Occurrence of low work intensity in Slovakia in relation to assessment of poverty and social exclusion

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Abstract

One of the goals of the strategy EUROPE 2020 is to reduce the number of persons of the EU that are threatened by poverty or social exclusion by 20 million. In order to monitor the progress of achieving this goal, the indicator AROPE (at risk of poverty or social exclusion) is used, which reflects 3 dimensions: income poverty, material deprivation and low work intensity. The article deals with the third dimension that is measured by low work intensity rate while a household with low work intensity is a household whose adult members aged 18-59 years worked an average of less than 20 % of their total work potential during the reference period.

The article focuses on the identification of factors that impact the occurrence of low work intensity in Slovak households and the quantification of the influence of these factors. A special attention is paid to mapping of regional disparities. Empirical analyses are based on data from survey EU SILC.

***Keywords*:** *poverty and social exclusion, low work intensity, EU SILC − European Union Statistics on Income and Living Conditions, logistic regression*

***JEL Classification*:** C51, C52, R29

1. Introduction

The paper focuses on mapping of occurrence of Slovak households with low work intensity (LWI) in the breakdown of various relevant variables. For a more comprehensive picture of the impact of individual variables on the danger of LWI, this article presents results that result from application of various statistical methods. The presented findings are based on analysis of the LWI rate. This rate serves to measure the exclusion from labour market and to monitor the progress towards achieving of the goal of poverty and social exclusion according to the strategy Europe 2020. There are several scientific works that focus on analysis of poverty and social exclusion in Slovakia such as (Bartošová and Forbelská, 2010; Gerbery, 2013; Labudová et al., 2010; Labudová, 2012; Mysíkova et al., 2015; Sipková and Sipko, 2014; Želinský, 2012) that were inspiration to write this article.

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The second chapter of the article briefly compares the LWI rate and the unemployment rate in the Slovak republic and European countries. Identification of relevant factors and quantification of their influence on occurrence of LWI in Slovak households is performed in other parts of the article.

2. Low work intensity rate in Slovakia and other European countries

Before we proceed with the analysis itself, let's look at the work low intensity rate in various European countries (Fig. 1).

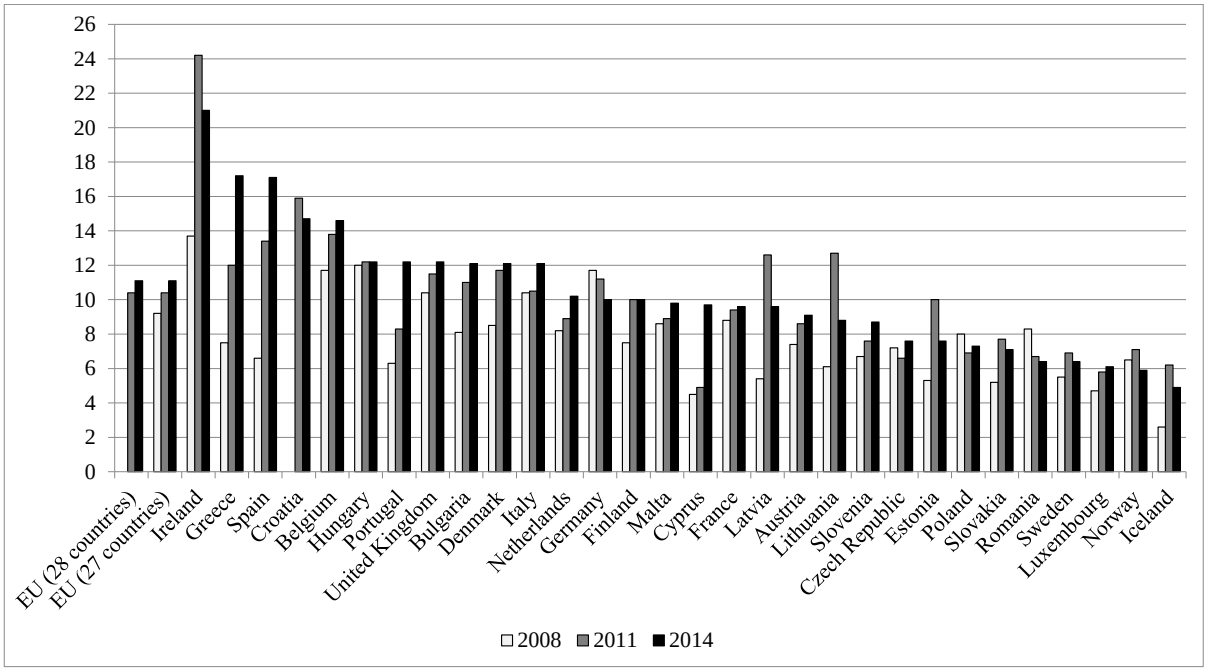

Fig. 1. Low work intensity rate in particular European countries.

