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# POLARIZATION OF HOUSEHOLD SAVING IN POLAND DURING FINANCIAL CRISIS 2007-2010

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## **Polarization of household saving in Poland during financial crisis 2007-2010**

**BARBARA LIBERDA**

Faculty of Economic Sciences  
University of Warsaw  
e-mail: [barbara.liberda@uw.edu.pl](mailto:barbara.liberda@uw.edu.pl)

**MAREK PEĆZKOWSKI**

Faculty of Economic Sciences  
University of Warsaw  
e-mail: [mpeczkowski@wne.uw.edu.pl](mailto:mpeczkowski@wne.uw.edu.pl)

### **Abstract**

In this paper we analyse the changing structure of Polish households with regard to the household saving rates in 2007-2010 and compare it with similar distribution of household saving during 1997-2000. The analysis is based on the household budget panel data from three panels of 15,000 of Polish households selected by authors for years 2007-2008, 2008-2009 and 2009-2010 from the Household Budget Surveys for 2007-2010. We estimate the long-term ergodic distribution of households according to saving rates. Our results show that the long term distribution of households reveals a tendency towards polarization of households with regard to saving rates. Comparing these results with the Authors' previous research for 1997-2000 for Poland we indicate that between 1997-2000 and 2007-2010 the change in polarization of households was asymmetrical towards the highest saving rate groups. That explains why Polish households could maintain the increase in savings during the financial crisis of 2007-2010.

### **Keywords:**

household, saving, polarization, Markov matrix, ergodic distribution, panel analysis

### **JEL:**

D12, D19

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## 1. Introduction

According to the standard theory of life cycle and permanent income hypothesis, savings are determined by the persistence and growth of income as well as by consumers' perception of income uncertainty (Campbell 1987; Carroll 1994, 2009; Deaton 1992). The expectation of an income rise will lower savings but, on the other hand, the fear of a cut in future income might increase saving rates. Consumers with greater uncertainty of income would save more. In the theoretical and empirical literature concerning household income and saving there is evidence that savings react mainly to the expected changes of current income. The impact of unexpected changes of current income on saving is highly unpredictable (Hall 1978; Flavin 1981; Baxter, Jermann, 1999; Poterba 1994; Mody, Ohnsorge, Sandri, 2012).

In earlier studies on Polish households for years 1997-2000 it was found that the uncertainty of permanent and transitory income in Poland is similar to income uncertainty in most of European countries and the variance of permanent income is generally lower than the transitory income variance (Liberda et al, 2003). The difference between uncertainty of permanent and transitory income in Poland was small, then shocks to both permanent and transitory income would affect saving positively. The distribution of households with regard to saving rates was very uneven in Poland during the first decade after transition into the market economy (Liberda, Pęczkowski, 2005).

This article extends the research on changing structure of household savings for Poland to the decade after the previous one was conducted. We analyse the polarization of Polish households with regard to savings during a time of increased income uncertainty caused by financial crisis of 2007-2010.

The analysis is based on a very rich and representative set of household budget panel data from Polish households surveyed during 2007-2010. Three panels of 15,000 households each (for years 2007-2008, 2008-2009 and 2009-2010) were selected by authors from the sample of 37,000 households (equal to 0.3% of the total number of households in Poland) surveyed each year by Polish Central Statistical Office. Every year half of the surveyed group of households is exchanged and each household is surveyed during two consecutive years. Data are collected with the use of monthly rotating method, e.g. each month one twelfth of the whole sample of 37,000 of households was surveyed. The selected panels of 15,000 households for years 2007-2008, 2008-2009 and 2009-2010 meet all the formal requirements regarding data consistency. The chosen panel of households is representative and allows for a generalization of results with regard to the whole population of Polish households within a margin of a random error.

The paper is organized in the following way: in Sections 2 and 3 we classify households into five groups with regard to saving rates and present the household income growth and saving rates in 2007-2010. In Section 4 we investigate changes in households' distribution with regard to saving rates in three panel data sets for years 2007-2008, 2008-2009 and 2009-2010 by applying the Markov mobility matrix. Then we estimate the long term distribution of households for 2007-2010 and compare it with a similar distribution one decade earlier between 1997-2000. In Section 5 we present our conclusions.

