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## EQUIVALENCE SCALE ESTIMATION ON RUSSIA LONGITUDINAL MONITORING SURVEY (RLMS) AND HOUSEHOLD BUDGET SURVEY DATA

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**Abstract.** This study is devoted to the evaluation of equivalence scales for the households of Russian Federation based on the data of economic situation Russian monitoring and population health RLMS-HSE and the Household Budget Survey (HBS) for 2013. The author compares equivalence scales, constructed according to the data of economic situation and population health Russian monitoring RLMS-HSE and the Household Budget Survey of the Federal State Statistics Service RF. The calculation of equivalence scales is made by regression estimation of the Engel curve. The values of obtained scale identified on the basis of the regression model for RLMS and HBS are practically the same. This makes it possible to talk about the advisability of HBS data further use for the comparative analysis with the studies based on RLMS data. They proved the necessity of equivalence scale use that take into account the observed economy on scale, which have a lower ranking in comparison with the official scale of the RF Federal Service of State Statistics. There is a comparable saving from combined living for a household with one or more persons of working age when it includes either the children or the persons of retirement age in equal numbers. The author shows that this has significant consequences for the evaluation of certain vulnerable groups of population poverty, which in its turn are of great importance for the implementation of a targeted social policy.

**Key words:** economics, poverty, inequality, household, living standard, welfare, RLMS, Russian Federation.

## 1. INTRODUCTION

As the goal of the study the author compares the equivalence scales constructed according to the data of the economic situation and population health Russian monitoring from RLMS-HSE and the household budget survey of RF federal service of state statistics. The National Research University "Higher School of Economics" and CJSC "Demoscope" with the participation of the Population Center of the University of North Carolina in Chapel Hill and the Institute of Sociology of Russian Academy of Sciences are engaged in the conduct of the economic situation and health Russian monitoring RLMS-HSE. A complete representative of household sampling is provided on the basis of the international methodology according to all indicators, including gender, age, geographical location and family composition (*The National Research University "Higher School of Economics" and CJSC "Demoscope"*, n. d).

The Household Budget Survey (HBS) is conducted by the Federal State Statistics Service of Russia every year in the framework of official statistical activities in all Russian regions. The results of this survey are used to study an extensive list of social, economic and other issues, including the identification of a basket of goods and services that is necessary to obtain weighting factors during the calculation of consumer price indices, as well as the cost of living for different population groups and other indices to compare the cost of living in dynamics; the assessment of the level, structure and the trends of economic well-being changes of families in terms of consumer cost distribution in the studied population samples and the determination of relationship between the level of well-being and the characteristics of households and their members; the drawing up of accounts of the household sector in the system of national accounts, as well as the reconciliation of national accounts with micro-level data; the assistance in the development and the implementation of economic and social policies, including the determination of the consumption basket at minimum wage; the study of consumer behavior in different subgroups of population. The survey covered private households and their members in the territory of Russia, except for the Chechen Republic. Individuals and families living in collective living quarters (homes for the elderly, boarding schools, orphanages, monasteries, barracks, camps, hospitals, prisons, etc.) do not participate in the survey (*Household Budget Survey*, n. d).

A significant number of works is aimed to study the poverty in the countries with transitional economies, in developing and developed countries. And most scientists agree that with the onset of transient processes in economies, income differentiation and the number of households with the incomes below the poverty line have increased significantly. Also, the conclusion is drawn in a large number of works about the high level of poverty among the families with a large number of children and the presence of a strong correlation between poverty and unemployment, as well as a low level of education.

A classic study of poverty and inequality in the countries with transitional economies should be represented by Milanovich's work (1998), supported by the World Bank (Milanovich, 1998). The author studied the general processes that took place during the development of market economy in CIS countries, Eastern Europe and the Baltic States, and the impact of these processes on the well-being of households. Besides, specific characteristics of poverty are presented for each country.

