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ORDERED LOGIT MODELING OF CHRONIC POVERTY DETERMINANTS IN RUSSIA

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Abstract

At the end of 20th century, fundamental social and economic changes took place in Russian society, reflecting changes in level and structure of poverty, as well as opportunities to get out of it. The economic reforms of "shock therapy" led to mass mobility of people up and down between social groups. At the same time, a large part of the population found itself on a social bottom in conditions of increasing inequality. A phenomenon of the "working poor" appeared. Despite the decrease in the level of the poor in the economically prosperous 2000-2009 years, social group of chronically poor individuals appeared in the country. The multidimensionality of deprivation of this group is explained by both the insufficiency of income to cover the subsistence minimum and the absence or deficit of accumulated assets. In this paper it is proposed to create a mathematical ordered logit model for identifying the main factors that influence households to go into/out of chronic poverty, as well as to become transient poor. As a result, the same factors make a household more likely to be chronic poor (as opposed to transient poor) and more likely to be poor in the first place (as opposed to non-poor). All independent variables have the same sign on the probability of a household being transient and chronic poor, and the opposite sign on the probability of being non-poor. The ordered logit model helps to understand the probability of a household with certain features to be part of chronic poverty profile.

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Keywords: Poverty, ordered logit model, mathematical methods, Russia.

1. Introduction

At the end of the 20th and beginning of the 21st centuries, fundamental social and economic changes took place in Russian society, reflecting changes in the level and structure of poverty, as well as opportunities to get out of it. The economic reforms of "shock therapy", which entailed a significant change in the structure of society, led to mass mobility of people up and down between social groups. At the same time, a large part of the population found itself on a social bottom in conditions of mass impoverishment and increasing inequality. A paradoxical phenomenon of the "working poor" appeared. Despite the decrease in the level of the poor in the economically prosperous 2000s, a social group of chronically poor individuals appeared in the country. The multidimensionality of the deprivation of this group is explained both by the insufficiency of income to cover the subsistence minimum and the absence or deficit of accumulated assets.

2. Problem Statement

The scientific problem to be solved in this project is the precise definition of determinants that influence household probability to become chronically poor without opportunity to escape poverty on their own, as well as to become transient poor. It can help in the development of social programs, targeting the most vulnerable groups of the population.

There is a set of paper devoted to studying the factors of poverty. Fitria (Fitria, 2017) finds out that assets (building, vehicle, jewellery, and savings) play an important role in determining the poverty status of households in Indonesia. Some demographic and socio-economic variables are confirmed to be statistically significant for a poverty status in Indonesia. However, the determinants of the poverty status vary within regions. Also Dartanto & Nurkholis (2013) apply an ordered logit model to examine the determinants of poverty dynamics in Indonesia, categorising households as poor, transient poor or non-poor. Their estimations confirmed that the determinants of poverty dynamics in Indonesia are educational attainment, the number of household members, physical assets, employment status, health shocks, the microcredit program, access to electricity, and changes in employment sector, employment status and the number of household members.

Research of Cracolici et al. (Cracolici, Giambona & Cuffaro, 2014), based on data from the 2005 Italian Survey on Income and Living Conditions highlights the main variables affecting the subjective economic well-being of all household typologies. These main variables are related to income adequacy, such as being able to afford housing, clothes and holidays, and also include the work-status and level of education of the respondent. The findings show that couples with no children have the highest level of perceived economic well-being, while couples with two or more children and even more so one-person households are more economically insecure. Also Coromaldi & Zoli (2012) investigate the main determinants of poverty in Italy by estimating logit regressions and an ordered probit model. Their empirical analysis is based on data from the Italian component of European Statistics on Income and Living Conditions.

In another study, Van Ham, Hedman, Manley, Coulter and Osth, (2014) contend that there are links between the places individuals live with their parents and their subsequent neighborhood experiences as independent adults. Through visualization methods and ordered logit models, they demonstrate that children living with their parents in high poverty concentration neighborhoods are very likely to end up in

similar neighborhoods much later in life. Ethnic minorities were found to have the longest cumulative exposure to poverty concentration neighborhoods.

Lepianka, Gelissen and van Oorschot, (2010) describe and explain the differences in popular poverty attributions that exist within and between 28 European countries. The results of rank-ordered logistic regression models show that differences in popular poverty explanations relate directly to whether one lives in a country with a Catholic tradition and a high level of poverty, their (subjective) experience of disadvantage and personal values.