Our study meets two goals. First, it fulfills the lack of research on household savings in transition economies of Europe during recent financial crisis. Second, according to our

knowledge, this study is the only one that combines the analysis of household savings during financial crisis (2007-2010) with the results of similar research for Poland one decade earlier (1997-2000).

## 2. Definitions and classification of saving rate categories

We defined household income as disposable income registered in the month of the survey (Methodology of Household Budget Surveys, CSO, 2011). Savings are calculated as a difference between disposable income and household expenditures, which is:

$$s = \text{income} - \text{expenditures}, \quad (1)$$

the saving rate  $sr$  being a ratio of savings and disposable income:

$$sr = s/\text{income} \quad (2)$$

We express the saving rate as a percentage of household disposable income.

**Table 1. Classification of the saving rate class**

Below -20%	very low saving rate (negative)
From -20% to -5%	low saving rate (negative)
From -5% to 5%	saving rate close to zero
From 5% to 20%	high saving rate (positive)
Above 20%	very high saving rate (positive)

Source: Own calculations

The saving rate was divided into 5 categories: very low saving rate (negative), low saving rate (negative), saving rate close to zero, high saving rate (positive), very high saving rate (positive).

## 3. Household income and savings during 2007-2010

The level and growth of real disposable income of Polish households grouped by saving rates in 2007-2010 are shown in Table 2.

**Table 2. Level and growth of real disposable income of Polish households grouped by saving rates in 2007-2010**

Saving rate groups	Monthly income 2007 zlotys*	Income growth		
		2008/2007 %	2009/2008 %	2010/2009 %
<-20%	1975	8.0	3.9	1.3
-20% to -5%	2220	8.4	2.2	3.2
-5% to 5%	2283	8.7	0.2	3.2
5% to 20%	2449	6.1	4.3	2.3
20%+	3298	6.9	2.2	4.1
<b>Total</b>	<b>2650</b>	<b>8.2</b>	<b>3.0</b>	<b>4.1</b>

\*The exchange rate of zloty to US dollar and to euro in 2007 was 1US\$=2.8 zloty and 1 euro=3.8 zloty (Statistical Yearbook, Poland, 2008, p. 617).

Source: Own calculations based on panel data for 2007-2008, 2008-2009 and 2009-2010 from Household Budget Surveys 2007-2010, Central Statistical Office (GUS), Poland, Warsaw.

The level of household income was positively correlated with the household saving rate. Disposable income of households grew from year to year during 2007-2010 in all households grouped by saving rates. This growth of household disposable income was higher in 2008 than in the following years when financial shocks continued affecting the Polish economy in 2009 and less in 2010. The average growth of real disposable income of Polish households observed on a micro scale was about 5% per year during 2007-2010.

The increase of disposable income was different in each group of households classified by saving rates with no clear tendency detected. Households with the highest saving rates encountered very low growth of income between years 2008-2009, similar to income growth of households which save at low rates. In 2009-2010 income of high saving households recovered fast, while the low saving households experience still declining growth rates of yearly income in the same years.

With varying volatility of real household disposable income and increasing uncertainty caused by the financial crisis, Polish households maintained high and rising saving rates from their current disposable income between 2007-2010 (Table 3).

**Table 3. Household saving rates in Poland in 2007-2010 (% of disposable income)**

	2007	2008	2009	2010
Median	12.1	13.5	14.2	15.4

Source: Own calculations based on Household Budget Surveys 2007-2010, Central Statistical Office (GUS), Poland, Warsaw.

The median of the saving rate for all households increased in 2007 from a relatively high level of 10.6% in 2006 and was rising during the subsequent years to reach 15.4% in 2010. This increase of households' saving rates took place at a time of a fall of the value of household assets in different financial instruments like shares, investment funds, pension funds etc.

