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Diversification of Polish Households Based on Credit Portfolio and Margin

Summary

The aim of this paper is to show the diversity of Polish households' financial behaviour in terms of debt as well as to identify households that are characterised by negative margin which is one of the measures of households' over-indebtedness. Moreover, in her paper, the author made an attempt to compare and evaluate two indicators of over-indebtedness: margin and debt-to-income indicator. To achieve the main objective, the cluster analysis method was used. Based on the households' credits portfolio and the level of margin, 13 homogeneous groups of households were generated. Three of them were characterised by negative margin, which classify them as over-indebted.

Key words: household over-indebtedness, Polish households, debt portfolio, cluster analysis, measures of over-indebtedness.

JEL codes: D10, D14

Introduction

The increase of households debt level is characteristic for most developed economies (Bloxham, Kent 2009). Moreover in the theory of economics the debt is perceived as an instrument stabilizing the level of household consumption in time (Gumy 2007; Barba, Pivetti 2009; Świecka 2009), which is directly related to the life-cycle hypothesis (Modigliani, Brumberg 1954). In the early stages of the life cycle of a household, when the demand for funds is high and the level of savings is small, a credit plays an important role. Therefore, saving and borrowing of households are mechanisms for smoothing consumption in time. Households use credits when their incomes are low and save when their income increases (Świecka 2009; Betti et al. 2001).

However, the dynamic increase in the volume and value of loans provided to households, together with financial mismanagement and a lack of financial awareness, due in large part to the scarcity of financial education, can contribute to over-indebtedness (Bywalec 2009; Świecka 2008, 2009). It is therefore necessary to distinguish two types of terms: indebtedness and over-indebtedness. (Russell et al. 2011; Gumy 2007; Disney et al. 2008).

Overindebtedness is a relatively new term which, because of its complex and multidimensional nature has not yet been clearly interpreted (Świecka 2008, 2009; Keese 2009;

Kempson 2002; Schicks 2010; Bricks, McKee 2010; Carpentier, van den Bosch 2008; Bryan et al. 2010; Russell et al. 2011; D'Alessio, Iezzi 2012; Bridges, Disney 2004; Kempson et al. 2004; Betti et al. 2007; OXERA 2004).

So far many different indicators of over-indebtedness was created. Household can be regarded as being at risk of over-indebtedness if a significant part of their income is spent on debt service. Therefore, one of the most often measures of over-indebtedness is debt service ratio. For gaining information on whether the debt servicing costs are not excessive, it is necessary to determine the threshold of this indicator. In the literature it is taken at the level 20-50% (Rebiere 2007; Carpentier, Van den Bosch 2008; DeVaney 1994; DeVaney, Lytton 1995; Faruqui 2006; MORI 2003; OXERA 2004; D'Alessio, Iezzi 2012; Beer, Schürz 2007; Kempson 2002).

Another indicator used in the researches of over-indebtedness is margin¹ (Zajączkowski, Żochowski 2007; Johansson, Persson 2006). Margin is the amount that stays in a household after deducting current income by the amount allocated for debt repayment and other fixed expenditures. 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.

Other indicators measuring over-indebtedness are based on arrears (D'Alessio, Iezzi 2012; Carpentier, van den Bosch; 2008 Bryan et al. 2010; Disney et al. 2008), the number of credit commitments (D'Alessio, Iezzi 2012; Bryan et al. 2010; Disney et al. 2008) or a subjective assessment of the financial situation of household (D'Alessio, Iezzi 2012; Carpentier, van den Bosch; 2008 Bryan et al. 2010; Disney et al. 2008).

Households behaviors, including financial behaviors in terms of debt and managing own budget, are very diversified. This diversification is shaped by different socio-economic factors of proximal and distal environment in which a household operates. Considering the above, it seems reasonable to divide the households into smaller, more homogeneous groups.

In recent years, more and more attempts of typology of households, individual consumers or countries of similar financial behavior are being made. In addition, the dynamic development of computational techniques and data analysis software significantly enhances the analytical capabilities. Traditional, *a priori*, methods of typology based most often on the demographic criterion, are increasingly being replaced by modern methods, in which the typological groups are defined *post hoc*, where heterogeneous collections are grouped in smaller, homogeneous subsets.