Source: Eurostat, own processing.

Among the Member States of EU, the highest LWI rates in 2014 were recorded in Ireland (21.0%), Greece (17.2%) and Spain (17.1%). It is obvious that the indicator is related to the unemployment rate. This was also confirmed by the fact that in 2014 Greece and Spain had the highest unemployment rates (26.5% and 24.5% respectively). Relatively high unemployment rates were also observed in Croatia (17.3%), Cyprus (16.1%) and Portugal (14.1%). In 2014 in comparison to 2008 the LWI rate in the above mentioned countries rose by more than 5 pp (in Spain by 10.7 pp, in Greece by 9.7 pp, in Ireland by 7.3 pp, in Portugal by 5.9 pp and in Cyprus by 5.2 pp). In both the EU 27 and Slovakia the proportion of people living in households with LWI increased by 1.9 pp in 2014 in comparison to 2018. It is quite surprising that on one hand,

Slovakia belongs to countries with relatively low value of the LWI rate (7.1% in 2014) and on the other hand, has one of the highest unemployment rates (13.2% in 2014).

Generally, we can say that countries with a high unemployment rate have a high LWI rate and vice versa. Using the Pearson correlation coefficient (r = 0.6131 (*p-value* = 0.0003)) and the Spearman correlation coefficient (r_s = 0.5120 (*p-value* = 0.0038)) a moderate positive relationship between stated rates was measured.

3. Selection of relevant factors and database adaptation

The presented analysis is based on EU SILC 2014 data that were collected in 5,490 Slovak households. Individual data about households and persons provided by the Statistical Office of the Slovak Republic were for the purpose of our analysis merged into one data file based on the household identification number and the personal identification number. The selection units were economical households[3]. To combine the household and personal data we kept only statistical units for heads of the households (the variable *VZT_OS* has been used).

The influence of available variables from EU SILC survey on the occurrence of LWI (represented by the binary variable *LWI*[4]) has been verified by means of various statistical tests for association such as Pearson Chi-Square test, Likelihood Ratio Chi-Square test, Mantel-Haenszel Chi-Square test as well as through the Stepwise regression method in logistic regression.

All used methods confirmed that occurrence of LWI is mostly affected by economic activity of the household members. Our research showed that the proportion of people living in households with LWI in case of households with at least 2 adults is nearly in deterministic relationship with economic activity of adult persons (variable RB210). We found out that within households with at least 2 adults the most vulnerable households were the ones where both adults were unemployed. These households represented more than 50% from all the households with low intensity of work. Moreover, households with at least one unemployed adult member, represented nearly 79% of the all complete households with low intensity of work.

Given that the objective was to point out regional disparities, we decided not to include variable RB210 – basic activity status in the next analysis, mainly because of its close

[3] Economical households are private households consisting of persons in a flat that live together and manage the household together including covering living needs together. As a sign of co--managing it is considered payment of basic household costs together (food, accommodation costs, energy, gas ...etc.)

[4] LWI = 1 if a household had low work intensity in corresponding year otherwise LWI = 0.

relationship to the region where the household is located. The resulting multicollinearity has caused problems with interpretation of regression parameters.

The second most important factor, from the point of view of impact on occurrence of LWI, is the household type. According to (Eurostat, 2015) in the majority of EU countries, LWI is most common in households with a single adult with dependent children and in single-person households and Slovakia adheres to this pattern as well (see Fig. 2).

In category of complete households, the most vulnerable group are households with two adults with at least three dependent children. If the head of those households is an unemployed or inactive person, their probability of LWI is nearly 75% and more than 50%, respectively. From the category of households with children the smallest threat of LWI have households with two adults and two dependent children. Households with an employed head of the household were endangered with LWI very rarely.