During the turbulent years of the financial crisis Polish households took, on the whole, rational financial decisions. They did not stop investing in real estates (houses), partly because many of those investments were undertaken earlier and resulted in payments in the following years. Generally, households maintained repaying mortgage loans but raised less loans and credits. They also decreased the stock of deposits and securities, albeit on a moderate scale (Table 4).

**Table 4. Average financial investment and credits of Polish households in 2007-2010 (in zlotys per household per month)**

Year	2007	2008	2009	2010
Net purchase of real estates	77	94	99	109
Net increase of deposits and securities	-32	-61	-49	-45
Loans and credits repaid	134	155	176	190
Loans and credits raised	144	152	123	121

Source: Own calculations based on Household Budget Surveys 2007-2010, Central Statistical Office (GUS), Poland, Warsaw.

The strategies of financial investment of Polish households were rather standard and led households to increase saving from current disposable income to protect their stocks of financial and real wealth from diminishing in market value.

#### 4. Mobility of households with regard to saving rates in 2007-2010 and 1997-2000

In this section we investigate the changes in the structure of households with regard to saving rates from year to year during 2007-2010. Having classified the five groups of households with different saving rate levels (Table 1), we examine the households' mobility between these groups in any of two consecutive years 2007-2008, 2008-2009 and 2009-2010.

Tables 5, 6 and 7 illustrate the distribution of shifts from a particular class of households in the initial year to other groups of households in the following year (mobility matrix). This method of research is used in Markov processes (Podgórska et al. 2000).

**Table 5. Households' mobility matrix subject to saving rates, 2007-2008**

		Saving rates 2008					Total
		<-20%	-20% to -5%	-5% to 5%	5% to 20%	20%+	
Saving rates 2007	<-20%	31.2	14.5	14.6	16.4	23.3	100
	-20% to -5%	19.5	15.4	15.5	22.7	26.9	100
	-5% to 5%	15.0	12.8	17.5	25.5	29.3	100
	5% to 20%	12.6	9.0	13.5	27.0	37.8	100
	20%+	8.6	6.3	7.3	18.7	59.1	100
Total		15.4	10.1	12.0	21.4	41.1	100

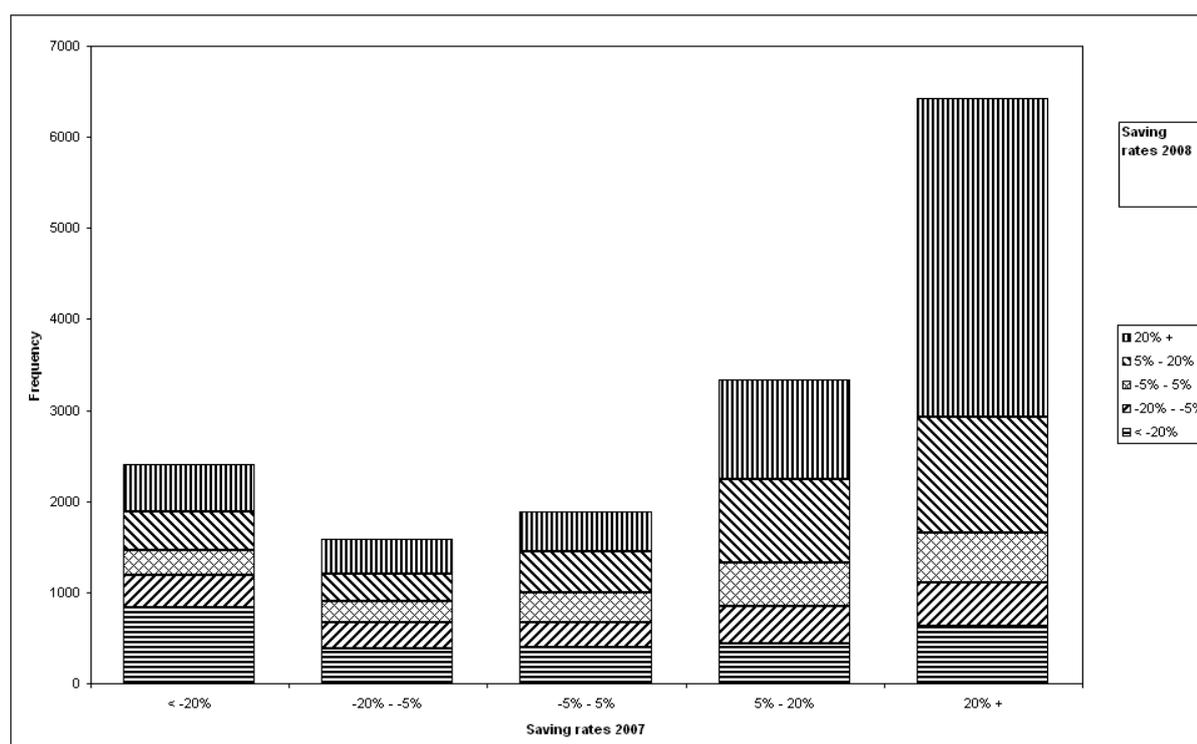
Source: Own calculations based on panel data for 2007-2008 from Household Budget Surveys 2007-2008, Central Statistical Office (GUS), Poland, Warsaw.

