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How do we value our income from which we save?*

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Abstract

In this paper we analyze the relationship between the perception of income as satisfying household needs and saving rate of this household. Using the multinomial logit regression function we measure the probability of a household to fall into one of the groups categorized by the subjective perception of income in relation to the current household disposable income. The variable specified for the valuation of income is income perception, defined as a class of observed disposable income located on the scale of the subjectively satisfying income. Factors determining the perception of income are: gender and education of the household head, family characteristics, source of income and place of residence. The analysis of relations between the income perception and the household saving rates shows that the perception of income affects both the household observed and predicted saving rates. The research is based on the Household Budget Surveys data for Poland in 2008.

Keywords: household, income, needs, valuation, saving, probability

JEL classification codes: D31, D14, D19

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1. Introduction

Expectations of household income are an outcome of economic conditions and household needs such as: a number and age of the household members, their health and education levels, costs of living in a certain area, employment opportunities, social security wealth, and also of individual psyche and behavior. Perception of income adequacy has been discussed by psychological economists since Katona first book (1951, 86-112). The concept that the level of satisfaction with income is relative and depends on a reference level of income was introduced by economists over fifty years ago (Duesenberry, 1949). Since then, many authors questioned the mainstream belief that utility depends on absolute income only. They have identified the importance of other variables like fairness, or sense of equity affecting the perception of satisfaction (Akerlof, 2002, 415). Akerlof and Kranton (2010, 10) state that even if utility functions have been developed to include nonpecuniary motivations, tastes and preferences, most economist have maintained that these preferences are individual characteristics while individuals' conceptions are dependent on social context. Kahneman (2002, 460) put forward more general issue that perception is reference dependent and this concept is incompatible with the standard interpretation of expected utility theory.

In the utility theory two welfare concepts have been distinguished. The first is ordinal utility, described by indifference curves and the second is the cardinal utility, estimated by subjective income evaluation. The cardinal utility function of income is operationalized by constructing the scale of different individual welfare levels (Van Praag, 1991, 69; Kot, 1993, 2000, 54-79). Individuals declare in a survey what levels of income would fulfil their needs as: insufficient income, sufficient income, above sufficient income. In this way the individual welfare function is obtained. Clark and Oswald (1996, 367-373) tested a hypothesis that utility depends on income relative to a reference level. They used reported job satisfaction as proxy utility data and argued that workers' reported satisfaction levels are inversely related to their comparison wage rates.

In this paper we measure the probability of the household to belong to a group characterized by the subjective perception of income as satisfying household needs (hardly sufficient, sufficient, above sufficient, much above sufficient). We assume that respondents perceive their income in relation to the norm of decent level of living in particular country. Declaring, that the income is sufficient or insufficient to satisfy needs, the respondent assumes these needs are satisfied by other people with similar socioeconomic characteristics.

We analyze the perception of income in Polish households with respect to the age and gender of the household head, family size and family characteristics, level of education, source of income, place of residence and quintile group of disposable income. The predicted values of income perception, obtained from the multinomial logit regression, are related to the saving rates of households. The research results show that the perception of income affects both the household observed and predicted saving rates.

Our study meets two goals. First, based on a very rich and representative set of data for household budgets in Poland it fulfils the lack of research on welfare characteristics of households in transition economies of Europe. The results of our analysis are in line with research outcomes for other countries. Second, according to our knowledge, this study is the only one that combines the analysis of household welfare with the saving decisions of households in Poland.

The empirical investigation is performed on the basis of data from the Household Budget Surveys for Poland in 2008 conducted by the Central Statistical Office. The sample

consists of 37,316 households and is fully representative for the whole population at the national level.

2. Income perception by households

In order to analyze the degree of satisfaction from household disposable income, we constructed a new ordinal variable called income perception in the following way: First, we used the question from Polish Household Budget Survey “What level of income would be considered (1) hardly sufficient, (2) sufficient, (3) above sufficient or (4) much above sufficient for satisfying household needs?”. Four levels of income satisfying household needs (hardly sufficient, sufficient, above sufficient or much above sufficient) are measured in absolute income units (zlotys). They are called the subjectively satisfying income as declared by the household head. Secondly, the declared quantities of satisfying income were compared to the observed current disposable income of households. In this way, we were able to rank observed income into classes of subjective income perception and construct a new ordinal variable called income perception.