Cracolici, Giambona, and Cuffaro, (2012) investigate the main determinants of households' subjective economic well-being by means of a Partial Proportional Ordered Logit Model. The empirical results show that the financial strain is the most relevant dimension of living conditions influencing the subjective economic well-being, but its effect is attenuated depending on the level of education and the tenure status of accommodation. Actually, when the highest levels of education are coupled with the status of self-employee, house-owner households have more chances to reach a higher probability to be economically satisfied.

3.   Research Questions

In this paper the authors study the determinants of going into/out of chronic poverty for the Russian households. Research questions to be answered are as follows. What is the relationship between household's characteristics (income, size, composition, etc.) and probability of belonging to chronic poor? Are households with certain characteristics more likely to be chronic poor than other households? Whether a household with certain characteristics is more likely to be chronic poor or transient poor?

4.   Purpose of the Study

The measurement of chronic poverty in transition and advanced economies has a limitation related to the absolute poverty line used by most researchers and that the definition of a household belonging to a particular poverty profile is based on calculating the number of years in poverty and underestimating the reasons that cause the entry / exit from chronic poverty. In this regard, it is proposed to create a mathematical ordered logit model for identifying the main factors that influence households going into/out of chronic poverty.

Empirical literature offers a number of studies devoted to revealing the factors of chronic poverty. Villarreal & Herreros (2018) use an ordinal logit model to estimate the relationship between socio-demographic conditions and poverty, and to define the profile most likely to suffer from poverty. The results indicate that the most prone profile is to be a young unemployed woman of indigenous culture with disabilities, born in the southwest of the country, who has not lived in the United States, and a resident in a large household with few family members employed and female head of household with the low level of education in Playas de Rosarito.

Walelign, Charlery, Smith-Hall, Chhetri, and Larsen, (2016) apply random effects logit and ordered logit models to estimate variables covarying with poverty categories and compared for annual household incomes with and without environmental income. Using the without environmental income data set significantly changed the number of households classified as poor, as well as rates of movements in and

out of poverty. Excluding household-level environmental income also distorted estimation of covariates of poverty incidence and poverty dynamics.

Zelinsky, Mysikova, and Vecernik, (2016) analyse to what extent the intergenerational transmission of poverty is associated with social mobility (in terms of educational and occupational intergenerational mobility) in the European Union (and Iceland, Switzerland and Norway). Interpretations of the findings are based on the ordered logit models estimated at European and country levels. The results suggest that educational and occupational mobility is in a statistically significant positive relationship with the intergenerational transmission of poverty (proxied by a change in the perceived financial stress of the household).

Guagnano, Santarelli and Santini, (2016) estimate a generalized ordered logit model in order to highlight to what extent self-perception of poverty in Europe is affected by the respondent/household socioeconomic characteristics and by household/community social capital endowment. The results confirm that social capital could be used by local and central governments as a further key function, in addition to the traditional socioeconomic ones for planning poverty reduction policies.

Another research quantifies the extent to which excess morbidity in rural areas is associated with individual characteristics, county income, and neighbourhood poverty. Auchincloss & Hadden (2002) analyse general health status and limitation of activity in logistic and multinomial logit models. Residents of rural counties were at greater risk for health problems compared to residents of metropolitan and central core counties. The residual rural disadvantage was concentrated in people with less than a high school education. Tract poverty and per capita income were also important predictors of morbidity.

Mendola, Busetta, and Aassve, (2009) implement a generalized ordinal logit model to assess the various factors associated with social disadvantage among youth. Their analysis shows important gender differences, though they are not the same across the countries included in the study. For some countries it turns out that being a woman is a protective factor against long-term poverty. As previous studies suggests, young individuals' living arrangements matter.

Parodi and Sciulli (2008) study the economic effects of disabled members on Italian households, with the aim of identifying a suitable target group for welfare policies. Results show significant differences in levels of income and poverty diffusion to the detriment of households with disabled members. In order to increase the income of the households with disabled members, policy recommendations should include the provision of care services and structural policies to improve employment, income and educational opportunities for households at greatest disadvantage.

In these circumstances, it seems appropriate to make research on main factors influencing the probability of going into/out of chronic poverty for the households of the Russian Federation. The study is done in order to identify opportunities for further development and targeting of antipoverty programs.

