2019

IARIW-HSE

Special IARIW-HSE Conference "Experiences and Future Challenges in Measuring Income and Wealth in CIS Countries and Eastern Europe" Moscow, Russia, September 17-18, 2019

Multidimensional Poverty in Russian Regions

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Paper Prepared for the IARIW-HSE Conference
Moscow, Russia, September 17-18, 2019
Session 7: Poverty and Wealth
Time: 13:15 – 15:15, September 18

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Abstract

Recent research has demonstrated the narrowness of the one-dimensional approach to the measurement of poverty through income or consumption. The development of capabilities theory has led to the emergence of multidimensional poverty concept. The main advantage of the multidimensional poverty approach is accounting for the deprivation in access to basic needs. Also, multidimensional poverty is closer to chronic poverty than the income poverty that primarily consists of transitory poverty. In Russia, the official data on poverty are heavily criticized with regard to choosing the poverty line and ignoring the economy on scale. The purpose of this paper is to calculate the multidimensional poverty index (MPI) for Russian regions and find the determinants of multidimensional poverty. To the best of our knowledge, it is a first attempt to calculate MPI for all regions of the Russian Federation. Multidimensional poverty index was developed by Alkire and Santos (2010). We modify a method of MPI calculation taking into account the most prevalent deprivations in Russia. The calculations are based on the microdata from the Comprehensive Monitoring of Living Conditions of the Population carried out by the Federal State Statistics Service of the Russian Federation (Rosstat) in 2014 that covered 136,232 individuals from all regions of Russia. The results show that the overall poverty rate and interregional inequality in Russia are much higher compared to Rosstat data. Using econometric methods we reveal the main demographic and social determinants of differences in multidimensional poverty indicators.

JEL Codes: I32, R13

Keywords: poverty, multidimensional poverty, education, health, living conditions, inequality, human development.

[1] We thank Juan Pedro Garces-Voisenat, Madan Chand Sarkar, Ruvim Shakhnovich, the participants of the 58th ERSA Congress, the II World Congress of Comparative Economics, as well as participants at numerous conferences and seminars at Higher School of Economics, Institute of Economics and Industrial Engineering, Novosibirsk State University, Novosibirsk State University of Economics and Management, and Siberian University of Consumer Cooperation, for their valuable comments and suggestions. Sergey Kapelyuk is grateful to the RFBR for the financial support under the research project № 18-010-01180. Nikita Ryabushkin is thankful to the RFBR and the Government of Novosibirsk Oblast for the financial support according to the research project № 19-410-543002. The authors are solely responsible for all errors in the paper.

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1. Introduction

The poverty rate is among the main development indicators. In this regard, the assessment of the poverty rate is important for identification and comparison of within-country regions. Recent research has demonstrated the narrowness of the unidimensional approach to the measurement of poverty through income or consumption. The development of capabilities theory has led to the emergence of multidimensional poverty concept. The main advantage of multidimensional poverty is the accounting for the deprivation in access to basic needs. Also, multidimensional poverty is closer to chronic poverty than the income poverty that primarily consists of transitory poverty.

Russia is of special interest due to the substantial diversity of its regions. The majority of studies show the large gap in well-being between rich and poor Russian regions. In Russia, the official data on poverty are heavily criticized with regard to choosing the poverty line and ignoring the economy on scale.

The purpose of this paper is to calculate the multidimensional poverty index (MPI) for Russian regions and find the determinants of multidimensional poverty. To the best of our knowledge, it is a first attempt to calculate MPI for all regions of the Russian Federation.

Multidimensional poverty index was developed by Alkire and Santos (2010) as an alternative to an outdated traditional approach based on the comparison of income or consumption with the poverty line. The first cross-country comparisons by MPI were introduced in the UNDP Human Development Report 2010. In subsequent years, different researchers adopt MPI for regional comparisons in the European Union, Malaysia, China, India, South Africa, Mexico, Argentina, Brazil, and other countries. For example, Alkire, Apablaza, and Jung (2014) suggest the modification of the MPI for EU regions. They add the environmental dimension to reflect such important deprivations for citizens in the developed countries as pollution, crime, and noise. Le, Nguyen, and Phung (2015) adjust the MPI calculation for regions in Vietnam by adding the deprivations in social insurance, social assistance, access to information, social participation.

Remarkably the ranking of regions in Vietnam by multidimensional poverty in their study differs from the ranking by income poverty.

In the UNDP Human Development Report 2010 the MPI replaced the Human Poverty Index (HPI) published in previous reports. MPI has a number of advantages compared with HPI. The values of MPI presented in the 2010 UNDP report varied from 3 percent in Europe and Central Asia to 65 percent in Sub-Saharan Africa. The majority of the people in multidimensional poverty live in Southern Asia and Sub-Saharan Africa.

Our research is an attempt to receive a reliable assessment of multidimensional poverty level in the Russian Federation in general and in its regions. The calculations are based on the microdata from the Comprehensive Monitoring of Living Conditions of the Population carried out by the Federal State Statistics Service of the Russian Federation (Rosstat) in 2014 that covered 136,232 individuals from all regions of Russia.

We modify a method of MPI calculation taking into account the most prevalent deprivations in Russia. The index of multidimensional poverty reflects a number of deprivations in education, health and living conditions. Each person in a household is defined as poor or not poor depending on the quantity of deprivations, which she faces in the household. Then these data are aggregated to conduct the measure of multidimensional poverty.

The results show that the overall poverty rate and interregional inequality in Russia are much higher compared to Rosstat data. For some results of our calculations considerably differ from the official statistics data. The multidimensional poverty rate in Russia according to our estimates is more than 22 percent that is almost two times higher the income poverty rate. The poorest region in Russia by the multidimensional approach is the Altai Republic where the deprivation is experienced by about the half of the inhabitants. The smallest poverty rates are observed in the federal cities of Moscow and Saint-Petersburg, Yamal-Nenets Autonomous Okrug, and Chukotka Autonomous Okrug where the level of the deprivation is lower than 10 percent.