A significant number of works is also devoted to the study of poverty in Russia. The works by Klugman (1995) (Klugman, 1998), Braithwaite and Ivanova (1998) (Braithwaite, 1998), (Braithwaite & Ivanova, 1998), Ovcharova, Turunsev and Korchagina (1999) (Ovcharova, Turunsev & Korchagina, 1998), Bradbury, Jenkins and Micklewright (2000) (Bradbury, Jenkins & Micklewright, 2000), Beglova and Sadyrtidinov (2015) are among them (Beglova, Sadyrtidinov & Guseva, 2015). These works are especially interesting, since they were made using the RLMS database. However, there are practically no foreign studies using the OBDX database to analyze poverty by equivalent income and the design of equivalence scale for this.

## 2. METHODS

In order to calculate the equivalence scales, an Engel curve is constructed that reflects the relationship between the consumption expenditure of a certain group of goods and the monetary estimate of consumption as a whole. During the construction of an equivalence scale, it is assumed that the level of household welfare with different composition is the same, if the share of their average per capita expenditure on personal goods is the same. Since the equivalence scale will be

applied to the study of poor households, the expenditure on food as the most critical cost for these families is used as the indicator of personal benefit consumption for evaluation. At the same time, the study by Deaton and Paxson (1998) (Deaton & Paxson, 1998), (Deaton, 1997) shows that Engel's law assumes a negative correlation between the share of food expenditures and consumer spending.

The Engel curve is estimated using the following regression equation (1):

$$w = a + b \ln \frac{X}{n} + \lambda n_t + \beta n_d + \delta n_p \quad (1)$$

where  $w$  is the share of food costs in total household costs,

$X$  - household consumption costs,

$n$  is the total number of household members,

$n_t, n_d, n_p$  is the number of working population, children and pensioners in a household, respectively

$a, b, \lambda, \beta, \delta$  – regression coefficients for an estimation.

Formula 1 is called the Working-Lesser form (Leser (1963)) (Leser, 1963), since its left-hand side is represented by a non-logarithmic share of the expenditure on food, and the right one is the logarithm of household consumer spending per capita. This form was used many times in the works studying poverty, which can serve as the confirmation of its greatest optimality for Engel curve explanation.

After the calculation of the regression coefficients the equivalence scales are constructed. A household consisting of one person of working age is the benchmark for comparison. In such a situation,  $n = 1$ , and the equation of Engel curve (1) will have the following form:

$$w = a + b \ln \frac{X}{n} + \lambda$$

The condition of monetary welfare estimate equality for a household of an arbitrary composition, which includes children besides the persons of working age and a reference household, is fulfilled if:

$$a + b \ln \frac{X}{n} + \lambda = a + b \ln \frac{X}{n} + \lambda n_t + \beta n_d$$

After the conversion of the obtained equality, the formula evaluating the equivalence scale is the following one:

Similarly, an equivalence scale is calculated for the families that include pensioners in addition to persons of working age. In order to compare the welfare of a household of an arbitrary composition with a standard, it is necessary to divide its income by the index of equivalence scale  $s$ , defined by formula 2.

In order to develop the equivalence scales and to use them for the revaluation of household incomes, the data of economic situation and health Russian monitoring of RLMS-HSE and the Household Budget Survey (OBDX) are used by the Federal Service for RF State Statistics in 2013. In total, RLMS database contains the information on 6148 households in 2013. 5,456 households have been selected among them, representing their income and expenditure on food (*The National Research University "Higher School of Economics" and CJSC "Demoscope"*, n. d). The whole sampling of 51322 households is used for the study in OBDX database for 2013, since all the necessary data are presented (*Household Budget Survey*, n. d).

### 3. RESULTS

The results of Engel curve regression evaluation are carried out by the share of food expenditure and are given in Table 1. The signs for variables in regression justified preliminary expectations. The validity of Engel's law once again proves a negative sign with the coefficient of the natural logarithm for an average per capita consumer spending. The results of calculations based on RLMS and OBDX data are the same coefficient values for the indicators indicating the number of children and the persons of working age. The values of the coefficients at the variable indicating the persons of retirement age diverge slightly for RLMS and

OBDX data. Also, the values of the coefficients are the same for variables that denote the number of children and pensioners within RLMS data. During the calculations based on OBDX data, the values of the coefficients for the same variables almost coincide.