5. Research Methods

Ordered logit modeling of chronic poverty determinants in Russia is carried out in several stages. At the beginning, using the multi-year monitoring data of Russian households (RLMS-HSE) for the period of 2008-2012, data on their well-being are estimated on the basis of calculated equivalence scales. Equivalence scales are calculated on the basis of the rules formulated by Engel - households with the same

share of food expenditures in consumer spending have the same standard of living, regardless of their composition. The selected form for estimating the Engel curve, in which the non-logarithm share of food expenditure is on the left and the logarithm of average per capita expenditures / household income on the right, is called the Working-Leser form Leser (1963) and, as practice has shown, gives the greatest explanatory power and is optimal to estimate the Engel curve.

Next, the equivalent household incomes of the sample for each year are calculated, the average equivalent incomes of each household - over five years. The relative poverty lines in each year and the average relative poverty line over five years are determined. A household belongs to the poor in a certain round if the consumption for one of its members, taking into account the adopted equivalence scale, is less than half of the median distribution of levels of expenditures per capita (OECD definition). With their help, all households are distributed to poverty profiles. The "non-poor household" profile includes households that are not poor in any of five years. The "transient poverty" profile includes households that turned out to be poor in no more than two out of five years. Households that are poor for more than two years in a row belong to the "chronic poverty" profile. The "on the verge of poverty" profile includes households that are poor in more than two years, but with an average income in five years exceeding the average relative poverty line, or poor in no more than two years, but with an average income in five years below the average relative line of poverty.

At the next stage, an ordered logit model is developed, giving the possibility to work effectively with discrete data. The model is brought to a state of readiness for further use by the authorities to identify chronically poor households that are entitled to receive targeted social assistance. In the econometric model, the dependent variable takes four values, which are poverty profiles: "non-poor households", "transient poverty", "on the verge of poverty" and "chronic poverty". Demographic, regional and social characteristics of households, as well as characteristics of heads of households, are used as independent variables.

6. Findings

As it can be seen in Table 1, all families are distributed among four poverty profiles ("outside poverty", "transient poverty", "on verge of poverty", "chronic poverty") due to their equivalent incomes and the number of years in poverty.

Table 01. Poverty profiles

Profile	Number of people
Outside poverty	3059
Transient poverty	1842
On verge of poverty	297
Chronic poverty	699

The main findings of ordered logit model are given in Table 2, where the marginal effects and p-values of the ordered logit estimates are presented. The variable affects the probability of household that goes into/out of certain poverty profile, if the marginal effect is statistically significant. The sign of the

marginal effect can help understand whether positive or negative is the influence of the variable on the probability of falling into a certain poverty profile.

Table 02. Determinants of main poverty profiles

Variable	Non-poor	Transient	On verge of poor	Chronic poor
Single adult with children	-0.303 (0.034)	0.055 (0.019)	0.092 (0.022)	0.158 (0.048)
Other households with children	-0.137 (0.024)	0.042 (0.018)	0.032 (0.008)	0.066 (0.018)
Unemployed in household for two or more years	-0.095 (0.046)	0.035 (0.027)	0.022 (0.015)	0.042 (0.022)
Two and more persons with health problems	-0.082 (0.033)	0.038 (0.014)	0.023 (0.007)	0.024 (0.007)
Household's head has school education	0.213 (0.117)	-0.075 (0.039)	-0.032 (0.023))	-0.108 (0.064)
Household's head has additional education except for school education	0.324 (0.068)	-0.085 (0.011)	-0.057 (0.011)	-0.182 (0.043)

The interpretation of results in Table 2 could be made in the following way. For example, the marginal effect for the variable "Unemployed in household for two or more years" is 0.035 when household falls into transient poverty, and a marginal effect is 0.042 for the same variable in the case the household falls into chronic poverty. It means that households with unemployed members for two or more years, who fall into poverty, are 1.2 times more likely to fall into chronic poverty than to transient poverty. The same comparison can be made for other determinants.

7. Conclusion

The main findings show that the same factors make a household more likely to be chronic poor (as opposed to transient poor) and more likely to be poor in the first place (as opposed to non-poor). All independent variables have the same sign on the probability of a household being transient and chronic poor, and the opposite sign on the probability of being non-poor. No variable was found, which, for all household types, increases the probability of being transient poor and decreases the probability of being chronic poor. Ordered logit model helps to understand which poverty profile is the most probable for a household with certain features.

Acknowledgments

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