Using econometric methods, we reveal the main demographic and social determinants of differences in multidimensional poverty indicators. The significant determinants include household size, the number of children in the household, type of settlement, age of the household members. The multidimensional poverty rate for households with three or more children is substantially higher compared to other households. The probability to live in multidimensional poverty is substantially higher for the dwellers of the small rural settlements and substantially lower for the big city inhabitants.

The structure of the paper is the following. Section 2 describes the official measurement of poverty in Russia based on the unidimensional income approach and highlights its main drawbacks. Section 3 presents our modification of the methodology of the multidimensional poverty measurement. Section 4 describes the data used for the calculations of the multidimensional poverty indicators. Section 5 presents the results including multidimensional poverty indicators across different population groups. Section 6 presents the results of the calculation of the multidimensional poverty indicators across geographical regions. Section 7 concludes.

2. Drawbacks of official poverty measurement in Russia

The official poverty measure is provided by the Russian official statistical agency, Rosstat. The poverty measurement approach was established in the 1990s and has undergone only minor changes since then. The measurement is based on the monetary approach and represents a complicated process. Poverty determination uses (i) the mean income calculated on the macroeconomic data and (ii) the income distribution obtained by the household budget survey. The macroeconomic estimate of the mean income is noticeably higher than its survey estimate; the discrepancy is explained by the existence of the informal economy. In fact, this discrepancy is the

main reason why poverty measure is not obtained directly by the household survey but calculated through the approach described above.

The main poverty measure is a headcount index determined as a percentage of the population with monetary income lower than the poverty line. The poverty line is defined at the regional level by an absolute approach. The poverty line equals the monthly subsistence minimum in the region. This minimum is established quarterly by the regional government. The poverty determination does not imply any adjustment for the household economies of scale. Government agencies in Russia use a similar approach to identify the poor households for social aid provision.

The official poverty measurement is subject to intensive critique. First, there are concerns regarding the measurement of income. The household budget survey does not measure income directly but only collects data on monetary consumption and net savings which are used to calculate monetary income. It is argued that net savings are measured very inaccurately with large recall bias and underestimation (World Bank, 2005). Korchagina et al. (1998) demonstrate that consumption-measured poverty estimates substantially differ from the income-measured poverty estimates in Russia.[4] Ovtcharova and Tesliuk (2006) show that ignoring the rental value of dwellings for homeowners overestimates the poverty rate among homeowners and underestimates the poverty rate among tenants.

Several studies (Lokshin et al., 2000; Spryskov, 2003; Denisova, 2012; Abanokova and Lokshin, 2014) reveal the significant household economy of scale but the official approach uses the same weights for all members of the household regardless of its size.

The determination of the poverty line is also heavily criticized. Ravallion and Lokshin (2003, 2006) show the inconsistency of poverty lines across different regions that could be explained, in their opinion, not only by climatic differences but also by manipulations of regional

[4] However, using the RLMS-HSE data, Denisova (2012) finds that both magnitude and dynamics of consumption-measured poverty rates are similar to magnitude and dynamics of income-measured poverty rates.

governments in order to attract transfers from the federal center. Some researchers advocate the relative approach instead of the absolute approach.[5]

Last but not least, the approach used by Rosstat to determine population estimates from survey data looks highly problematic. To provide the representativeness, Rosstat weights the sample creating the highly differentiated weights that could lead to substantial biases (World Bank, 2005). Another point of critique is the assumption of log-normality used to model the income distribution. Aivazian and Kolenikov (2001) and Sheviakov and Kiruta (2001) argue that the real income distribution in Russia is far from the log-normal. Kolmakov (2008) argues that the log-normal model appropriately approximates the middle-part of the income distribution in Russia but does not properly fit its lowest and highest parts.

Each of the above-mentioned problems could cause a substantial deterioration of poverty indicators. Thus, the variety of existing alternative poverty measures in Russia comes as no surprise. However, to the best of our knowledge, none of the previous measures has applied the multidimensional approach.

It is worth to review in some detail the results of alternative estimation. Mroz and Popkin (1995) were among the first who present alternative estimates. According to Rosstat, the national poverty rate in 1992 equals 33.5 percent while Mroz and Popkin's estimate equals 28.4 percent. However, they argue that the significant part of those considered by the official measure to be poor is not really poor. Ferrer-i-Carbonell and Van Praag (2001) apply several approaches to poverty measurement including absolute, relative and subjective measures, and in some cases receive the estimates much higher than the official estimate. Denisova (2012) calculates both absolute and relative poverty measures applying equivalence scales to account for the household economy on scale. For 2009, the absolute poverty rate reported by Denisova (2012) is substantially lower than the corresponding Rosstat estimate while the relative poverty rate is closer to the Rosstat absolute poverty rate. Abanokova and Lokshin (2014) show that after the economy-on-scale adjustment the

[5] Remarkably, Litvintseva et al. (2007) and Denisova (2012) demonstrate that the dynamics of the relative poverty measure differs from the dynamics of the absolute poverty measure.

poverty profile significantly changes. Lokshin and Yemtsov (2013) review several alternative estimates of the poverty rate and reveal the high diversity (for example, in 2000 ranging from 27.9 to 53.1 with an official estimate of 29.0 percent), concluding that it is hard to establish which estimate is closer to the reality.

3. Methodology

The multidimensional approach to poverty measurement has aroused as an alternative to the traditional unidimensional approach when the poverty determination is based on a comparison of the one indicator (e.g. income or consumption) with the poverty line. The multidimensional approach recognizes that some poverty indicators in a poor household could be higher the poverty line, while a non-poor household could also have values of some indicators below the poverty line. To be identified as a poor within the multidimensional framework, a household should be poor by several dimensions, in other words, the certain number of poverty indicators should be below the consequent poverty lines.

