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OVER-INDEBTEDNESS OF HOUSEHOLDS IN POLAND AND ITS DETERMINANTS

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Abstract. The aim of this study is to identify determinants of over-indebtedness of Polish households, measured by negative margin. The method of logistic regression was applied in order to achieve the main objective of the study. The source material was individual data of the *Household Budget Survey in 2011*. The survey was conducted by Central Statistical Office of Poland (GUS). The research results show that over-indebtedness of Polish households, measured by negative margin, is most influenced by: the age and education level of the household head, belonging to a socio-economic group, biological type of family and household income.

Key words: household over-indebtedness, socio-economic determinants, logistic regression, Polish households, measures of over-indebtedness

INTRODUCTION

Nowadays indebtedness is something natural, accompanying households in everyday life [Haas 2006]. The phenomenon of households indebtedness is very common in developed countries with modern financial systems. Over the last decades the attitude to a credits has changed considerably and nowadays it has become a part of a modern consumer society [Lea et al. 1995]. Households in some way accustomed to live on credit, and treat it as a common source of financing their needs and desires [Raijas et al. 2010].

However, a dynamic increase of both, the volume and value of credits granted to households can contribute to the creation of over-indebtedness if households' finances are mismanaged and if their financial awareness is low and financial education is inappropriate [Świecka 2008, 2009, Bywalec 2009].

Over-indebtedness is a relatively new term, not having a single definition. So far, there is no general agreement on the definition of over-indebtedness, how to measure this

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phenomenon and where is the border between indebtedness and over-indebtedness [Betti et al. 2007]. As noted by OXERA [2004], many analysis concerning over-indebtedness focus on construction of various types of measures, with frequent omission of a clear definition of over-indebtedness.

Schicks [2010] emphasizes that the literature of over-indebtedness not always distinguished the definitions from measures or indicators. Disney et al. [2008] believe, that although there is no agreement on the definition of over-indebtedness, this term should not be equated with high levels of debt. However there is no agreement in the literature about which is the best indicator to study the over-indebtedness [Bryan et al. 2010, Russell et al. 2011]. Despite the fact that there is no universally accepted definition of over-indebtedness, this phenomenon is often treated as a problem with the repayment of financial liabilities.

At the European level many attempts were made to characterize the phenomenon of over-indebtedness using various measures. For the measurement of this phenomenon, the European Commission proposes to use three models (Fig. 1): objective, subjective and administrative [Betti et al. 2001, 2007, Świecka 2008, 2009, Russell et al. 2011].

Objective ratios are the measurable, based on quantitative data. They include such measures as the consumption/income ratio, the debt/asset ratio or the debt payment/income ratio, describing the possibilities of debt repayment [Betti et al. 2007].

Objective measures also include the ratio based on arrears (arrears indicator). A house-hold is considered to be over-indebted if it has arrears in credit repayment and/or paying liabilities connected with flat maintenance exceeding three months [Fondeville et al. 2010].

The subjective model assumes that household members know their own financial situation the best. Thus, subjective measures take into account the views of families concerning debt repayment problems. A household is over-indebted if it assumes that debt repayment constitutes too large a financial burden [Kempson 2002, Gumy 2007].

Administrative measures of over-indebtedness, in turn, are based on official data concerning the formal procedures of acting in over-indebtedness cases.

One of the objective measures of household over-indebtedness is margin [Johansson and Persson 2006, Zajączkowski and Żochowski 2007]. Margin is the amount that stays

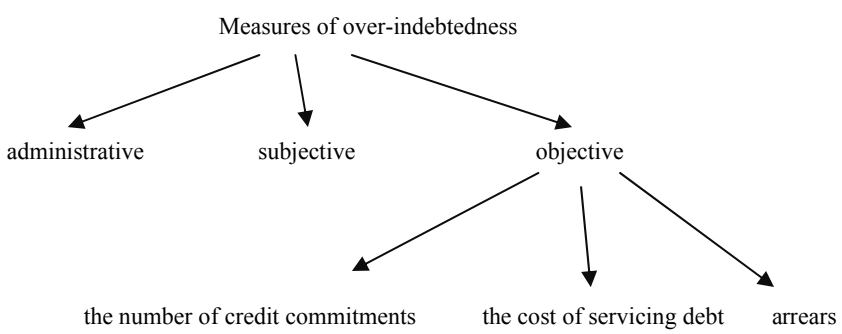

Fig. Measures of household over-indebtedness
Source: Own work.

in a household after deducting current income by the amount allocated for debt repayment and other fixed expenditures. Margin can be determined by basic types of expenditure method – household income is reduced by the amount of real incurred fixed expenditures such as rent, energy and by expenditures on basic goods and services such as food, transport, housing, water. The negative margin may indicate financial problems of household. It means an inability of household to repay debt and basic expenses from a current income [Zajączkowski and Żochowski 2007].