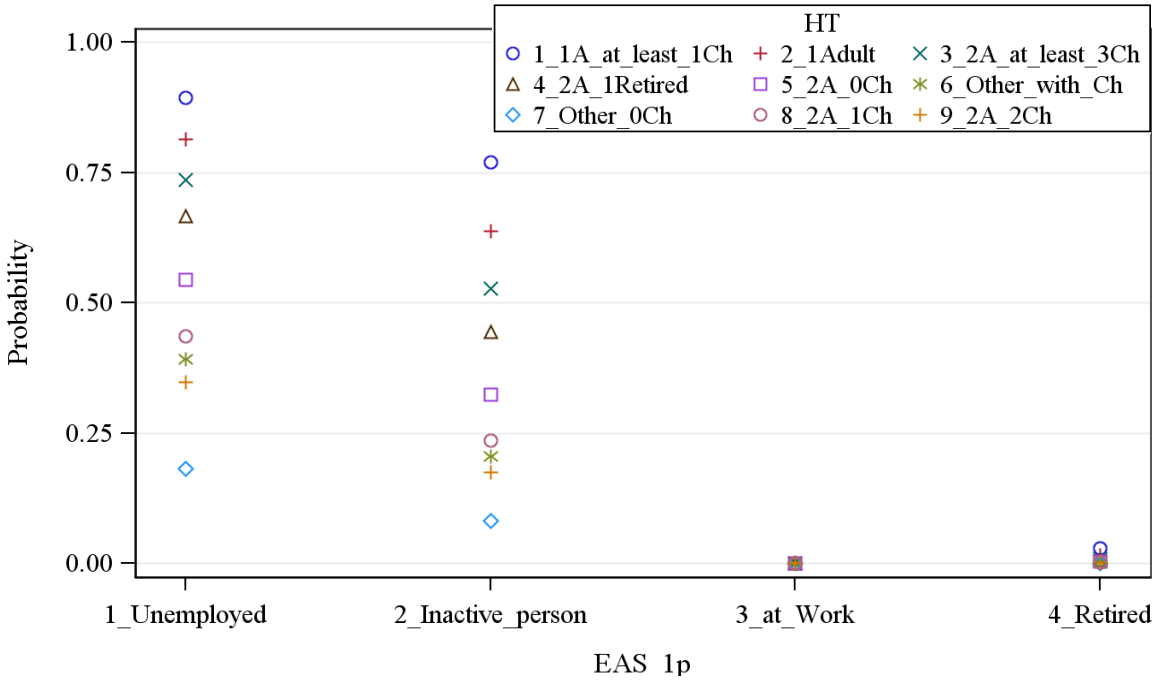

Fig. 2. Predicted probabilities of low work intensity according to the type of household and economic activity status of household head.

Source: EU SILC 2014, authors' own elaboration.

It is known that Slovakia has been long one of the countries with economic and social disparities between regions. There are different opportunities in the labour market in various regions. Therefore, it is not surprising that the region and the degree of urbanisation have relevant effect on occurrence of LWI. Other important factors that have been proven by our

analysis were variables *Age*, *Education*, *Marital status* and *Health* of household head. Because the variable *Marital status* was a source of multicollinearity, it was, similarly to the economic activity of household head, excluded from the further analysis.

	Original variables (EU SILC) – values and description	New names of dummy variables	
HT – Household typ		**HT**	
5	Single person	1Adult	
6	Two adults, no dependent children,	2Adult_0Ch	
7	Two adults, no dependent children, at least 1 adult 65+	2A_1Retired	
8	Other households without dependent children	Other_0Ch	
9	Single person with one or more dependent children	1A_at_least_1Ch	
10	Two adults with one dependent child	2A_1Ch	
11	Two adults with two dependent children	2A_2Ch	**B**
12	Two adults with three or more dependent children	2A_at_least_3Ch	
13	Other households with dependent children	Other_with_Ch	
DB100 – Degree of urbanisation		**URBANISATION**	
1	Densely populated area	Dense	**B**
2	Intermediate area	Intermediate	
3	Thinly populated area	Sparse	
PE040 – Highest ISCED level attained		**EDUCATION**	
0	Less than primary education		
1	Primary education	Less_than_Secondary	
2	Lower secondary education		
3	Upper secondary education	Upper_Secondary	
4	Post-secondary non-tertiary education	Post_Secondary	
5	Short cycle tertiary	Tertiary_1	
6	Bachelor or equivalent		
7	Master or equivalent	Tertiary_2_3	**B**
8	Doctorate or equivalent		
PH010 – General health		**HEALTH**	
1	Very good	Good	
2	Good		
3	Fair	Fair	
4	Bad	Bad	**B**
5	Very bad		
PX010 – Age at the end of the income reference period		**AGE**	

Table 1. Original[5] and new categories of explanatory variables.