Multidimensional poverty index (MPI) was suggested by Alkire and Foster (see the description of its theoretical and methodological roots in Alkire and Foster, 2011). The index has quickly become popular among researchers, international agencies and policymakers.

The first step in the MPI determination is to determine the weighted sum of deprivations (c_i) in household i:

$$c_i = \sum_1^d (g_{ij} \times w_j), \quad (1)$$

where d is the number of all possible deprivations, j denotes deprivations (j = 1, 2, …, d), g_{ij} is an indicator of deprivation j in household i (g_{ij} equals 1, if i-th household experiences deprivation j, and equals 0 otherwise), w_j is a weighted coefficient of deprivation j.

Next step determines whether i-th household is poor or not, by comparing the weighted sum of deprivations c_i with the threshold k:

$$Poor_i = \begin{cases} 1, & c_i \geq k \\ 0, & c_i < k \end{cases}, \quad (2)$$

where $Poor_i$ is a binary variable, indicating whether *i*-th household is poor or not.

The number of poor people (q) is determined as follows:

$$q = \sum_{m=1}^{n} Poor_m, \quad (3)$$

where *m* indexes individuals, *n* is the total number of individuals, $Poor_m$ is a binary variable indicating whether *m*-th individual is living in a poor household ($Poor_i$ = 1) or not. All individuals from *i*-th household are counted as poor, if *i*-th household is poor.

Multidimensional poverty index is a product of the headcount ratio (H) and poverty intensity (A):

$$MPI = H \times A. \quad (4)$$

To determine the headcount ratio, the number of poor (q) is divided by the total population (n):

$$H = \frac{q}{n}. \quad (5)$$

Headcount ratio gives the measure of the poverty rate. The main drawback of the traditional poverty rate is its indifference to the poverty depth i.e. it does not take into consideration how much the income falls below the poverty line. The large increase in incomes of severely poor households wouldn't be reflected by poverty rate if the incomes do not exceed the poverty line. On the other hand, the minor increase in income of households that are close to the poverty line can result in the substantial reduction in the poverty rate. This drawback makes difficult the usage of the poverty rate in the assessment of the effectiveness of the antipoverty policy. The multidimensional indicator reflecting the poverty depth is the poverty intensity.

Poverty intensity (A) is a mean number of deprivations in poor households divided by the total number of deprivations:

$$A = \frac{\sum_1^{n\frac{c}{d}}}{n} \quad (6)$$

Poverty intensity varies in the range of 0.3 to 1, where the minimum value is observed when all poor households are near the poverty line, and the maximum value is observed when all poor households experience all possible deprivations.

The universality of the multidimensional poverty index is in its applicability not only to cardinal data but to also ordinal and nominal data. See Alkire et al. (2015) for a more thorough description of the multidimensional poverty measurement.

We modify a method of MPI calculation taking into account the most prevalent deprivations in Russia. Our modification also uses three dimensions of MPI as the original index. These dimensions are education, health, and living condition. However, the list of deprivations in each dimension has changed. In our modification of MPI, the deprivation in education includes the following indicators: primary education or less, the number of years of education less than 5 years, no school attendance for children 7-16 years old. The deprivation in health includes the following indicators: self-assessment of health as poor, chronic diseases, disability, and lack of access to medical care. The deprivation in living conditions include problems with hot and cold water supply, bad accommodation conditions, living in communal apartments, problems with the electricity, poor quality of water from any available source, inappropriate heating type, poor self-evaluation of current financial position, lack of resources to buy medical drugs, income below the poverty line. The comparison of the deprivations in our framework with the deprivations used in the original index is presented in Table A1 in the Appendix. Exact definitions of deprivations in the original approach are according to the UNDP Human Development Report 2010 (UNDP, 2010).

Then we calculate an index reflecting deprivations that are experienced by a household for each dimension. The maximum value is 10 in the extreme case when all deprivations exist in the household. Each dimension has equal weight (thus the maximum point in each dimension is equal to 10/3). Dimension "Education" has 3 indicators; therefore, the weight of each indicator is equal to (10/3)/3 or 1.111. Dimension "Health" includes 4 indicators, so the weight of each deprivation is

equal to (10/3)/4=0.833. Dimension "Living conditions" includes 10 indicators and in this case, the weight of each measure is equal to (10/3)/10=0.333.

To identify the multidimensionally poor households, all indicators are multiplied by its weight and summarized that in turn results in the general indicator of household deprivation, c_i. The household is considered to be multidimensionally poor if $c_i > 3$.

4. Data

We determine the multidimensional poverty indicators using microdata from the Comprehensive Monitoring of Living Conditions of the Population (CMLC). The CMLC is both nationally and regionally representative household survey carried out by the Federal State Statistics Service of the Russian Federation (Rosstat). There were four waves of this survey conducted in 2011, 2014, 2016, and 2018. We use the data from the second wave that was organized in September 2014 and covered 60 thousand households with 136,232 individuals from all regions of Russia. The first, 2011 wave covered 10 thousand households and was representative only at the national level, but not at the regional level.[6]

The CMLC is conducted as a LSMS-type survey. The main goal of the CMLC is to collect data on the living conditions of Russian households as well as explore their needs in comfortable and safe environment, healthy lifestyle, child development, professional mobility, and social networking. To construct the sample, Rosstat used the multistage random sample design based on the results of the 2010 Russian Census. The data are collected by trained interviewers using both household and individual questionnaires. An interviewer must visit selected household at least three times before this household is replaced by another from the reserve list. An interviewer is not allowed to substitute the household at his own will. One of the members of the household also provides answers for those members of his household who are absent or unable to respond. One of

[6] The CMLC data are available at http://www.gks.ru/free_doc/new_site/KOUZ14/survey0/index.html

the parents answers the individual child questionnaire for children aged less than 15 years. The household response rate in 2014 was about 84 percent. See also Fleischer et al. (2016) for the CMLC description and comparison with similar surveys in OECD countries.