Objective measures of over-indebtedness are generally considered as more accurate and reliable. Despite this, many researchers based their analysis on subjective measures, claiming that the household is the best expert of their financial situation [Schicks 2010]. On the other hand, the undoubted disadvantage of subjective measures is that it depends on individual interpretation and feelings of the respondents, which differ between individual households, as well as between countries [Fondeville et al. 2010].

AIM OF THE PAPER, MATERIAL AND METHODS

The aim of this study is to identify determinants of over-indebtedness of Polish households, measured by negative margin. The study was based on data from the *Household Budget Survey in 2011*, which was conducted by Central Statistical Office of Poland (GUS). The study involved 37,375 households, of which 30% were indebted. Analysis was performed on indebted households with the use of logistic regression. Logistic regression is a method used with the dichotomous dependent variable. Independent variables can be both qualitative and quantitative. This method is often used to examine the probability of occurrence of an event Y, provided the occurrence of events $x_1, x_2, \ldots, x_n$ [Stanisz 2007]. The logistic function that the logistic regression model is based on has the following formula [Stanisz 2007]:

$$P(Y) = \frac{e^{(\beta_0 + \beta_1 X_1 + \beta_k X_k)}}{1 + e^{(\beta_0 + \beta_1 X_1 + \beta_k X_k)}}$$

where:
$P(Y)$ – the probability that variable Y will equal 1 for the independent variable value X_k;
Y – dichotomous dependent variable;
X – individual socio-economic traits of the household and the head of the household;
β – structural parameters of the model.

The following dichotomous variables were used in a model:

- The variable assumes the value of 1 for over-indebted households (with negative margin),
- The variable assumes the value of 0 for households without problem with over-indebtedness (with positive margin).

In order to interpret the logit model an expression called the odds ratio is usually used, which is the ratio (*OR*) between the occurrence probability of a phenomenon and the probability that the phenomenon will not take place:

In order to estimate the parameters of logistic regression model a set of independent variables was assumed, which characterises different socioeconomic aspects of households. Then the variables were presented in Table 1.

Table 1. Independent variables assumed in logistic regression model

Trait (Independent variable)	Response categories[a]
Biological type of family	childless couples
	couples with 1 child
	couples with 2 children
	Couples with 3 or more children
	single-parent families
	couples with dependent children and others
	a single person with dependent children and others
	other
	single non-familial
Type of place	city with population over 500 thousand inhabitants and more
	city with population 200–499 thousand inhabitants
	city with population 100–199 thousand inhabitants
	city with population 20–99 thousand inhabitants
	city with population less than thousand inhabitants
	village
Age of the household head	25–34
	less than 24
	35–44
	45–54
	55–64
	over 65
Socio-occupational group	staff of private or public sector
	farmers
	self-employed
	retirees and pensioners
	living on unearned sources
Income	Quintile I
	Quintile II
	Quintile III
	Quintile IV
	Quintile V
Education household of the level head	primary school and lower
	vocational/middle school
	secondary
	higher education
Sex of the household head	man
	woman

[a]Reference categories marked in bold type.

Source: The authors' own compilation based on the *Household Budget Survey in 2011* [GUS].

In order to avoid collinearity in the estimation of logit model parameters selected categories of each qualitative variable were omitted, which in consequence led to the generation of a reference group in comparison with which the results were analysed [Daras and Jerzak 2005].

The reference group in logit models consists of the households where the heads of households are:

- man;
- aged 25–34;
- people with higher education;
- living in big cities with population over 500,000 inhabitants;
- staff of private or public sector;
- childless couples;
- with low income (quintile I).

RESULTS

As mentioned in the introduction, in 2011 in Poland, about every third household was indebted. Every tenth household repaying debts was over-indebted in terms of a negative margin. This means that their current income was not enough to cover basic expenses and debt repayment. Over-indebted households spend for debt repayment nearly 1,000 PLN per month (Table 2). The value of the regulated amount of debt in households with negative margin accounted for 13% of the total amount of debt service.

Table 2. Characteristics of over-indebted households (with negative margin)

The share of households in the total amount of debt service (%)	The share of over-indebted households in a numer of indebted households (%)	The value of repaid credits (PLN·month^{-1})			
		average	QI	QII	QIII
13	9.2	969	220	454	933

Source: The authors' own compilation based on Household Budget Survey in 2011.