Among the households characterized by very low negative saving rates (below minus 20% of the household income) in 2007, about one third remained in the same group in the following year. Three groups of ca. 15% of the households each moved to the 'low saving rate' class (minus 20% to minus 5% of the household income), 'close to zero saving rates' class (minus 5% to plus 5% of the household income) and to a 'high saving rates' class (5% to 20% of the household income).

The most spectacular move was observed by almost one fourth of households that shifted up to the 'very high saving rate' class (above 20% of the household income) in 2008 from the 'very low negative saving rates' class (below minus 20% of the household income) in 2007. Moreover in 2007 in the 'very high saving rate' group three fifths of households remained in the same class.

Tables 5, 6 and 7 reflect large fluctuations between particular groups of households in each period of two consecutive years 2007-2008, 2008-2009 and 2009-2010. Additionally, the 'very high saving rates' class is the most stable one because 60% of households from that group remained in the same group throughout 2007-2010. The retention of households in the 'lowest saving rates' group is ca. 30% of the size of this group. The 'lowest saving rates' group consists not only of households with very low income but also of households that take large mortgage credits that leads to higher savings from current disposable income in the next months (years) when the credits are in repayment. The number of households in each saving rates' class and shifts from a particular class in the initial year to other classes of households in the following year are presented in the cumulated bar charts (Figures 1, 2 and 3).

**Figure 1. Households' mobility subject to saving rates, 2007-2008**



Source: Own calculations based on panel data for 2007-2008 from Household Budget Surveys 2007-2008, Central Statistical Office (GUS), Warsaw.