The CMLC provides comprehensive information on various living conditions that makes it an appropriate source for measuring complex social indicators. For instance, the data of the CMLC are used among other datasets to construct the multidimensional Active Ageing Index for Russia (Varlamova et al., 2017).

5. Multidimensional poverty profile

Our calculations of the multidimensional poverty estimates indicate that the percentage of those who are poor by multidimensional approach is 22.8 percent. The poverty intensity (A) is 0.438; thus, the multidimensional poverty index is 0.100 (0.228 × 0.438). The proportion of multidimensionally poor is rather large indicating that the substantial share of Russian households experiences several deprivations. However, the number of deprivations in poor households is not very high as the poverty intensity does not tremendously exceed its minimum value. Therefore the value of MPI is moderate.

Table 1 presents the estimates of the multidimensional poverty rate (H) and the percentage of urban inhabitants among multidimensionally poor compared with the traditional poverty indicators. The column (2) presents the estimates reported by the official Russian statistical agency, Rosstat. Rosstat publishes only the income poverty rate based on the quarterly household budget survey (HBS) data and modified at macroeconomic level (for details, see section "Drawbacks of official poverty measurement in Russia"). In spite of the quarterly frequency of the survey, Rosstat publishes only yearly data. Note that Rosstat uses sampling weights to provide nationally representative estimates. In the next columns, we provide both weighted and unweighted estimates. The column (3) presents our estimates of the income poverty rate by what we call the

"indirect approach". Specifically, following the Rosstat, we use the imputed income that is a continuous variable computed as a sum of monetary consumption and net savings (see the abovementioned section). Unlike the Rosstat, we present estimates for the 3rd quarter of 2014 to obtain the comparability of the results with the annual CMLC survey conducted in this quarter; however, our weighted estimate of the proportion of urban dwellers among poor is pretty close to the corresponding Rosstat yearly estimate in column (2). The large discrepancy in estimates of the income poverty rate is entirely caused by the Rosstat's macroeconomic adjustment that raises household incomes in all parts of its distribution. The column (4) presents the estimates of poverty measured by consumption that is also a continuous variable. Remarkably, the HBS contains the direct question on income but it is reported only in intervals so we use the centers of these intervals to compute the alternative HBS income poverty estimates reported in the column (5). Last columns are based on the CMLC data. Similar to HBS, income in the CMLS is reported in intervals. The CMLC income poverty estimates presented at column (6) are nearly similar to the HBS direct income poverty estimates (see column 5). However, there are striking differences in the estimates changes after the weighting. While the CMLS estimates experience only slight changes after the weighting, the HBS estimates change substantially. In our view, these differences may be attributed to the higher dispersion of the HBS weights compared to the CMLS weights. The HBS has the high dispersion of survey weights with the standard deviation of 2.49 mean values and the maximum value equal to 12,414,970,000 of the minimum value while the CMLC weights have substantially lower dispersion with the standard deviation of 0.4 mean values and max/min ratio of 90.5. In this regard, the CMLS data are more appropriate for the poverty assessment than the HBS data.

All in all, Table 1 indicates that the CMLC in many ways is similar to the HBS. The main cause of the differences in the official poverty rate and the calculated poverty rate is the macroeconomic adjustment of the income distribution. However, Rosstat does not adjust the composition of poverty. Thus, the main differences in Rosstat estimates and our estimates

presented below could be attributed to the differences in the income and the multidimensional approaches.

Table 1. Comparison of the HBS and the CMLC poverty estimates

	Official Rosstat data	Poverty by income (indirect approach)	Poverty by consumption	Poverty by income (direct question)	Poverty by income (direct question)	Multidimensional poverty
	based on HBS	HBS	HBS	HBS	CMLC	CMLC
	2014	2014 Q3	2014 Q3	2014 Q3	2014 Q3	2014 Q3
	(2)	(3)	(4)	(5)	(6)	(7)
Poverty rate		0.298	0.461	0.276	0.269	0.228
Poverty rate, weighted estimate	0.112	0.211	0.339	0.242	0.234	0.210
Proportion of urban dwellers among poor		0.502	0.532	0.475	0.498	0.545
Proportion of urban dwellers among poor, weighted estimate	0.611	0.609	0.621	0.604	0.531	0.595

Notes: the column (2) presents Rosstat data, columns (3)–(7) present the authors' calculations based on HBS and CMLC data.

The direct comparison of subgroups by the poverty rate is not feasible because Rosstat does not provide data on poverty rate by type of settlement or sociodemographic groups. Instead, Rosstat provides the distribution of poor by settlement types and other subgroups. Note that it is not possible to construct official poverty rates by these subgroups due to the impossibility to account for the adjustment at the macroeconomic level. Rosstat presents poverty rates only for major age groups. Table 2 compares poverty measures across age groups. The income poverty rate is highest among younger people and lowest among the elderly. In contrast, all multidimensional measures are highest among the older population. These differences are partly due to ignoring the economy on scale by the income approach given that under-16-years-olds generally belong to larger households and the elderly usually live in smaller households. Another source of difference is the actual fixation of the minimum amount of the old-age pension to the subsistence minimum. Thus, many pensioners receive the pension equal or slightly higher the poverty line that allows avoiding the income poverty but does not fully protect from deprivations accounted by the multidimensional approach.