The following example is believed to clarify our concept. Suppose the respondent considers income at the level of 800 zlotys hardly sufficient, 1600 zlotys sufficient, 3000 zlotys above sufficient, and 5000 zlotys much above sufficient. Suppose that the household current disposable income is 2000 zlotys. It means that the respondent subjectively views her/his income as high enough to be considered sufficient, but too small to be considered above sufficient. Then such income is described as average.

The new variable described above is called income perception. It locates the current disposable income on the scale of the subjectively satisfying income. Income perception variable has five categories: very bad (current disposable income is below the level of hardly sufficient), bad (current disposable income is above the level of hardly sufficient but below sufficient), average, good and very good. Income perception very good means that the current disposable income of the household is above the threshold recognized as much above sufficient. In the example given above the value of the income perception variable is average.

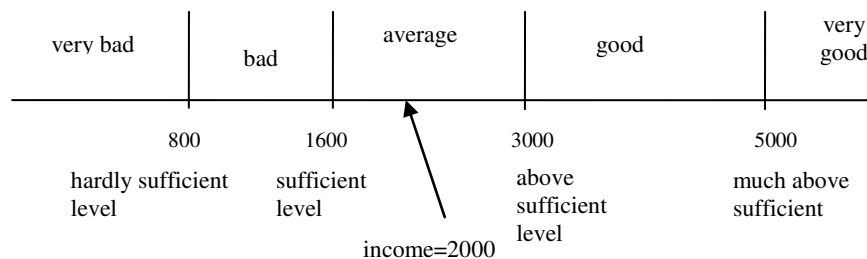


Figure 1. Income perception categories = observed disposable income of the household on a scale of the subjectively satisfying income

In Table 1 the distribution of households is presented according to categories of disposable income with respect to income perception (as explained in Figure 1).

Table no 1. Structure of households with respect to income perception in 2008

Percentage of households by categories of income perception				
very bad	bad	average	good	very good
8.7%	13.8%	48.1%	21.8%	7.8%

Source: Household Budget Surveys in 2008, Central Statistical Office, Warsaw, Poland

Less than one fourth of households fall into a category of bad or a very bad income as perceived by households. Their current disposable income is below sufficient level to fulfil household needs. Almost half of households belong to a category of average income with their current disposable income above the level treated subjectively as sufficient but below the level declared by households as above sufficient. One fifth of the total number of households falls into a class of good income with current disposable income higher than income treated as above sufficient. A group of households with very good incomes consists of 8% of the total number of households which current disposable income is above the threshold recognized as much above sufficient (Table 1).

We computed the ratio of the income perceived as hardly sufficient, sufficient, above sufficient or much above sufficient, to the current disposable income of the household. This ratio shows the disparity between the current income position of the household (earned disposable income) and the expectations of what this income position could be. This disparity reflects the level of fulfilment of income aspirations and is in line with the theory that the perception of income status is always relative, either to that of others (e.g. neighbours and friends) or to the demonstrated consumption styles and saving patterns prevailing in the society (Michalos, 1991).

Table no 2. Ratio of the declared level of satisfying income to observed disposable income, by classes of income perception in 2008

Declared level of the satisfying income	Ratio of the declared level of satisfying income to the observed disposable income in classes of income perception				
	Very bad	Bad	Average	Good	Very good
Hardly sufficient	2.52	0.83	0.61	0.44	0.31
Sufficient	3.32	1.16	0.79	0.58	0.40
Above sufficient	5.11	1.75	1.34	0.87	0.59
Much above sufficient	7.48	2.51	1.94	1.34	0.80

Source: Household Budget Surveys in 2008, Central Statistical Office, Warsaw, Poland.

Households with observed incomes falling into a group of very bad incomes (below the level treated as hardly sufficient) perceive above sufficient income as an income five times higher than is their disposable income, and a much above sufficient income as seven times higher than their own income (Table 2). They also expect that the sufficient income should be three times as high as is their current disposable income. Income that would be two and a half times higher than their own disposable income is treated as only hardly sufficient to fulfil their needs. This is the only category of households, grouped by the perception of income that expects higher income than their current one at all levels of income valuation. This is caused by a low average level of observed incomes in these households. In all other households, grouped by income perception, the hardly sufficient income is treated as being below the household current real income. Due to a psychological

need to protect own income status, households in better material conditions refer to the worst income position as falling below the household own income level. Campbell et al. (1976, 208-209) argue that in such cases aspirations decrease and serve as shock absorbers to maintain satisfaction. Litwin and Sapir (2009, 399) recall cognitive dissonance theory; having lower income may lead poorer people to change their interpretation as to how much is needed to satisfy basic needs.