This part of paper attempts to identify the strength and direction of impact of socio-economic traits on the over-indebtedness of Polish households. The results of logit model estimations are shown in Table 2. The variable assumes the value of 1 for over-indebted households (with negative margin) and the value of 0 for the households without problem of over-indebtedness (with positive margin). Presented model, due to the unbalanced research sample, takes into account the adjusted cut-off point (0.09). In addition, bold typed traits in Table 2 are reference categories in relation to which the interpretation of the results are made.

As a result of statistical insignificance one variable was eliminated from the model: sex of the head of household. Other variables, i.e.: the level of education, type of place, belonging to a socio-economic group, biological type of family, income and the age of the household head were statistically significant.

Overall classification accuracy of the model is quite high and amounts 77%. The model correctly classified 70% of over-indebted households and as much as 78% of households without problem of over-indebtedness. In the case of logit model a low level of pseudo-R^2 is determined by a large number of observations and binary variables [Gruszczyński 2002].

As shown in Table 3, one of the key factors influencing dealing with a debt service is the education level of household head. The data in Table 3 shows that the lowest risk of over-indebtedness measured by negative margin have households run by people with higher education, which constituted a reference group. The lower education level of household head, the greater is the risk of over-indebtedness. The households run by people with primary education or lower the had almost three times higher chances to be over--indebted than households run by people with higher education.

The reasons for this situation can be seen, among others, in higher-income of better educated people. The results of a research indicate that with an increase in the level of education increases also household incomes. Only 4% of households with at most primary education is in Quintile V of income, while among households with higher education this percentage is as high as 60%. Income in households of better educated people is able to fully cover both, the expenditure related to the basic functioning of household, as well as the repayment of debt.

The ability of households to service debt is relatively weakly differentiated by type of place. As indicated by the data in Table 3, a statistically significant difference was observed only in the households from small cities (with a population of 20–99 thousand). The likelihood of over-indebtedness was in these households almost 30% lower than in households from very big cities (over 500 thousand inhabitants).

The risk of over-indebtedness in the aspect of negative margin also differs in socio--economic groups. The lower chances of being over-indebted was characterized by households of staff of private and public sector, which constituted a reference group. In turn, the most vulnerable for over-indebtedness were households run by farmers, where the risk of a negative margin was almost five times higher than in households of staff of private and public sector. Statistically significant differences were also recorded in the households of self-employed. The risk of over-indebtedness in these households is more than a half higher than in households of staff of private and public sector.

Another factor determining household over-indebtedness in terms of negative margin is the biological type of family. The reference group constituted in this case, households of a pairs without children. As shown in Table 3, this group of households is much more threatened by over-indebtedness than other types. The exception here were single-person households, were the chances to be over-indebted is the highest. The risk of a negative margin was in their case almost twice higher than in households of couples without children.

As indicated by the parameters of the logit model, the probability of over-indebtedness decreases with the increase of the number of dependent children. In the households run by couples with one child the risk of over-indebtedness is about one third lower than in households run by couples without children. In households run by couples with two children it is almost half lower (45%), and households of couples with three or more children – more than half (57%) than in households of childless couples.

Table 3. The parameters of logit model (1 – households is over-indebted, with negative margin)

Variable[a]	B_i	Significance[b]	Significance level	exp (B_i)
Level of education				
higher		***	0.000	
primary school and lower	1.075	***	0.000	2.931
vocational/middle school	0.532	***	0.000	1.703
secondary	0.363	***	0.000	1.437
Type of place				
City with population over 500 thousand inhabitants and more		**	0.011	
City with population 200–499 thousand inhabitants	–0.053		0.758	0.948
100–199 Thousand inhabitants	0.092		0.599	1.096
20–99 Thousand inhabitants	–0.327	*	0.030	0.721
Below 20 thousand inhabitants	–0.303		0.064	0.739
Village	–0.005		0.970	0.995
Socio-occupational group				
Staff of private and public sector		***	0.000	
Farmers	1.591	***	0.000	4.910
Self-employed	0.448	**	0.006	1.565
Retirees and pensioners	0.132		0.285	1.141
Living on unearned sources	0.320		0.101	1.378
Biological type of family				
Childless couples		***	0.000	
Couples with 1 child	–0.402	**	0.006	0.669
Couples with 2 children	–0.592	***	0.000	0.553
Couples with 3 or more children	–0.838	***	0.000	0.432
Single-parent families	0.051		0.833	1.052
Couples with dependent children and others	–0.934	***	0.000	0.393
Single person with dependent children and others	–0.987	***	0.000	0.373
Other	–0.518	***	0.000	0.595
Single non-familial	0.685	***	0.000	1.983
Income				
Quintile I		***	0.000	
Quintile II	–1.277	***	0.000	0.279
Quintile III	–2.067	***	0.000	0.127
Quintile IV	–2.751	***	0.000	0.064
Quintile V	–3.373	***	0.000	0.034
Age				
25–34 years old		***	0.000	
Less than 24 years old	0.339		0.168	1.404
35–44 years old	0.183		0.163	1.200
45–54 years old	0.332	**	0.011	1.394
55–64 years old	0.687	***	0.000	1.988
65 years old and more	0.489	**	0.006	1.631
Constant	–0.168		0.420	0.845
N		11 111		
Cox's and Snell's pseudo-R^2		0.109		
Nagelkerke's pseudo-R^2		0.237		
Adjusted cut-off point		0.09		
Overall classification accuracy		77.1%		