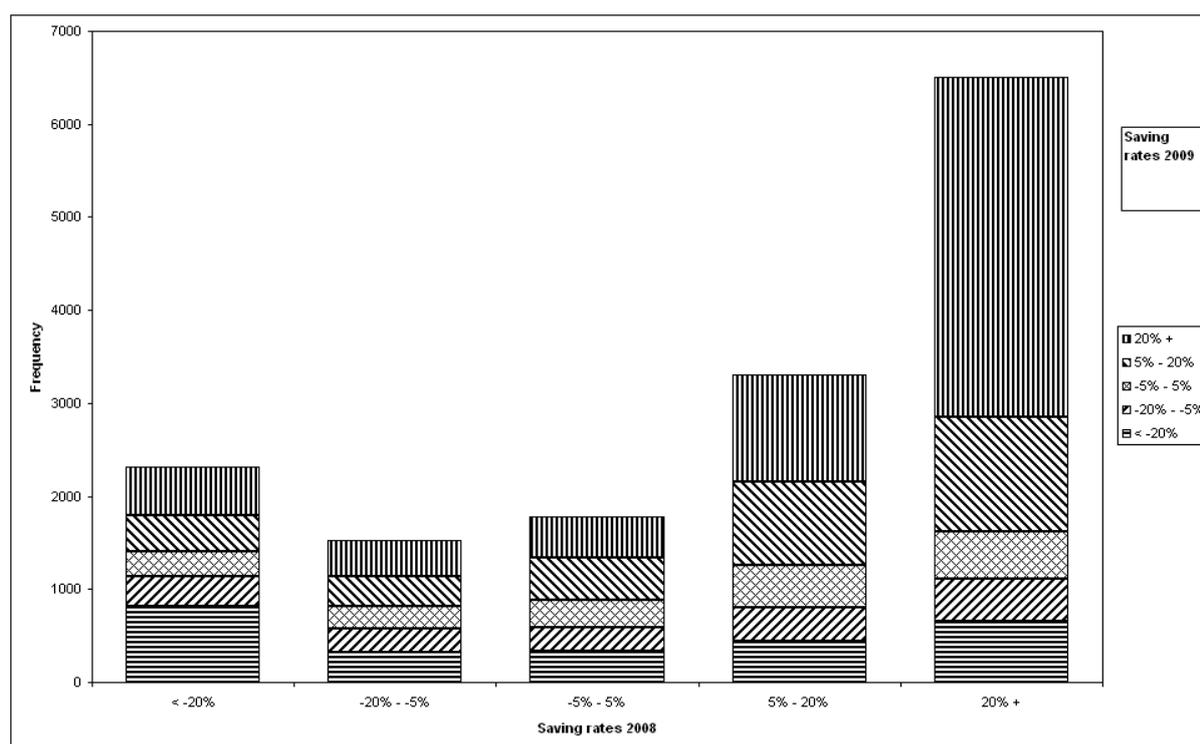
Each bar in Figures 1, 2 and 3 represents one row in Tables 5, 6 and 7, respectively. It shows how the households that belonged in the initial year of observation (e.g. 2007) to a particular class of savings (for example minus 20% of the household income) are distributed between classes of households with different saving rates in the second year of observation (e.g. 2008). Each bar in a chart (and a row in a table) sums up to 100% of households of this particular saving rate class. The height of the bar reflects the number of households that belong to one class of saving rates in the initial year of observation and the distribution of this class of households between classes of households with different saving rates in the following year.

**Table 6. Households' mobility matrix subject to saving rates, 2008-2009**

		Saving rates 2009					Total
		<-20%	-20% to -5%	-5% to 5%	5% to 20%	20%+	
Saving rates 2008	<-20%	31.7	12.4	13.0	17.1	25.7	100
	-20% to -5%	19.9	15.2	15.3	22.2	27.3	100
	-5% to 5%	14.9	13.9	16.8	25.4	29.0	100
	5% to 20%	11.9	9.8	13.7	27.3	37.2	100
	20%+	8.3	6.3	7.2	18.7	59.5	100
Total		15.0	9.9	11.5	21.4	42.2	100

Source: Own calculations based on panel data for 2008-2009 from Household Budget Surveys 2008-2009, Central Statistical Office (GUS), Poland, Warsaw.

**Figure 2. Households' mobility subject to saving rates, 2008-2009**



Source: Own calculations based on panel data for 2008-2009 from Household Budget Surveys 2008-2009, Central Statistical Office (GUS), Poland, Warsaw.