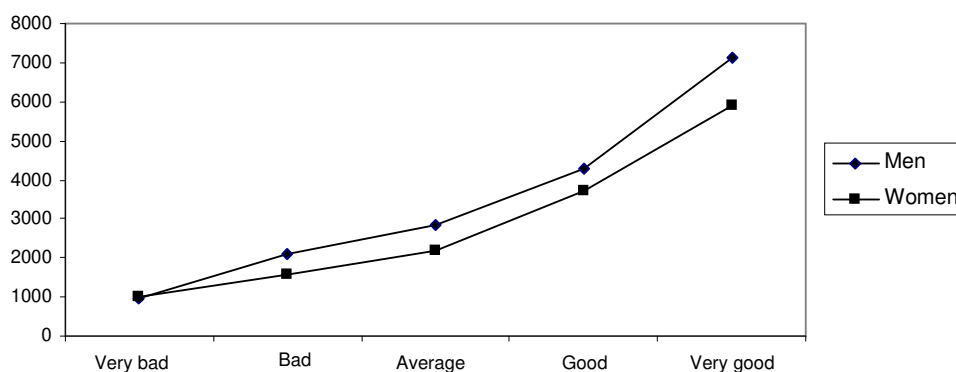
The households belonging to a category of very good disposable income according to income perception perceive income as much above sufficient when it reaches a level of 4/5 of their current disposable income (Table 2). Income at a level of 2/5 of their own disposable income is perceived as sufficient. Income that is lower than one third of their current disposable income is perceived as hardly sufficient for those households.

For households in a class of average income the declared sufficient income satisfying the household needs is 4/5 of their current disposable income. Income perceived as much above sufficient is twice as high as their disposable income (Table 2). For all households in the panel income treated as sufficient is located on average at a level of 4/5 of real disposable income of the household (Table 3).

Generally, when the observed household disposable income is relatively low it is mostly perceived as hardly sufficient or sufficient, approximately parallel to its level. With higher observed incomes the perception of above sufficient or much above sufficient income levels rises steeply. Incomes perceived as hardly sufficient fall generally below the current disposable income of the household (the ratio of the declared satisfying income hardly sufficient to disposable income is below one). It originates from an implied tendency of the household to rank the household disposable income above the level treated as bad, as discussed above. The opposite happens with the perception of income as good or very good. Here, the declared satisfying income levels - above sufficient or much above sufficient - are lower than the current disposable income of households (Table 2).

Income perception of women and men

The share of households headed by women in Poland has grown in recent years from one third to more than 40% of the total number of households in 2008. Households headed by women differ from the households run by men both in average disposable income levels, which are lower, and in income perception. Men value their current disposable income as fulfilling their needs to a higher extent than do women, e.g. the relation of declared satisfying income to disposable income is lower for men than for women (Figure 2 and Table 3). Similar results were obtained in our previous research based on the data from the Polish Household budget surveys for 2004 and 2005 (Liberda, 2007, 22-23; Liberda, Pęczkowski, 2007, 165). According to the Polish Household Budget Surveys in 2008 women treat their income as closer to their expectations of satisfying income in lower income categories (hardly sufficient and sufficient), and far from their expectations in case of income perceived as above sufficient and much above sufficient (Table 3).



Source: Household Budget Surveys in 2008, Central Statistical Office, Warsaw, Poland.

Figure 2. Current disposable income of households by gender of the household head and categories of income perception in 2008 (in Polish zlotys)

Table no 3. Ratio of the declared satisfying income (hardly sufficient, sufficient, above sufficient, much above sufficient) to disposable income, by gender in 2008

Declared level of satisfying income	Ratio of declared satisfying income to disposable income		
	Men	Women	Total
Hardly sufficient	0.58	0.66	0.61
Sufficient	0.76	0.85	0.80
Above sufficient	1.17	1.31	1.23
Much above sufficient	1.64	1.82	1.72

Source: Household Budget Surveys in 2008, Central Statistical Office, Warsaw, Poland.