Table 2. Poverty estimates by age groups

	Official income poverty rate	Income poverty rate	Multi-dimensional poverty rate *H*	Poverty intensity *A*	Multidimensional poverty index *MPI*
	Rosstat	CMLC	CMLC	CMLC	CMLC
	(2)	(3)	(4)	(5)	(6)
Total population	0.112	0.269	0.228	0.438	0.100
By age groups:					
Under 16 years old	0.185	0.451	0.171	0.417	0.071
16-30 years old	0.110	0.300	0.152	0.429	0.065
Men 31-59 years old, and women 31-54 years old	0.117	0.258	0.184	0.430	0.079
Men 60 years and older, and women 55 years and older	0.053	0.148	0.369	0.453	0.167

Notes: the column (2) presents Rosstat data for 2014, columns (3)–(6) present the authors' calculations based on CMLC data.

The following comparisons are made by poverty profiles. Distribution of multidimensionally poor by settlement type and size is not quite different from the distribution of poor by income (see Table 3). However, the share of large city inhabitants is somewhat larger among multidimensionally poor compared to income poor.

Table 3. Distribution of poor by type and size of settlement

	Official income poverty rate	Income poverty rate	Multidimensional poverty rate *H*
	Rosstat	CMLC	CMLC
	(2)	(3)	(4)
Urban settlements	0.611	0.498	0.545
One million and more	0.094	0.037	0.068
250,000 – 999,999	0.078	0.069	0.102
100,000 – 249,999	0.081	0.058	0.066
50,000 – 99,999	0.084	0.076	0.070
Less than 50,000	0.274	0.251	0.248
Rural settlements	0.389	0.502	0.455
5,000 and more	0.100	0.093	0.084
1,000 – 4,999	0.177	0.203	0.172
200 – 999	0.107	0.202	0.179
Less than 200	0.005	0.012	0.011

Notes: the column (2) presents Rosstat data for 2014, columns (3)–(4) present the authors' calculations based on CMLC data.

Table 4 demonstrates substantial differences in the distribution of poor by economic activity and employment status. Unfortunately, in the case of poverty distribution, Rosstat counts as unemployed only those who have registered at an employment office. In Russia registered unemployed represent only a small part of all job seekers, so the majority of unemployed are considered to be out of labor force. In Panel A we estimate poverty distribution using the Rosstat approach. Panel B uses more common approach when all unemployed are included in the labor force. However, the conclusions from the comparison of columns (3) and (4) in Panels A and B are quite similar. Multidimensional approach substantially decreases the share of employed and unemployed and increases the share of individuals out of labor force among the poor. The latter increase is entirely caused by the larger share of pensioners out of the labor force.

Table 4. Distribution of poor by labor force participation and employment status (only for individuals aged 15 and older)

	Official income poverty rate	Income poverty rate	Multidimensional poverty rate *H*
	Rosstat	CMLC	CMLC
	(2)	(3)	(4)
Panel A			
In labor force	0.644	0.492	0.337
Employed	0.628	0.470	0.326
Registered unemployed	0.016	0.022	0.011
Out of labor force	0.356	0.508	0.663
Pensioners	0.120	0.283	0.581
Non-pensioners	0.236	0.225	0.082
Panel B			
In labor force	…	0.576	0.388
Employed	0.628	0.470	0.326
All unemployed	…	0.106	0.062
Out of labor force	…	0.424	0.612
Pensioners	…	0.246	0.542
Non-pensioners	…	0.178	0.070

Notes: the column (2) presents Rosstat data for 2014, columns (3)–(4) present the authors' calculations based on CMLC data.

There are also remarkable differences in the distribution of poor by household size (see Table 5). Larger households tend to have larger share among income poor, while smaller households tend to have larger share among multidimensionally poor. The highest share among income poor belongs to four-person households, while the largest share among multidimensionally

poor belongs to two-person households. The most obvious explanation of these differences is the ignoring of the economy on scale by the income approach. Note also that for very large households the pattern changes: the share of very large households with 5 members or more is larger than the share of four-person households among income poor, while the former share is smaller than the latter share among multidimensionally poor.

Table 5. Distribution of poor by household size

	Official income poverty rate	Income poverty rate	Multidimensional poverty rate *H*
	Rosstat	CMLC	CMLC
	(2)	(3)	(4)
1 person	0.031	0.050	0.147
2 person	0.151	0.156	0.320
3 person	0.253	0.216	0.198
4 person	0.322	0.295	0.161
5 person and more	0.243	0.284	0.175

Notes: the column (2) presents Rosstat data for 2014, columns (3)–(4) present the authors' calculations based on CMLC data.

Table 6 presents the poverty distribution by presence and number of children in the household. Multidimensional approach enlarges the share of childless households among the poor, while the income approach results in a higher share of households with children among the poor.

Table 6. Distribution of poor by presence and number of children in household

	Official income poverty rate	Income poverty rate	Multidimensional poverty rate *H*
	Rosstat	CMLC	CMLC
	(2)	(3)	(4)
Without children	0.371	0.272	0.624
With children	0.629	0.728	0.376
1 child	0.307	0.273	0.183
2 children	0.236	0.300	0.127
3 and more	0.086	0.155	0.066

Notes: the column (2) presents Rosstat data for 2014, columns (3)–(4) present the authors' calculations based on CMLC data.

The analysis above gives an incomplete picture of multidimensional poverty profile as different determinants of poverty can interact with each other. More thorough analysis requires using the regression technique. Table 7 presents the results of the regression models estimation

where the dependent variables are the different poverty indicators. All models are estimated on the CMLC data. Column (2) and column (3) present the results from binary probit models where dependent variables are binary variables indicating whether an individual belongs to a poor household or not. Column (4) presents the results from linear regression models where the dependent variable is the poverty intensity that is a continuous variable.