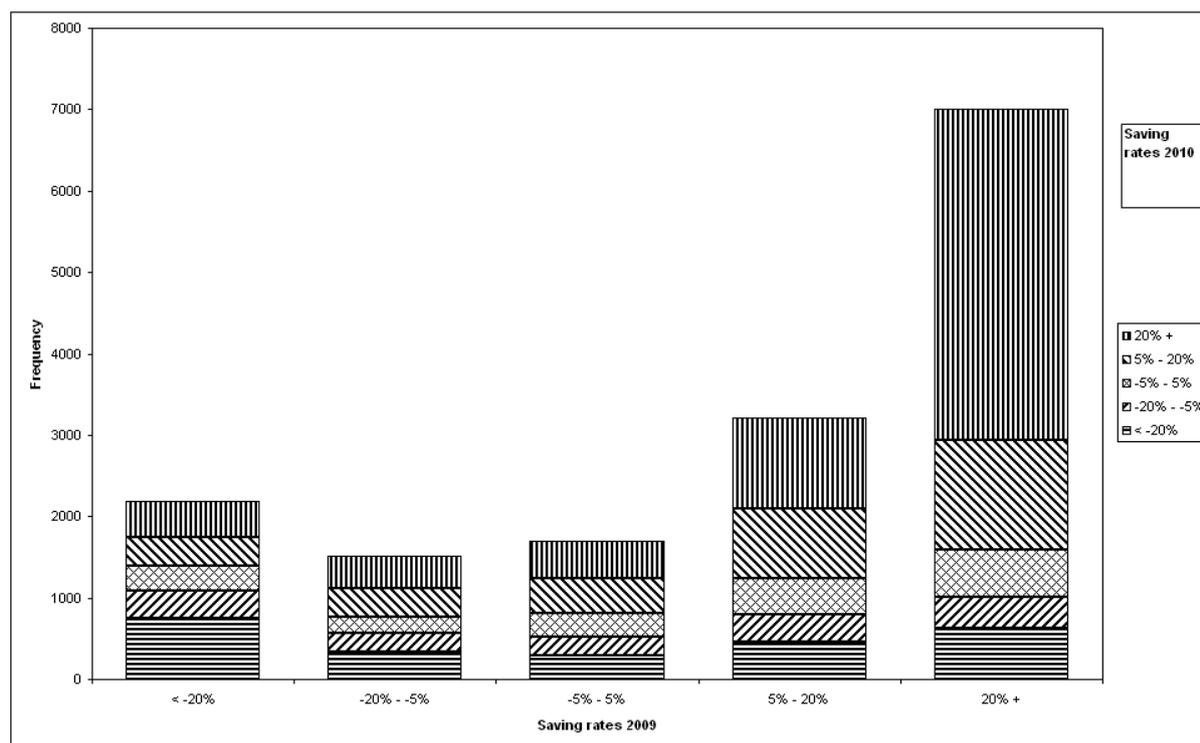
The differences in households' mobility between particular years are small. The groups of households that stayed right where they were a year before are those that save the most and those that save the least.

**Table 7. Households' mobility matrix subject to saving rates, 2009-2010**

		Saving rates 2010					Total
		<-20%	-20% to -5%	-5% to 5%	5% to 20%	20%+	
Saving rates 2009	<-20%	30.6	13.6	11.6	18.5	25.7	100
	-20% to -5%	21.7	15.3	15.2	22.4	25.5	100
	-5% to 5%	16.8	11.1	16.4	24.0	31.7	100
	5% to 20%	10.6	10.5	12.8	25.9	40.2	100
	20%+	7.0	6.0	7.1	17.3	62.6	100
Total		14.0	9.7	10.9	20.6	44.8	100

Source: Own calculations based on panel data for 2009-2010 from Household Budget Surveys 2009-2010, Central Statistical Office (GUS), Poland, Warsaw.

**Figure 3. Households' mobility subject to saving rates, 2009-2010**



Source: Own calculations based on panel data for 2009-2010 from Household Budget Surveys 2009-2010, Central Statistical Office (GUS), Poland, Warsaw.

Assuming a constant household mobility we could draw some conclusions about the long term distribution of households with regard to the saving rates. Such procedure would allow for a construction of an ergodic distribution. This distribution would illustrate a long term household structure, which reflects the probability of falling into a higher, lower or the same level of saving rate.

In order to verify such assumption, the long term household distribution subject to the saving rate was calculated, initiating a Markov process from mobility matrix in particular years (2007-2008, 2008-2009 and 2009-2010). Table 8 shows the long term household distribution subject to the saving rates for particular initial periods.