Accordingly, the construction of econometric and statistical models based on traditional methods of analysis, often seems to be insufficient. Nowadays in the typology of financial behavior of individual consumers or households, it can be observed the increasing use of multidimensional data analysis methods, especially cluster analysis (Machaue, Morgner 2001; Fünfgeld, Wang 2009; McDougall, Levesque 1994; Gunnarsson, Wahlund 1997; Beer

¹ Margin was 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.

et. al. 2006; Fatuła 2010; Smyczek 2001; 2011; 2012a; 2012b; Gola 2012; Anioła, Gołaś 2011a; 2011b; 2012; Adamczyk, Anioła 2011).

Materials and methodology

The aim of this paper is to show the diversity of Polish households' financial behavior in terms of debt as well as an identification of households that are characterized by a negative margin.

The study was based on data from Household Budget Survey in 2011, which was conducted by Central Statistical Office of Poland. The study involved 37 375 households, of which 30% were indebted. Analysis was performed on indebted households with the use of cluster analysis.

Table 1

Indicators of cluster analysis – having (YES) or not having (NO) particular kinds of credits and negative margin

Indicators	Clusters												
	1	2	3	4	5	6	7	8	9	10	11	12	13
mortgage	NO	YES	YES	NO	NO	NO	NO	YES	NO	NO	NO	YES	NO
debt in credit card	NO	NO	NO	NO	YES	NO	NO	NO	NO	YES	NO	NO	NO
credit in bank	YES	NO	YES	NO	YES	NO	YES	YES	YES	NO	NO	YES	YES
credit in other institutions	NO	NO	NO	NO	NO	YES	NO	NO	YES	YES	YES	NO	NO
loans from private persons	NO	NO	NO	YES	NO	NO	NO	YES	NO	NO	NO	NO	YES
margin <0	NO	NO	NO	NO	NO	NO	YES	NO	NO	NO	YES	YES	NO
number of households	5 640	1 786	619	189	846	727	623	20	349	49	60	47	97
% of households	51,0	16,2	5,6	1,7	7,7	6,6	5,6	0,2	3,2	0,4	0,5	0,4	0,9

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

The cluster analysis, non-hierarchical, k-means method was used to study the composition of households' debt portfolio. Due to the size of research sample and qualitative dependent variable data-mining module was used. The basic criterion for the classification using cluster analysis were different financial products, as well as the level of margin. Cluster analysis was conducted on the basis of 5 variables representing different forms of debt (mortgage, debt in credit card, credit in bank, credit in other institutions² and loans from

² Institutions other than banks, eg. shadow banks, quasi-banks.

private persons) as well as the level of margin. If the margin is negative (smaller than 0), a household is perceived as over-indebted, because the income is not sufficient to cover basic expenses of household and debt repayment. The fact of declaring (yes-no) by a household the listed above forms of debt and the level margin (yes=the margin is below 0, household is over-indebted) was a basis for identification and naming the types of households (table 1).

The obtained results were the basis for profiling clusters (types of households). The profiling was conducted by cross-tabulation using contingency tables, which show the simultaneous distribution of several features.

Research results

Conducted cluster analysis based on the structure of households credit portfolio and the level of margin allowed to distinguish and identify 13 homogeneous groups of households. Three of them, clusters: 7, 11 and 12 were characterized by a negative margin, which classifies them as over-indebted (table 2). Distinguished clusters were characterized by following features:

Cluster 7 – the most numerous group of households characterized by a negative income margin (average margin equals -703 PLN). This group is represented by 623 households, i.e. 5.6% of the analyzed population. The debt to income ratio in this cluster was rather high and amounted to 48%. In every third household (36%) debt-to-income ratio exceeded 30%. The credit portfolio was dominated by credit in banks (44% of incomes). Households from this group were characterized by the lowest income (1004 PLN), and as many as 45% of households obtained income of the first quintile.

The households from cluster 7 were characterized by the following socio-economic features:

- The highest age of the head of household (54 years old), every fourth household is run by person above 65, and every third – by persons aged 55-64 (30%).
- Relatively high percentage of single family households (20%).
- Almost half of the households is run by retirees and pensioners (48%), relatively high percentage of farmers' households (10%).
- Relatively high percentage of households from rural areas (60%).
- Very low level of education of the head of household, every fourth household is run by people with no more than primary education, and almost 40% - by people with vocational or middle school education.