Table 7. Regression estimates

	Dependent variable – income poverty	Dependent variable – multidimensional poverty	Dependent variable – poverty intensity
	(2)	(3)	(4)
Age	*baseline category – 0-14 years old*		
15-19 years	0.021***	0.019***	0.007**
	(0.005)	(0.006)	(0.003)
20-29 years	0.103***	0.032***	0.007**
	(0.004)	(0.005)	(0.003)
30-39 years	0.087***	0.080***	0.015***
	(0.004)	(0.004)	(0.002)
40-49 years	0.097***	0.100***	0.021***
	(0.005)	(0.005)	(0.003)
50-59 years	0.107***	0.151***	0.023***
	(0.005)	(0.005)	(0.003)
60-69 years	0.066***	0.190***	0.026***
	(0.006)	(0.006)	(0.003)
70-79 years	0.038***	0.275***	0.037***
	(0.007)	(0.006)	(0.003)
80 years and older	-0.045***	0.331***	0.060***
	(0.009)	(0.008)	(0.004)
Highest education degree	*baseline category – higher education*		
unfinished higher	0.100***	0.026***	-0.014***
	(0.008)	(0.009)	(0.004)
vocational, specialized secondary	0.120***	0.070***	0.007***
	(0.003)	(0.003)	(0.001)
secondary	0.164***	0.074***	0.014***
	(0.003)	(0.003)	(0.002)
less than secondary	0.155***	0.463***	0.160***
	(0.007)	(0.008)	(0.003)
Job (1 – employed, 0 – non-employed)	-0.134***	-0.117***	-0.021***
	(0.003)	(0.003)	(0.002)
Old-age pension (1 – pensioner, 0 – non-pensioner)	-0.079***	-0.054***	-0.020***
	(0.004)	(0.004)	(0.002)
Number of children in household	*baseline category – no children in household*		
1 child	0.146***	-0.016***	-0.014***

	(0.003)	(0.003)	(0.002)
2 children	0.275***	-0.004	-0.014***
	(0.003)	(0.004)	(0.002)
3 children	0.414***	0.037***	-0.009***
	(0.005)	(0.006)	(0.003)
4 children and more	0.474***	0.085***	-0.006
	(0.011)	(0.009)	(0.005)
Number of adults in household	*baseline category – one adult*		
2 adults	-0.002	0.059***	0.029***
	(0.003)	(0.003)	(0.001)
3 adults	0.058***	0.149***	0.063***
	(0.003)	(0.004)	(0.002)
4 adults and more	0.116***	0.217***	0.077***
	(0.004)	(0.004)	(0.002)
Arctic zone (1 – arctic zone, 0 – other regions)	-0.057***	-0.037***	0.001
	(0.007)	(0.007)	(0.004)
Federal district	*baseline category – Central federal district*		
Northwestern	0.010**	0.002	-0.001
	(0.004)	(0.004)	(0.002)
Volga	0.037***	-0.001	-0.000
	(0.003)	(0.003)	(0.002)
Southern	0.085***	0.023***	0.003
	(0.004)	(0.004)	(0.002)
North Caucasusian	0.103***	0.015***	0.002
	(0.004)	(0.004)	(0.002)
Ural	0.063***	0.003	0.002
	(0.004)	(0.004)	(0.002)
Siberian	0.119***	0.073***	0.012***
	(0.003)	(0.003)	(0.002)
Far Eastern	0.094***	0.021***	-0.007***
	(0.005)	(0.005)	(0.002)
Type of settlement	*baseline category – big city*		
medium city	0.071***	0.066***	0.008***
	(0.005)	(0.004)	(0.002)
small city	0.157***	0.086***	0.011***
	(0.004)	(0.004)	(0.002)
big village	0.178***	0.124***	0.018***
	(0.005)	(0.005)	(0.003)
medium village	0.249***	0.154***	0.024***
	(0.004)	(0.004)	(0.002)
small village	0.298***	0.167***	0.026***
	(0.004)	(0.004)	(0.002)
R-squared	–	–	0.27
Pseudo R-squared	0.27	0.17	–
Number of observations	136,232	136,232	31,013

Notes: columns (2) and (3) report marginal effects, column (4) reports coefficients, robust standard errors are in parentheses.

(***) Significant at the 1 percent level; (**) significant at the 5 percent level; (*) significant at the 10 percent level.

We do not interpret the regression estimates as the determinants of poverty because this identification strategy does not allow to reveal the causal nature of the relationships. Rather, we consider it as correlations with *ceteris paribus* condition that is the association between the independent variable and the dependent variable given that other independent variables do not change.

In general, the results of regression analysis confirm previous results. The significant determinants include household size, the number of children in the household, type of settlement, age of the household members. The elderly individuals have the highest probability to be multidimensionally poor while middle-aged individuals have the highest probability to be poor by income. Low education substantially increases the risk to become multidimensionally poor but only moderately increases the risk to become poor by income. Presence of one child in a household is associated with higher income poverty and lower multidimensional poverty. However, the high number of children in a household is associated with higher rates of both income and multidimensional poverty. An increase in the number of adults in a household also increases the probability to fall both into multidimensional poverty and income poverty. The probability to live in multidimensional poverty is substantially higher for the dwellers of the medium-sized rural settlements and substantially lower for the big city inhabitants. The regression results demonstrate significant differences in probability to be poor by the location. These differences highlight the importance of investigation of the multidimensional poverty in regional dimension.

