearly reveal that in both groups of countries the risk of becoming poor is falling as the age is rising. In my view, this is due to the generally rising wages during an individual's career. Nevertheless, when I evaluated the profile analyses, I found that there are significant differences between the EU15 and EU12 countries. This difference was not seen after excluding the structural effects. The poverty risk decreased in both groups of countries as employees' education level was rising, although I found no significant differences in their odds ratio. In the new member states the situation of employees without elementary education was much worse compared to people living in the economically developed old member states. Another difference is that in the old member states employees with no elementary education (ISCED 0-1) are in the worst situation and poverty risk is falling significantly if an employee has elementary qualification (ISCED 2). Another interesting difference can be seen comparing the two groups of countries, namely that in the old member states employees with post-secondary education and those with higher education have more or less the same poverty risk. This difference is much more significant in the new member states: employees with post-secondary education have a much higher risk. According to the type of households we can see that in both groups of countries households with two adults and one dependent child, i.e. the maximum two-generation households with few children are in the most favourable situation. A rise in the number of children increases the poverty risk of employees. In the new member states adults with three or more dependent children are in an especially unfavourable situation. Comparing the two models in terms of the issue of migration we can see that the migrant employees of the old member states have a much higher poverty risk than those who were born in the old member states. This can probably be attributed to the fact that due to the free movement of labour a significant number of employees move from Eastern Europe to Western Europe hoping to achieve higher living standards. It is important to note the using logistic regression we excluded the effect of education on the poverty rate of migrant employees, so it cannot explain the higher poverty risk of migrant employees. The two models do not show significant differences in terms of the factor of living in a rural area, however it can be stated that in the EU12 countries employees living in scarcely populated areas have nearly twice as high poverty risk (e=2.615) compared to E15 countries (e=1.460).

I conduct a similar analysis concerning the regression model including the occupation variable in both the EU15 and the EU12 countries. If we compare these findings with the basic model presented in Table 9, we can see several significant differences. In the EU12 countries e.g. the highest odds ratio belongs to a particular occupation, i.e. the category of unskilled workers. In the EU15 countries education is an important explanatory factor even after excluding the effect of occupation. In the basic model elementary education constituted a much higher risk in the EU12 countries, which significantly decreased after excluding the effect of occupation in the EU12 member states. The findings of the new model prove that elementary education poses a higher poverty risk in the EU15 member states. It can also be seen that the role of living in a rural area is significantly decreasing in the EU12 member states after including the occupation variable. This cannot be seen examining the EU15 countries. This means that with regard to poverty risk living in a rural area in an EU15 country has a much less significant effect compared to the EU12 countries.

To sum up, it can be stated that by means of the logistic regression model I found different poverty odds in terms of several dimensions with regard to employees living in the old and new member states, therefore my H4 hypothesis – the factors causing working poverty significantly differ comparing the EU15 and EU12 member states – is partly proven.

New research findings

1. I introduced a new deprivation index (EU2010 deprivation index), which I gained by modifying and correcting the official Eurostat deprivation indicator. In my view, a household is regarded as deprived if it is characterised by at least three of the nine deprivation factors of the EU2010 index. The nine factors of the EU2010 index are as follows:

$$D_{EU2010}(d_{hous}, d_{heat}, d_{hyg}, d_{arr}, d_{food}, d_{car}, d_{dur}, d_{liv}, d_{hol});$$

where:

d_{hous} = housing condition
d_{heat} = adequate heating of the house
d_{hyg} = availability of indoor sanitary facilities
d_{arr} = arreas on utility bills
d_{food} = access to adequate food
d_{car} = ability of the household to afford a car
d_{dur} = ability of the household to afford durable consumer goods (computer, television, washing machine, telephone)
d_{liv} = is the income sufficient to make a living
d_{hol} = ability of the household to cover holiday and unexpected expenses

2. I introduced a poverty calculation method which compares poverty to a European poverty threshold (PPP) completed with a deprivation condition to be met, rather than compare to a relative poverty threshold within a nation. The applied formula is as follows:

$$I_e < 0{,}3 \cdot Me_{EU}$$

$$or$$

$$D_t \geq 3 \quad and \quad I_e < 0{,}6 \cdot Me_{EU}$$

where:

$D_ö$ = total deprivation score of a household; $0 \leq D_t \leq 9$
I_e = annual per capita income of a household (PPP)
Me_{EU} = EU27 median income (PPP)

3. I examined the working poor by means of my own method described above, which provides a more realistic description of the situation of the working poor. The findings of the new methodology show significant differences compared to the information previously available on the working poor.

CONCLUSIONS AND RECOMMENDATIONS

In my research paper I intended to justify my supposition that the Eurostat poverty calculation method fails to measure a majority of the deprived and it regards individuals as poor who are otherwise not considered deprived. In fact, this method does not show the rate of the deprived, it rather has a close correlation with income inequality indicators. Due to the methodological problems of the Eurostat method it is not suitable for drawing valid and reliable conclusions on poverty or the situation of the working poor at a regional (EU, EGT) level. I managed to justify my hypothesis in several steps. On the one hand, applying cross-tabulation and analysis of variance and comparing the deprived and the income poor I managed to justify that the method fails to measure a majority of the deprived. As a conclusion we can state that according to the findings the Eurostat definition of poverty based on the national median income does not correlate with deprivation.