Variable	Coefficient		Standard error		t-stat		Significance	
	RLMS	OBDX	RLMS	OBDX	RLMS	OBDX	RLMS	OBDX
Const	2.04	2,7	0,04	0,02	48,05	160,98	0	0
$\ln \frac{X}{n}$	-0.17	-0,2	0	0	-37,54	-130,8	0	0
$n_c$	-0.04	-0,04	0	0	-16,37	-44,84	0	0
$n_d$	-0.03	-0,03	0	0	-6,87	-28,97	0	0
$n_p$	-0.03	-0,024	0	0	-6,47	-15,1	0	0

Table 1. Results of the Engel curve regression based on RLMS\* and OBDX data

\* - the results of regression according to RLMS data were calculated by the author in the previous work (Beglova, Sadyrtdinov & Guseva, 2015).

Therefore, the regression equations based on RLMS and OBDX data, respectively, are the following ones:

$$w = 2.04 - 0.17 \ln \frac{X}{n} - 0.04n_c - 0.03n_d - 0.03n_p \quad (3)$$

and

$$w = 2.7 - 0.2 \ln \frac{X}{n} - 0.04n_c - 0.03n_d - 0.02n_p \quad (4)$$

The obtained determination coefficients (0.19 for formula 3 and 0.26 for formula 4) are insignificant, which is typical for this kind of regression equations. The appearance of additional dummy variables is likely to contribute to their increase.

#### 4. DISCUSSION

The same values of coefficients at the regressors indicating the age composition of households in formula 3 and 4 indicate that there is no statistically significant difference in equivalence scales that were constructed using RLMS and OBDX data for 2013. There is also comparable savings from cohabitation for a household with one or more persons of working age when children or the

persons of retirement age included in its composition in equal numbers.

Household composition		Equivalence scale (s)	$\Delta s$
$n_t$	$n_d$ or $n_p$		
1	0	1	-
2	0	1.27	0.27
3	0	1.6	0.34
4	0	2.03	0.42
1	1	1.19	0.19
1	2	1.42	0.23
1	3	1.7	0.27
2	1	1.51	0.51
2	2	1.8	0.29
2	3	2.15	0.35

Table 2. Equivalence scale for household income revaluation in Russia for 2013

#### 5. CONCLUSIONS

The equivalence scale presented in Table 2 for Russian households is the same for both RLMS and OBDX data. The volatile situation in the economy over the past few years does not allow the government to implement a full-scale program to combat poverty and bring the income of all households of a vulnerable group to a subsistence level. In this situation, equivalence scales should be in demand, using which an average per capita income of households is adjusted into equivalent incomes, considering an economy from good consumption point of view. Thus, the model proposed by the author to reassess the welfare of households using equivalence scales can be applied by public authorities in order to reduce poverty and target vulnerable households which need assistance.

#### 6. SUMMARY

The equivalence scale, constructed with the help of regression equation on the basis of Engel law in

2013 is identical both for the data of economic situation and population health Russian monitoring (RLMS) and for the Household Budget Survey (OBDX) conducted by the Federal Service of State Statistics of Russia. This allows to use OBDX data for comparative analysis with RLMS data in further studies on equivalence scales.

It is proposed to use calculated equivalence scales that provide saving depending on scale, instead of an official scale by the Federal Service of State Statistics of Russia. The savings on scale imply the savings in consumption at co-residence of working age persons with children or the persons of retirement age. The author concludes that the use of equivalence scales contributes to the implementation of a more targeted social policy, since it allows more accurate identification of the most vulnerable groups of households. The model of household income revaluation with the use of equivalence scales created by the author should be used by the authorized state bodies to reduce poverty and to target the households belonging to a vulnerable group.

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