**Table 8. Long term distribution of households subject to saving rates 2007-2010**

Saving rates levels					
	<-20%	-20% to -5%	-5% to +5%	5% to 20%	20%+
Long term households' distribution					
Years*					
2007-2008	0.145	0.097	0.117	0.213	0.428
2008-2009	0.143	0.096	0.113	0.214	0.434
2009-2010	0.133	0.093	0.106	0.204	0.464

\*Starting dates of the Markov processes

Source: Own calculations based on panel data for 2007-2008, 2008-2009 and 2009-2010 from Household Budget Surveys 2007-2010, Central Statistical Office (GUS), Poland, Warsaw.

Table 8 indicates that in three of the long term household distributions with regard to saving rates the probability of falling into a group of very high saving rates (above 20% of the

household disposable income) was the highest (0.4). The probability of belonging to the lowest saving rate class was close to 0.15. Groups falling into ‘minus 20% to minus 5%’ saving rate group and ‘minus 5% to 5%’ saving rate group were the fewest.

The results of households’ mobility to different groups of saving during 2007-2010 is compared to the Authors’ previous research for Poland for years 1997-2000 (Table 9).

**Table 9. Long term distribution of households subject to saving rates 1997-2000**

Saving rates levels					
	<-20%	-20% - -5%	-5% - +5%	5% - 20%	20%+
Long term households’ distribution					
Years*					
1997-1998	0.211	0.127	0.137	0.196	0.328
1998-1999	0.198	0.125	0.125	0.221	0.332
1999-2000	0.198	0.132	0.130	0.236	0.303

\*Starting dates of the Markov processes

Source: Liberda, Peczkowski, 2005, p. 40; own calculations based on 4-year panel data of 3001 households from Household Budget Surveys 1997-2000, Central Statistical Office (GUS), Poland.

Both long term distributions of households for years 1997-2000 and 2007-2010 demonstrate polarization of households with regard to saving rates. The probabilities to belong to the top and to the bottom groups of saving rates are the biggest. But the shares of households’ groups with the highest and with the lowest saving rates differ in two studied decades. The change in polarization of households according to saving was not symmetrical between 1997-2000 and 2007-2010.

The group of households with lowest savings is relatively smaller a decade later and a group with highest savings is relatively bigger (Tables 8 and 9). This asymmetrical polarization of households toward highest saving rate groups explains the tendency of increasing average saving rates of Polish households during the financial crisis of 2007-2010.

## 5. Conclusions

In this paper we examined the changing structure of households in Poland with regard to saving rates. The analysis was based on the household budget panel data from three panels of 15,000 Polish households selected by authors for years 2007-2008, 2008-2009 and 2009-2010 from the Household Budget Surveys for 2007-2010. We applied the Markov mobility matrix and estimated the long term ergodic structure of households with regard to saving rates. It illustrates the probability of a household of falling into one of the saving rates classes ranging from negative savings of minus 20% or less to 20% or more of household disposable income.

Our results show that during four consecutive years (2007-2010) almost one third of households that had negative savings of minus 20% of household disposable income in the first year of observation remained in their class also the following year. But one fourth of this group of households shifted up in the following year to the group of households with positive savings of more than 20% of household disposable income. In the class of households with highest saving rates three fifths of households kept these high saving rates.

The long term (ergodic) distribution of households reveals a very high probability (0.4) of a household of falling into a group with highest saving rates and a relatively high

probability (0.15) of belonging to a group with lowest saving rates. The shares of households in the middle of the distribution (which do not save at all or have either negative savings or small positive savings) are lower. It proves the tendency toward polarization of households with regard to saving rates.

Comparing these results with the authors' previous research for years 1997-2000 we indicate that the change in polarization of households according to saving was not symmetrical between 1997-2000 and 2007-2010. The group of households with lowest saving rates is smaller a decade later and a group with highest saving rates is bigger (Tables 8 and 9). This asymmetrical polarization of households towards the highest saving rate group was significant in explaining why Polish households could maintain positive and rising savings during the highly uncertain period of the financial crisis in 2007-2010.

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FACULTY OF ECONOMIC SCIENCES  
UNIVERSITY OF WARSAW  
44/50 DŁUGA ST.  
00-241 WARSAW  
[WWW.WNE.UW.EDU.PL](http://WWW.WNE.UW.EDU.PL)