Cluster 11 is formed by only 60 households (0,5% of analyzed population). Debt to income ratio was relatively high and amounted 34%, and debt to income indicator was bigger than 30% in 28% of households. The debt portfolio was dominated by credits taken in other institutions. To serve this kind of debt, households of this cluster spend approximately one third of their incomes. Analyzed group of households were characterized by the lowest level of margin among all clusters (-1017 PLN), what was undoubtedly influenced by very

low level of income (1148 PLN). As much as 43% of households from this cluster obtained incomes from the first quintile.

Table 2
Synthetic characteristics of households with negative margin

Features	Clusters		
	7	11	12
Dominant type of credit (% of income)	in banks (44%)	in other institutions (32%)	mortgage (28%) in banks (24%)
Debt to income ratio	48%	34%	60%
% of households with high debt to income ratio (>30%)	36%	28%	96%
margin	-703 PLN	-1 017 PLN	-801 PLN
Equivalent income	the lowest (1 004 PLN)	very low (1 148 PLN)	average (1 847 PLN)
Age of a head of household	average	high	rather high
Biological type of family	single-person households	single-person households, childless couples, single-parent families	households with dependent children
Socio-economic group	retirees and pensioners, farmers	retirees and pensioners	self-employed, farmers
Type of place	village	village	big cities from 200 to 499 thousands inhabitants
Education of a head of household	very low	low	rather high
Sex of a head of household	-	woman	-

Source: like in Table 1.

The households from cluster 11 were characterized by the following socio-economic features:

- High age of the head of household (average 52 years old), more than 40% of households is run by people over 55,
- Relatively high percentage of single families (20%), childless couples (25%) and single-parent families (5%),
- Every third household is run by retirees and pensioners,
- More than half of the households are located on rural areas,
- Relatively high percentage of households run by women (58%),
- Low level of education. Every tenth household is run by people with no more than primary education, and every third household by people with vocational or middle school education.

Table 3
Synthetic characteristics of households with positive margin

Features	Clusters												
	1	2	3	4	5	6	8	9	10	13			
Dominant type of credit (% of income)	in banks (12%)	mortgage (23%)	mortgage (16%) in banks (9%)	from private persons (15%)	credit card (13%) in banks (7%)	in other institutions (11%)	mortgage (16%) in banks (15%) from private persons (8%)	in banks (10%) in other institutions (9%)	credit card (13%) in other institutions (10%)	in banks (14%) from private persons (10%)			
Debt to income ratio	12%	24%	27%	16%	21%	11%	42%	19%	28%	24%			
% of households with high debt to income ratio (>30%)	6%	18%	35%	13%	22%	5%	60%	15%	33%	27%			
Equivalent income	1601 PLN	2751 PLN	2551 PLN	808 PLN	1696 PLN	2055 PLN	1999 PLN	1670 PLN	1755 PLN	1163 PLN			
Age of a head of household	average (1624 PLN)	the highest (2706 PLN)	very high (2687 PLN)	very low (1284 PLN)	high (2133 PLN)	average (1890 PLN)	high (2504 PLN)	average (1869 PLN)	high (2553 PLN)	average (1735 PLN)			
Biological type of family	-	low	rather low	average	average	average	low	average	average	average			
		couples with one or two children	couples with one or two children	single households, single households with dependent children and other persons, couples with three or more children	-	-	households with dependent children	single households and couples with dependent children and other persons	childless couples	single households			

Features	Clusters												
	1	2	3	4	5	6	8	9	10	13			
Socio-economic group	retirees and pensioners	staff of private or public sector, self-employed	staff of private or public sector, self-employed	retirees and pensioners, living on unearned sources	-	-	staff of private or public sector	-	-	retirees and pensioners			
Type of place	village	very big cities with population over 500 thousands inhabitants	-	small cities from 20-99 thousands inhabitants	very big cities with population over 500 thousands inhabitants	small cities from 20-99 thousands inhabitants	-	-	very big cities with population over 500 thousands inhabitants	-			
Education of a head of household	low	very high	rather high	low	rather high	diversified	high	-	rather high	average			
Sex of a head of household	-	-	-	-	-	-	men	-	-	-			

Source: like in Table 1.

Cluster 12 – is represented by only 47 households (0,4%), in which debt service ratio was the highest among all clusters and amounted 60%. In almost all households (96%), the debt to income ratio was higher than 30%. In the credit portfolio dominated mortgages (28% of income) and credits in banks (24% of income). In this group of households a very high debt to income ratio corresponded to the average level of income. In a consequence, income was not sufficient to cover current expenses and debt repayment and lead to a negative margin (average -801 PLN).