Income perception according to age

The ratio of declared satisfying income (hardly sufficient, sufficient, above sufficient and much above sufficient) to disposable income does not differ much according to age of the household head. The expectations of income are higher in the households headed by persons at the age of 35-40 and at the age of 55-59.

Before the official retirement age (60-64), the expectations of income in relation to current disposable income have been only slightly lower than at the age of 55-59. In our earlier study based on the data for 2005 (Pęczkowski, 2006, 5-6; Liberda, Pęczkowski, 2007, 170), we found that people at the age of less than 55 had more chance to receive very good income, as perceived by them, than persons above 55 years of age. It was mainly due to the fact that the effective retirement started earlier in Poland (around 55 -59 years of age) than was the official retirement age.

Higher perception of income (of what income should be in relation to obtained disposable income) in young households is an outcome of the needs and aspirations of people starting independent family life. The discrepancy between income aspirations and actual level of income of young adults is natural and has been found in the research made in

other countries, for example USA (Easterlin, 2006, 465). In Poland at present this discrepancy is aggravated by the presence of children. Since the transition to market economy the cost of providing for children has been rising due to the state retreat from protecting young families, as well as privatization of many forms of social assistance.

In families after retirement the expectations of income are relatively high. This is not typical for developed market economy societies. For example in the USA, as Easterlin points out, satisfaction with one's financial situation starts to rise in the midlife and increases in the late life when income typically declines. He argues that aspirations decline with age and the pressure of debt payments on income diminish (Easterlin, 2006, 475). In Poland high expectations of income are caused by the relatively low income of the pensioners, especially in the case of women, and by the disillusionment with the results of the transition to a market economy. This feeling has been the highest within the older generation who lived before in society of more equal income distribution (Gucwa-Lesny, 2005, 8).

3. Regression analysis

We use the multinomial logit regression function to find the probability of a household falling into a group of households categorized by the subjective valuation of income. Logistic regression is used to investigate the relationship between discrete responses and a set of explanatory variables. We assume that the dependent variable Y may have $g+1$ ($g \geq 1$) different values denoted for convenience by $1, \dots, g, g+1$ and the response probability as $p = P(Y=i)$ is to be modeled. Using transformation $f(p)$, called a link function, we can express the mean of the response variable as linearly related to the explanatory variables $f(p) = \alpha_i + \beta_1 X_1 + \dots + \beta_k X_k$, where k is a number of independent variables and $i = 1, \dots, g$.

For binary response models $g=1$ and Y can take on one of two possible values and a link function is called logit function

$$\text{logit}(p) = \ln \left(\frac{P(Y=1)}{P(Y \neq 1)} \right) \quad (1)$$

For ordinal response models we usually estimate the cumulative probability of the response categories rather than their individual probabilities and the model has the form

$$\text{logit}(p_i) = \ln \left(\frac{P(Y \leq i)}{1 - P(Y \leq i)} \right) = \alpha_i + \beta_1 X_1 + \dots + \beta_k X_k \quad (2)$$

$\alpha_i, i = 1, \dots, g$ are g intercept parameters.

This model is known as the proportional odds model because the odds ratio of the event $Y \leq i$ that is $\frac{P(Y \leq i)}{1 - P(Y \leq i)} = \exp(\alpha_i + \beta_1 X_1 + \dots + \beta_k X_k)$ is independent of the category i .

The odds ratio is assumed to be constant for all categories. This assumption can be verified by testing the equality of separate slope parameters β_{1j} simultaneously for all explanatory variables:

$H_0 : \beta_{1j} = \beta_{2j} = \dots = \beta_{gj}$, where β_{1j} is the coefficient for i -th response and j -th variable X_j .

The test statistics has an asymptotic chi-square distribution. If the assumption of the proportional odds is not satisfied, we should rather use the nominal response logistic model, even if the response variable is nominal. The nominal response logistic model is used when $g+1$ are possible responses that have no natural ordering.

The model has a link function

$$\text{glogit}(p) = \ln\left(\frac{P(Y=i)}{P(Y=g+1)}\right) = \alpha_i + \beta_{i1}X_1 + \dots + \beta_{ik}X_k \quad (3)$$

called a generalized logit function.