[a]The bracketed and bold typed traits are reference categories.
[b]Symbols: *significant variables for p <0.05; **significant variables for p <0.01; ***significant variables for p <0.005.

In turn, the least threatened over-indebtedness are households of single people with dependent children and other persons and households of couples with dependent children and other persons. The risk of a negative margin was in these types of households more than 60% lower compared to the reference group (households of childless couples).

The study also indicate that one of the most important aspects of determining the way a households manage their budget, thus affecting the ability to service the debts, is household's income. The parameters of the logit model show that with the increase of income decrease the risk of over-indebtedness. The greatest chances for a negative margin was characterized the households with the lowest income (Quintile I), which formed the reference group. It can also be seen that with the increase of income, decreases the odds ratio, from 0.279 (for Quintile II) to 0.034 (Quintile V). This means that households with income of the second quintile were more than 70% less likely to be over-indebted than households of the poorest (Quintile I), and in the households with the highest income (Quintile V) chances for being over-indebted were reduced by as much as 97%.

A significant impact on the ability of household to service debt has also the age of the household head. Much more likely to be over-indebted in terms of negative margin, were households run by elderly people. The highest risk of over-indebtedness had households run by people aged 55–64. In these households the risk of a negative margin was almost twice as high as in households run by people aged 25–34 (reference group). In the households of the oldest people (over 65), the odds ratio was 1.63; while in households led by people aged 45–54 it was slightly lower and amounted 1.39. Other age groups showed no statistically significant relationship with over-indebtedness.

CONCLUSIONS

The research results show that over-indebtedness of Polish households, measured by negative margin is most influenced by the age and education level of the household head, type of place, belonging to a socio-economic group, biological type of family and income.

The following conclusions can be made on the basis of the conducted logit analysis:

1. Much more likely to be over-indebted in terms of negative margin, were households run by elderly people.
2. The lower the education level of household head, the greater is the risk of over-indebtedness measured by negative margin.
3. The problem of over-indebtedness is relatively weakly differentiated by type of place. In the households from small cities (with a population of 20–99 thousand inhabitants) the likelihood of over-indebtedness was lower than in households from very big cities (over 500 thousand inhabitants).
4. The lower chances of being over-indebted was characterized by households of staff private and public sector staff, whereas the highest chances for being over-indebted had the households of farmers.
5. Single-person households have the highest chances to be over-indebted among all types of families.

6. The probability of over-indebtedness decreases with the increase of the number of dependent children in a family.
7. With the increase of income decrease the risk of over-indebtedness.

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NADMIERNE ZADŁUŻENIE GOSPODARSTW DOMOWYCH W POLSCE I JEGO DETERMINANTY

Streszczenie. Głównym celem pracy jest identyfikacja czynników determinujących nadmierne zadłużenie gospodarstw domowych w Polsce, mierzone ujemnym buforem dochodowym. Cel został osiągnięty z wykorzystaniem metody regresji logistycznej. Dane źródłowe pochodzą z bazy danych Głównego Urzędu Statystycznego – *Budżety gospodarstw domowych z 2011 roku*. Wyniki badań wskazują, że głównymi czynnikami wpływającymi na nadmierne zadłużanie się polskich gospodarstw domowych są: wiek i poziom wykształcenia głowy gospodarstwa domowego, typ miejsca zamieszkania, przynależność do grupy społeczno-ekonomicznej, typ biologiczny rodziny oraz dochód gospodarstwa domowego.

Key words: zadłużenie gospodarstw domowych, czynniki społeczno-ekonomiczne, regresja logistyczna, polskie gospodarstwa domowe, miary nadmiernego zadłużenia

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