The households from cluster 12 were characterized by the following socio-economic features:

- Relatively low age of the head of household (42 years old), 45% of households were run by persons aged 35-44,
- Relatively high percentage of households with dependent children (more than 60%),
- Relatively high percentage of households run by self-employed (13%) and farmers (11%),
- Relatively high percentage of households (15%) from big cities (200-499 thousands inhabitants),
- Relatively high level of education of the head of household, 45% of households run by people with secondary education and 36% - run by people with higher education.

The other ten distinguished groups of households (clusters: 1,2,3,4,5,6,8,9,10,13) were characterized by positive margin (table 3). Therefore in the light of the criterion of margin indicator, these are households without problem of over-indebtedness. The incomes in these households are sufficient to cover basic expenses and debt repayment.

Conclusions

Based on the results of cluster analysis, presented above, some conclusions can be made:

1. **A high debt to income ratio does not necessarily mean financial problems for households (negative margin).** On the other hand, taking into account the results contained in table 2, households with a negative margin are characterized by a relatively high (cluster 11) or very high (clusters 7, 12) debt to income ratio, as well as the high percentage of households that spend for debt repayment more than 30% of income. However taking into account the households from cluster 8, it can be noticed, that despite the very high level of debt to income indicator (42%), they were characterized by high levels of margin (1999 PLN) and thus, had no financial problems. After covering from a current income all expenses related with the basic functioning of the households and debt repayment, even at a high debt to income ratio, in these households still remained available almost 2000 PLN. These differences show clear evidence of **greater usefulness in assessing the financial problems of households a margin indicator, than the debt to income ratio.**
2. **Relatively more often financial problems affected households with bank credits than households with mortgages.** As the example may be indicated the households form cluster 7 - the largest group with a negative margin, where the debt portfolio is

dominated by credits in banks. This conclusion is essentially no undermine the characteristics of households with negative buffer with concentration 11, which was the dominant credit mortgage. This conclusion is essentially no undermine by the characteristics of households with negative margin from cluster 11, where the dominant credit was mortgage. This cluster is in fact represented by only 49 households. Moreover, the second dominated type of credit in this cluster is bank credit, which burden the income of households in lower, but similar to the mortgage degree. Clearly the phenomenon of absence of financial problems in indebted households with mortgage determine the characteristics of households from a cluster 2. These households took out mainly mortgages and were at the same time characterized by the highest level of margin.

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Zróźnicowanie polskich gospodarstw domowych według portfela kredytowego i marży

Streszczenie

Celem artykułu jest ukazanie różnorodności zachowań finansowych polskich gospodarstw domowych z punktu widzenia zadłużenia, jak również zidentyfikowanie gospodarstw, które cechuje marża ujemna, będąca jedną z miar nadmiernego zadłużenia gospodarstw domowych. Co więcej, w artykule podjęto próbę porównania i oceny dwóch wskaźników nadmiernego zadłużenia: marży i relacji długu do dochodu. Do osiągnięcia głównego celu wykorzystano metodę analizy skupień. Na podstawie portfela kredytowego gospodarstw domowych i poziomu marży wygenerowano 13 jednorodnych grup gospodarstw domowych. Trzy z nich cechowała marża ujemna, która klasyfikuje je jako nadmiernie zadłużone.

Słowa kluczowe: nadmierne zadłużenie gospodarstw domowych, polskie gospodarstwa domowe, portfel wierzytelności, analiza skupień, miary nadmiernego zadłużenia.

Kody JEL: D10, D14

Дифференциация польских домохозяйств по кредитному портфелю и марже

Резюме

Цель статьи – указать разновидность финансового поведения польских домохозяйств с точки зрения задолженности, а также выявить хозяйства, которым свойственна отрицательная маржа, являющаяся одной из мер чрезмерной задолженности домохозяйств. Кроме того, в статье предприняли попытку сравнить и оценить два показателя чрезмерной задолженности: маржу и отношение долга к доходу. Для достижения основной цели использовали метод кластерного анализа. На основе кредитного портфеля домохозяйств и уровня маржи определили 13 гомогенных групп домохозяйств. Три из них характеризовались отрицательной маржей, которая классифицирует их как чрезмерно задолженные.

Ключевые слова: чрезмерная задолженность домохозяйств, польские домохозяйства, портфель долгов, кластерный анализ, меры чрезмерной задолженности.

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