We have g intercept parameters and k parameters for each response level. $1, \dots, g$. It means that parameters for explanatory variables are dependent on response level. The last level ($g+1$) is a reference level so our model compares an effect of each level with the reference level. These models were introduced by McFadden as the discrete choice model, and they are also known as multinomial models (Mc Fadden, 1974).

When a variable is an ordinal variable it is natural to use the ordered logistic regression function. However, the assumption of the proportional odds model was not fulfilled in our analysis. When we applied the ordered logistic regression function the hypothesis was rejected. Hence, we use the multinomial logit regression functions.

For estimating our model we used the procedure `mlogit` in STATA11 (method of estimation – maximum likelihood method, ML).

The dependent variable has 4 categories of income perception (bad, average, good and very good). For the multinomial logistic model two categories of income perception (very bad and bad) have been aggregated into one group named bad. The category “average” is a reference category and the coefficients for other categories should be related to this category. Coefficients that are not significant, at the level of 0.05, are marked by italic.

Explanatory variables used in the model:

- age group (two categories: 1 - under 34 years and 0 - above 35 years)
- employment (1 – employees, self-employed, farmers and 0 – non-working, pensioners and unemployed)
- gender (1 – man and 0 – woman)
- class of residence of the household (1 – above 20,000 inhabitants, 0 – below 20,000)
- tertiary education (1 - tertiary, 0 – below tertiary)
- children (1 – with children, 0 – without children)
- income group (1 – decile groups 5 to 10, 0 – decile groups 1 to 4)

In Table 4 the odds ratios r_{ij} of the model (3) are presented.

Table no 4. Results of the regression analysis (multinomial logistic regression function)

Variables (reference category in parenthesis)	Bad	Good	Very good
age group (age 35+)	1.0330 (0.447)	-0.0573 (0.136)	1.0051 (0.926)
employment (non-working)	0.8115 (0.000)	1.6557 (0.000)	2.9499 (0.000)
gender (woman)	0.8261 (0.000)	1.2585 (0.000)	1.4860 (0.000)
class of residence (below 20,000)	1.0756 (0.013)	0.8859 (0.000)	0.6140 (0.000)
tertiary education (below tertiary)	0.8474 (0.001)	1.3993 (0.000)	1.3839 (0.000)
children (no children)	0.6313 (0.000)	1.6721 (0.000)	2.1660 (0.000)
income group (deciles 1-4)	0.2554 (0.000)	3.8821 (0.000)	11.8835 (0.000)

The dependent variable is income perception: bad, average, good and very good. Category average is a reference category. All coefficients except age group 35+ are statistically significant (p-values in parentheses).

We compare odds ratios between non-reference and reference groups for the same explanatory variable at different levels of the dependent variable (which are categories of income perception: bad, average, good, very good). The reference group has an odds ratio equal to one (reference groups in parentheses) Values of odds ratio less than 1 mean that probability of belonging to a given category is smaller than that of belonging to a reference category.

The results of the regression analysis are the following:

- The differences of perception of income in households categorized by age of the household head are not big enough to be statistically significant. In our earlier studies conducted on Polish household budget data for years 2004-2006, we found that people at the age below 35 years are more likely to be in a group that perceive their own income as bad. They often earn relatively high incomes but they value these levels of income as insufficient taking into account family needs. This result was consistent with the empirical analysis conducted in other Eastern European Country - Slovenia (Stanovnik, 1992).
- Working individuals (employees, self-employed, farmers) are more satisfied with their income than the non-working ones. Working persons have more chance to belong to a higher income group (subjectively perceived by them as good) than the non-working persons (pensioners and the unemployed) who more often fall into a category of perceiving their income as bad.
- Households headed by men are more likely to fall into a group of very good income, categorized by income perception, than households headed by women.
- Residents of big cities have higher expectations of income than persons living in small towns and villages. They are less satisfied with their disposable income than households in small localities. Households in villages and small towns perceive the same level of disposable income as more satisfying their needs than the residents of big towns who view it as not satisfying for them.
- Persons with tertiary education perceive their income as more satisfying their needs than people without tertiary education. The probability of belonging to the good and very good income groups is higher of tertiary educated persons than of those less educated. It may be due to the fact that people with tertiary education have on average higher income

than less educated people. If well educated people have higher aspirations, they manage to fulfil them.