Source: EU SILC 2014, authors' own elaboration.

[5] For a correct interpretation it is necessary to take into account the description of relevant variables that is stated on the following website: http://ec.europa.eu/eurostat/web/income-and-living-conditions/methodology/list-variables.

There has been no significant difference between levels of some of relevant variables regarding the chance of the household suffering from LWI. For this reason these levels have been combined. To make the results more transparent the variables have been renamed and the original and new codes of variables are displayed in Table 1.

For every nominal variable so-called dummy variables have been created while the reference category is in Table 1 marked by the letter B. The variable *Region* remained unchanged and its variations are labelled by the whole name of region.

4. Examination of individual effects by logistic regression

The above mentioned explanatory variables have been included in the final logistic model. Using logistic regression (Allison, 2012; Rublíková et al., 2009) it is possible to quantify what effect an individual explanatory variable has on the probability of being in a LWI household, while it controls the effect of other variables. Table 2 shows that all the variables described in Table 1 and variable *Region* are significant risk factors.

Type 3 Analysis of Effects

Effect	DF	Wald Chi-Square	Pr > ChiSq
HT	8	95.9301	<.0001
AGE_1p	1	174.6914	<.0001
URBANISATION	2	31.7007	<.0001
REGION	7	24.2792	0.0010
EDUCATION_1p	4	46.4896	<.0001
HEALTH_1p	3	67.2744	<.0001

Hosmer and Lemeshow Goodness-of-Fit Test

Chi-Square	DF	Pr > ChiSq
8.7254	8	0.3660

Table 2. Wald test of significance of variables contribution
and Hosmer–Lemeshow test of adequacy.
Source: EU SILC 2014, authors' own elaboration within SAS Enterprise Guide.

To assess the model fit and adequacy of the logistic model we used *Akaike Information Criterion* (*AIC*), *Schwarz Criterion* (*SC*) and the measures of association: *Somer's D (0.678), Goodman-Kruskal Gamma (0.678), Kendall's Tau-a* (0.054) and *c* – the measure of rank correlation of ordinal variables (0.839). The success of prediction based on the estimated logistic regression model was nearly 84%. Although it is less than in case of model with explanatory variable – Economic activity of household head, it is still sufficient and Hosmer–Lemeshow test (Hosmer et al., 2013) confirmed the adequacy of the model with relevant variables listed in Table 3. Point estimates of parameters of the logistic regression model and

tests of the model parameters significance are listed in Table 3. Table 3 also shows estimates of odds ratio which inform how much more (or less) likely the given group is to be in a low work intensity household than the reference group (see Table 1).

Parameter		Estimate	Wald Chi-Square	Pr > ChiSq	Odds Ratio
Intercept		-3.7785	38.8836	<.0001	
HT	**1A_at_least_1Ch**	2.4894	24.8644	<.0001	**12.054**
HT	**1Adult**	2.5741	42.7369	<.0001	**13.119**
HT	**2A_at_least_3Ch**	1.5958	12.5271	0.0004	**4.932**
HT	**2A_1Retired**	1.8448	12.7747	0.0004	**6.327**
HT	**2A_0Ch**	2.0592	24.8189	<.0001	**7.840**
HT	**Other_with_Ch**	1.5061	13.3817	0.0003	**4.509**
HT	**Other_0Ch**	0.8192	3.1030	0.0781	**2.269**
HT	**2A_1Ch**	0.7205	2.6022	0.1067	**2.055**
AGE		-0.0924	174.6914	<.0001	**0.912**
URBANISATION	**Sparse**	1.2638	24.5484	<.0001	**3.539**
URBANISATION	**Intermediate**	0.6218	5.7242	0.0167	**1.862**
REGION	**Presov**	0.9550	5.5988	0.0180	**2.599**
REGION	**Kosice**	1.2430	10.5986	0.0011	**3.466**
REGION	**BanskaBystrica**	0.9785	6.1346	0.0133	**2.661**
REGION	**Nitra**	0.5678	1.9231	0.1655	**1.764**
REGION	**Trencin**	0.6371	2.2805	0.1310	**1.891**
REGION	**Trnava**	0.0876	0.0379	0.8457	**1.092**
REGION	**Zilina**	0.7476	3.3291	0.0681	**2.112**
EDUCATION	**Less_than_Sec.**	2.3006	36.6994	<.0001	**9.980**
EDUCATION	**Upper_Secondary**	1.4247	17.3786	<.0001	**4.157**
EDUCATION	**Post_Secondary**	1.2507	4.1688	0.0412	**3.493**
EDUCATION	**Tertiary_1**	-1.1386	0.9388	0.3326	**0.320**
HEALTH	**Bad**	1.7676	64.3464	<.0001	**5.857**
HEALTH	**Fair**	1.0567	31.5216	<.0001	**2.877**