6. Multidimensional poverty in Russian regions

The estimates of multidimensional poverty indicators for all Russian regions are presented in Table A2 in the Appendix. For comparison Table A2 presents the official statistics data on income poverty. In some cases (among the most notable the Altai Republic, Belgorod Oblast) our estimates considerably differ from the official statistics data. The poorest region in Russia by the

multidimensional approach is the Altai Republic where the multiple deprivations are experienced by about half of the individuals in the survey. The estimate of the multidimensional poverty rate for the Karachay-Cherkess Republic is 48.2 percent that is slightly lower the estimate for the Altai. It follows by the Oryol Oblast where the multidimensional poverty rate is 36.8 percent. The least poor regions are the federal cities of Moscow and Saint-Petersburg, Yamal-Nenets Autonomous Okrug, and Chukotka Autonomous Okrug with the multidimensional poverty rates lower than 10 percent. The ranking of Russian regions by MPI is very similar to the ranking by multidimensional poverty rate.

Table A2 also shows average values of education, health, and living conditions indices in the regional dimension. The three poorest regions by education are Chechen Republic, Kurgan Oblast, and the Republic of Kalmykia. The poorest regions by health are Altai Republic, Karachay-Cherkess Republic, Oryol Oblast. The poorest regions by living conditions are Altai Republic, Tyva Republic, Zabaykalsky Krai. Thus, the largest contribution to variance in multidimensional estimates is provided by health and living conditions while education has only small effect on the indicators.

Comparison of the results across federal districts indicates that regions from the North Caucasus demonstrate relatively better results when income approach is replaced by multidimensional approach. While the inhabitants in these regions experience a lot of deprivations in living conditions the health indicators are much better providing more favorable multidimensional estimates. Most of Siberian regions have worse results by multidimensional approach due to numerous deprivations in health and living conditions. The Northern regions however show lower values of poverty indicators due to better access to services that is unavoidable in severe climate conditions.

7. Conclusions

The multidimensional approach provides a possibility to consider a number of various deprivations that offer a more comprehensive depiction of poverty compared to income poverty. We apply the multidimensional poverty approach to obtain alternative estimates of poverty in Russia across population groups and regions. Our calculations demonstrate higher poverty estimates and larger interregional inequalities compared to the official statistics data. According to multidimensional poverty estimates pensioners and those living alone have the highest risk of poverty that considerably contradicts with the Rosstat data.

The results of the study indicate that the usage of the deprivation approach can provide poverty profile that substantially differs from those obtained by measuring income or consumption. The results also highlight the necessity to improve the methodology of poverty assessment in Russia. Some improvements can be realized within the unidimensional framework. For example, the poverty analysis by the households of different size shows the necessity of adjustment to economy of scale in the household.

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Appendix

Table A1. **List of deprivations**

Dimension	Original approach	Our approach
Education	1. No household member has completed at least six years of schooling. 2. A school-age child (up to grade 8) is not attending school.	1. Any of adult household members has only primary education or less. 2. Any of adult household members has the number of years of education less than 5 years. 3. No school attendance for any child 7-16 years old.
Health	1. A household member is malnourished. 2. A child has died in the household within the five years prior to the survey.	1. A household member evaluates her health as poor. 2. A household member has a chronic disease. 3. Disability of any household member. 4. Lack of access to medical care.
Living conditions	1. Not having access to electricity. 2. Not having access to clean drinking water or if the source of clean drinking water is located more than 30 minutes away by walking. 3. Not having access to improved sanitation or if improved, it is shared. 4. Using 'dirty' cooking fuel (dung, wood or charcoal). 5. Having a home with a dirt, sand or dung floor. 6. Not having at least one asset related to access to information (radio, TV, telephone) and not having at least one asset related to mobility (bike, motorbike, car, truck, animal cart, motorboat) or at least one asset related to livelihood (refrigerator, arable land, livestock).	1. Problems with cold water supply. 2. Problems with hot water supply. 3. Bad accommodation conditions. 4. Living in communal apartments. 5. Problems with the electricity. 6. Poor quality of water from an available source. 7. Inappropriate heating type. 8. Poor self-evaluation of current financial position. 9. Lack of resources to buy medical drugs. 10. Household income below the household poverty line.