My analyses revealed that the Eurostat poverty calculation method is in fact an income inequality indicator. According to Eurostat, poverty rate within a society mostly depends on the extent of income differences in a given member state. To eliminate this inaccuracy I suggest introducing an indicator which, apart from per capita income, reflects the real rate of deprivation. When I calculated the poverty threshold of member states on PPP and I compared these findings to the income poverty rate, I found astonishing results. These findings show that the Eurostat poverty definition hides huge differences. Therefore I suggest introducing a method which uses a single poverty threshold in each EU member state. Consequently, I suggest that instead of the median incomes of member states we use the EU27 median income (PPP) as a reference point in each member state. This new method completely meets the requirements mentioned above, i.e. individuals should be regarded as poor if in their households the per capita equivalent income is lower than 30% of the median income (PPP) of the examined region, or lower than 60% of the median income and an individual is deprived.

My second hypothesis, which is related to the statements mentioned above, says that the Eurostat calculation method does not take into account the disparities in economic development between the old and new member states and therefore constitutes a breach of the European principle of solidarity. I prove this by comparing the new poverty calculation method with the Eurostat method. This step includes testing the new method at the same time. The findings confirm the hypothesis, namely that the Eurostat method fails to reflect the disparities in economic development between the member states. The new method, however

is suitable for providing a more realistic description of the situation. My conclusion is that no significant differences can be seen between the situation of the EU15 and the EU12 countries based on the results of the Eurostat poverty calculation method. The rates of income poverty in 2009 stood at 16.2% and 16.9%. The findings of the new method, however, show significant differences (5.7% and 35.2%), which meets our expectations to a higher extent, given the well-known differences in incomes between the two groups of countries. In line with the principle of European solidarity, the EU should put increased emphasis on the significant social differences, which are hidden in the official statistics.

My hypothesis concerning the working poor – which is the last hypothesis of my research paper – says that comparing the EU15 and EU12 member states we can find significant differences between the factors causing working poverty. This hypothesis was partly justified by applying the basic logistic regression model to examine the EU15 and EU12 member states. It can be seen that there are no significant differences in terms of several factors examined such as gender, age, marital status or the type of household; these sociological features increase working poverty risk to approximately the same extent. The findings, however also show that in terms of certain factors we can find significant differences. Not surprisingly, we can conclude that employees in the EU15 member states have a much lower odds ratio to become working poor. Examining several factors the most significant differences were caused by education, occupation, living in a rural area and migration. Education proved a much more significant factor in the EU12 countries compared to EU15. Despite the fact that there is a clear correlation between education and working poverty risk in both groups of countries, this correlation is less visible in the old member states when comparing elementary and secondary education. In my view – without examining the statement in more detail – this can be attributed to the fact that skilled and unskilled jobs are more appreciated in the old member states than in the new ones. This is probably related to the supply and demand situation on the labour market. A similar conclusion can be drawn regarding factors such living in an urban or a rural area. Working poverty risk is twice as high in the new member states. I think this is due to the fact that the general economic situation in the rural and urban areas is similar, but the general development level of the rural areas is much higher in the old member states. In the comparison it is also important to highlight the situation of migrant employees. Despite the typical trend, migrant employees living in the old member states have a higher odds ratio. In the Results chapter, although it was not closely related to my dissertation, I compared the findings of the basic logistic regression model to the original EU income poverty indicator, which surprisingly revealed much lower differences

in poverty odds in terms of education categories. This means the EU income poverty indicator underestimates the effect of education on poverty risk compared to the corrected poverty index. By highlighting this finding I would like to emphasize that education is an important factor to be considered in examining the odds of becoming poor. The new definition of poverty introduced in my paper gives a much higher priority to education as an important factor influencing poverty. Therefore I suggest that special attention should be paid to education in further studies on the working poor or on examining the possible solutions to this problem as a phenomenon.

Based on the findings of the logistic regression model on the EU15 and EU12 countries – despite the fact that they only justified my hypothesis in part – I still suggest studying the differences further. In my view, applying the logistic regression model even at a member state level might reveal further interesting differences. A detailed analysis of the revealed differences could help identify the employment policy measures which would considerably reduce poverty risk in certain member states. The examination of the effect of family taxation on poverty risk could also be a subject of a further study. It could be interesting to examine to what extent the French taxation model reduces poverty risk according to the size of households compared to other member states. I believe several studies could be conducted using the methodology described above in my dissertation.

In addition, the model including the occupation categories revealed that the single effect of education decreases considerably after including the occupation factor, which means that the dominant effect of education was partly attributed to occupation. This is especially true of the EU12 member states as in the EU15 countries education remained a significant factor even after excluding the effect of occupation. As a conclusion, my suggestion is that given the fact that sectoral wages significantly affect working poverty risk, national social welfare policies should aim to provide sufficient incomes to employees in order to minimise their poverty risk and to help them achieve reasonable living standards.

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