Table 3. Logistic regression model and odds ratios of low work intensity.

Source: EU SILC 2014, authors' own elaboration within SAS Enterprise Guide.

As we found out in the previous analysis the most threatened household groups are incomplete households i.e. single-person households and households with single adult and one or several dependent children. These households have approximately 13 (12 respectively) times higher probability of low work intensity than households with two adults and two dependent children. Households with two adults have significantly lower risk. From all the complete households the most vulnerable households are the ones that have two adults without dependent children. In contrast to the former analysis (Fig. 2) the logistic model shows that households of

two adults and at least three children have a lower threat of LWI than the previously stated household type. Probability of LWI in case of households of two adults and at least three children is nearly 5 times higher than for reference category of households. With respect to the analysed risk there are no significant differences between households with two adults and one dependent child and households with two adults and two dependent children.

Another interesting finding is that the increase of age of household head result in a decrease of risk of suffering from low work intensity.

In terms of population density, thinly populated areas have the worst situation. Households living in areas with sparse urbanisation have to face 3.5 higher risk of LWI than households which live in densely populated areas. This is likely due to worse job opportunities and higher joblessness in rural areas than in urban areas.

If we take into account regional aspect there are significant disparities between individual Slovak regions in terms of occurrence of LWI. In Table 3 we can see that Eastern Slovakia (Kosice and Presov region) and Central Slovakia (Banska Bystrica and Zilina region) have a significantly (at confidence level 0.1) higher probability of being in a low work intensity household than Bratislava region. Providing the constancy of relevant explanatory variables we can say that households from Kosice region have nearly 3.5 times higher risk of LWI than households from Bratislava region. The logistic regression model revealed that there is no significant difference between Bratislava region and Trnava region.

Based on our analysis it has been clearly proven that the increase of educational qualification has a positive impact on the reduction of danger of LWI. Where the household head has a lower secondary or a primary education the odds of LWI is nearly 10 times as high as where the household head has tertiary education ISCED level 7 or level 8.

Last but not least, health condition plays an important role in use of labour potential of adult household members. If the health of the head of the household is considered as bad or very bad then the danger of LWI is nearly 6 times higher than in households where the household head perceives his/her health as good or very good.

Conclusion

Based on the Chi-squared tests of association and logistic regression used on the EU SILC 2014 data we discovered that occurrence of low work intensity within Slovak households significantly depends on household type, region and degree of urbanisation of the place where the household lives and factors related to the household head: age, economic activity status, educational attainment, health and marital status. Although the most significant factor was the

economic activity status we did not take it into account in the final logistic model due to significant collinearity with the variable *Region*. Since our partial aim was to analyse regional disparities we prioritized the variable *Region*. Because of the significant contribution to the multicollinearity we did not include the variable *Marital status* into the final logistic regression model either.

In terms of low work intensity in Slovakia, the most vulnerable households are incomplete households i.e. single-person households and households with single adult and at least one dependent child living in thinly populated areas in Eastern Slovakia where the head of the household is a person with primary or low secondary education who perceives his/her health condition as very bad or bad. On the other hand, the least endangered households are complete households (especially with 1 child or 2 children) living in densely populated areas, in Bratislava or Trnava region and where the household head has a tertiary education and perceives his/her health as good or very good. The impact of the particular variables was quantified through use of the odds ratio.

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