Table A2. **Multidimensional poverty indicators by Russian regions**

	Income poverty rate	Multidimensional poverty rate	Living conditions index	Health index	Education index	MPI
	(2)	(3)	(4)	(5)	(6)	(7)
The Russian Federation	**0.112**	**0.228**	**1.15**	**1.05**	**0.13**	**0.100**
Altai Krai	0.170	0.334	1.29	1.30	0.18	0.148
Altai Republic	0.207	0.495	1.66	1.50	0.21	0.224
Amur Oblast	0.140	0.287	1.29	1.20	0.10	0.122
Arkhangelsk Oblast	0.141	0.249	1.17	1.22	0.06	0.105
Astrakhan Oblast	0.120	0.217	1.27	1.07	0.15	0.096
Belgorod Oblast	0.075	0.364	1.23	1.46	0.16	0.164
Bryansk Oblast	0.123	0.183	1.18	0.90	0.17	0.086
Chechen Republic	0.142	0.245	1.50	0.68	0.34	0.112
Chelyabinsk Oblast	0.117	0.191	1.00	1.07	0.14	0.083
Chukotka Autonomous Okrug	0.083	0.090	0.92	0.69	0.07	0.036
Chuvash Republic	0.161	0.242	1.11	1.21	0.15	0.105
Irkutsk Oblast	0.186	0.287	1.26	1.16	0.21	0.132
Ivanovo Oblast	0.142	0.279	1.27	1.20	0.15	0.125
Jewish Autonomous Oblast	0.214	0.185	1.14	1.21	0.06	0.076
Kabardino-Balkar Republic	0.185	0.233	1.20	0.89	0.25	0.100
Kaliningrad Oblast	0.121	0.243	1.21	1.07	0.19	0.110
Kaluga Oblast	0.094	0.196	1.10	0.92	0.05	0.081
Kamchatka Krai	0.170	0.157	0.89	1.18	0.05	0.063
Karachay-Cherkess Republic	0.195	0.482	1.48	1.53	0.23	0.220
Kemerovo Oblast	0.141	0.242	1.12	1.17	0.11	0.102
Khabarovsk Krai	0.132	0.125	1.00	0.89	0.02	0.048
Khanty-Mansi Autonomous Okrug	0.109	0.118	0.83	0.92	0.07	0.049
Kirov Oblast	0.127	0.300	1.13	1.45	0.16	0.133
Komi Republic	0.143	0.206	1.01	1.20	0.10	0.088
Kostroma Oblast	0.135	0.259	1.14	1.22	0.14	0.112
Krasnodar Krai	0.101	0.320	1.27	0.98	0.13	0.107
Krasnoyarsk Krai	0.167	0.361	1.23	1.27	0.18	0.140
Kurgan Oblast	0.166	0.345	1.34	1.29	0.30	0.161
Kursk Oblast	0.087	0.286	1.16	1.20	0.18	0.125
Leningrad Oblast	0.104	0.123	0.89	0.85	0.05	0.050
Lipetsk Oblast	0.080	0.277	1.15	1.19	0.14	0.119
Magadan Oblast	0.121	0.146	0.94	0.95	0.07	0.057
Mari El Republic	0.197	0.323	1.17	1.30	0.23	0.147
Moscow	0.090	0.052	0.59	0.71	0.02	0.021
Moscow Oblast	0.076	0.110	0.89	0.79	0.05	0.045
Murmansk Oblast	0.109	0.115	0.83	1.09	0.08	0.050
Nenets Autonomous Okrug	0.090	0.213	1.16	1.11	0.11	0.096
Nizhny Novgorod Oblast	0.085	0.207	1.05	1.04	0.14	0.092
Novgorod Oblast	0.122	0.208	1.08	1.08	0.08	0.090
Novosibirsk Oblast	0.152	0.306	1.24	1.25	0.15	0.138
Omsk Oblast	0.120	0.314	1.44	1.09	0.24	0.144
Orenburg Oblast	0.119	0.283	1.22	1.24	0.14	0.124
Oryol Oblast	0.128	0.368	1.25	1.48	0.12	0.161
Penza Oblast	0.126	0.261	1.20	1.09	0.17	0.112

Perm Krai	0.120	0.227	1.16	1.12	0.10	0.098
Primorsky Krai	0.147	0.195	1.25	1.02	0.05	0.084
Pskov Oblast	0.161	0.324	1.24	1.43	0.13	0.140
Republic of Adygea	0.110	0.348	1.52	1.24	0.22	0.156
Republic of Bashkortostan	0.108	0.241	1.23	1.05	0.17	0.106
Republic of Buryatia	0.169	0.289	1.53	1.00	0.15	0.132
Republic of Crimea	0.231*	0.243	1.32	1.03	0.13	0.107
Republic of Dagestan	0.101	0.274	1.55	0.79	0.25	0.124
Republic of Ingushetia	0.249	0.225	1.58	0.66	0.23	0.094
Republic of Kalmykia	0.347	0.343	1.58	1.22	0.26	0.160
Republic of Karelia	0.142	0.236	1.16	1.15	0.07	0.100
Republic of Khakassia	0.175	0.324	1.32	1.28	0.17	0.149
Republic of Mordovia	0.172	0.229	1.20	1.00	0.21	0.106
Republic of North Ossetia-Alania	0.121	0.213	1.25	0.94	0.16	0.099
Republic of Tatarstan	0.070	0.174	1.02	0.93	0.14	0.077
Rostov Oblast	0.129	0.248	1.34	1.01	0.10	0.109
Ryazan Oblast	0.109	0.274	1.21	1.17	0.19	0.126
Saint Petersburg	0.083	0.068	0.71	0.82	0.02	0.027
Sakha (Yakutia) Republic	0.174	0.309	1.29	1.20	0.07	0.128
Sakhalin Oblast	0.091	0.242	1.32	1.07	0.05	0.102
Samara Oblast	0.126	0.137	0.99	0.83	0.09	0.060
Saratov Oblast	0.149	0.209	1.22	0.97	0.08	0.087
Sevastopol	0.151*	0.115	1.23	0.64	0.00	0.044
Smolensk Oblast	0.152	0.274	1.14	1.21	0.17	0.125
Stavropol Krai	0.116	0.304	1.39	1.12	0.14	0.132
Sverdlovsk Oblast	0.083	0.211	1.04	1.12	0.11	0.088
Tambov Oblast	0.093	0.324	1.36	1.17	0.24	0.149
Tomsk Oblast	0.164	0.176	1.06	0.94	0.11	0.077
Tula Oblast	0.098	0.182	1.07	0.92	0.10	0.079
Tver Oblast	0.119	0.261	1.29	1.12	0.07	0.108
Tyumen Oblast	0.121	0.276	1.24	1.13	0.22	0.131
Tyva Republic	0.347	0.322	1.65	1.04	0.08	0.139
Udmurt Republic	0.113	0.263	1.17	1.40	0.10	0.113
Ulyanovsk Oblast	0.121	0.176	1.17	0.93	0.10	0.076
Vladimir Oblast	0.135	0.246	1.18	1.16	0.11	0.105
Volgograd Oblast	0.140	0.267	1.29	1.04	0.09	0.113
Vologda Oblast	0.129	0.201	1.01	1.17	0.10	0.085
Voronezh Oblast	0.091	0.312	1.32	1.16	0.14	0.136
Yamalo-Nenets Autonomous Okrug	0.069	0.075	0.95	0.60	0.03	0.032
Yaroslavl Oblast	0.099	0.310	1.13	1.36	0.14	0.135
Zabaykalsky Krai	0.180	0.357	1.62	1.12	0.21	0.169

Notes: the column (2) presents Rosstat data for 2014, columns (3)–(7) present the authors' calculations based on CMLC data.
*) 2015 estimates.