- Families with children perceive their own income as fulfilling their needs more than do persons without children though, as mentioned before, young families with children are objectively in more difficult material situation than no-children young couples. But the probability of single persons or families without children (pensioners or very young people) to belong to lower income groups is higher than in case of families with children.
- According to expectations, people from bottom four income decile groups perceive their income as less fulfilling their needs than households from deciles five to ten. Households from 5-10 income decile groups fall with much higher probability into groups of good and very good income.

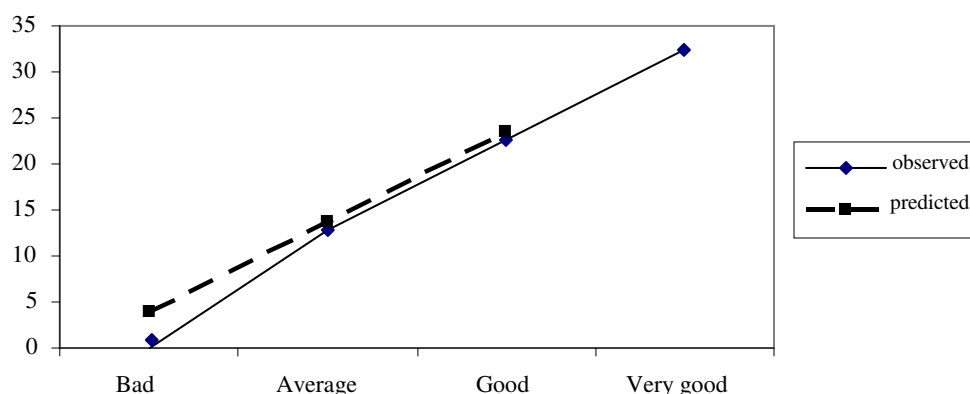
Income perception and saving rates

The predicted values of income perception, obtained from the multinomial logit regression, are related to the saving rates of households. Table 5 and Figure 3 present the saving rates predicted by the model as well as the household's observed saving rates in classes of income perception.

Table no 5. Observed and predicted saving rates (median) of households by categories of income perception

Group of income perception	Saving rate (median, in %)	
	observed	predicted
Bad	1.97	3.96
Average	12.79	13.78
Good	22.62	23.39
Very good	32.47	
Total	13.74	13.74

Source: Model results based on the data of the Household Budget Surveys in 2008, Central Statistical Office, Warsaw, Poland.



Source: Model results based on the data of the Household Budget Surveys in 2008, Central Statistical Office, Warsaw, Poland.

Figure 3. Observed and predicted saving rates (median) of households by categories of income perception

Saving rates are predicted for 3 groups of income perception (bad, average and good). The results show that the multinomial logistic regression model is appropriate for estimating the probabilities of households to belong to a certain group of income perception.

In all groups of households observed and predicted saving rates are positive. There is a big difference in the saving rates between households that perceive their income as bad, and all other groups of households that fall into categories of average or good income. The latter groups save more than 10% of their disposable income.

In an earlier study Liberda (2007, 24-28) found that household savings measured in classes of income preference were affected both by the current and the preferred incomes. In income groups above the level of hardly sufficient income, savings were positively related to the current disposable income. Only when current disposable incomes fell below the level of hardly sufficient income, savings were negative.

Using presented model we can predict that if the household perceives its disposable income as average or at least sufficient to fulfil the household needs, this household saves quite a high share of income.

4. Conclusions

In this paper we analyze the relationship between the perception of income as satisfying household needs and saving rate of this household. Using the multinomial logit regression function we measure the probability of a household to fall into one of the groups categorized by the subjective perception of income (hardly sufficient, sufficient, above sufficient, much above sufficient) in relation to the current disposable income of the household. The variable specified for the valuation of income is income perception, defined as a class of disposable income (very bad, bad, average, good, very good) located on the scale of the subjectively satisfying income.

We have found that the following groups of households headed by: women, pensioners and the unemployed, persons without tertiary education, families without children, people

from bottom four decile groups of income, and residents of big cities would more probably belong to the category of bad income with respect to their income perception.

The results of the analysis show that the perception of income affects the household saving. The observed and predicted household saving rates are similar when the household income is perceived as average or good. Even if the household is located in a class of bad income (due to income perception) the predicted saving rate is positive, though higher than the observed saving. This difference is caused by an inclination of the household to subjectively overestimate income in case of low income and to undervalue income when it is really high.

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