

Poverty and Poverty Measurement in Russia: Energy Poverty in the Energy Rich Country

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Abstract

The problem of poverty in Russian Federation is considered from the point of view the energy poverty of households. Despite the tremendous energy potential the situation in regions of RF in term of energy supply of population is quite different. The multidimensional index of energy poverty for 79 regions was calculated on the base Household Budget Survey 2009. The components of this index include the following indicators: the presence of regular breaks with electricity, the presence of regular interruption heat, no hot water, and use as a fuel source for heating wood, coal and coke. Energy poverty has provides the social and economic consequences. It is proposed to use the energy poverty index to adjust values of absolute poverty index in Russian regions.

Keywords: multidimensional poverty measurement, regional indices

1. Introduction

Direct measures of poverty that look at income per capita have a long history. Now this indicator is the core of absolute poverty measurement (the share of population with income below of poverty line). But poverty is not just about income. Absolute approach was added by the deprivation and living standards, particularly in Britain. From Charles Booth and before, through to Seebholm Rowntree and Peter Townsend in the XXth century, the living conditions of the poor have been investigated to establish those who live in poverty. Thus a relative deprivation approach was appeared. Measuring only relative income poverty captures just part of the picture and does not fully describe the complexity of poverty. It is also important to measure other things that capture the multi-dimensional nature of poverty. Measures of deprivation are not the same as measures of income – they relate to how people live. Deprivation is the consequence of a lack of income and other resources, which cumulatively can be seen as living in poverty. The relative deprivation approach to poverty examines the indicators of deprivation, which are then related back to income levels and resources.

To further the relative deprivation approach, we propose to introduce the energy poverty as deprivation and to use the multidimensional energy poverty index, following to Sabina Alkire and James Foster. This index consists from the several indicators such as:

- Regular power outages (more than once per month, lasting more than two hours),
- Regular interruptions in heat,
- No hot water (from central or individual sources),
- Use as a fuel for heating the wood, coal and coke.

The last indicator is included for reasons of environments, safety and ease of use of energy sources. These variables are very important for living conditions in Russian Federation with long frosty winter, instable climate conditions and big distances between living places.

The energy poverty index is built as not-weighted average of the shown four variables. We propose to use the energy poverty index for adjustment of absolute poverty index. This approach gives us the possibility to combine the absolute and the relative measurement of poverty.

2. Approach and results

We use the Household Budget Survey-2009 because this data-base was opened by Rosstat. Essentially the deprivation approach involves identifying goods or activities which are seen as basic necessities in the country someone is living. These can be things such as having new and not second hand clothes, adequate shoes, a meal with meat or fish once every two days, adequate heating, a television, being able to go to the pub or a social outing with friends once a week, having an annual holiday and so on. Since the beginning research poverty in Russia (in the middle of 1990th) the meal (meat and fish) was the main deprivation indicator. Then (since the early 2000-s) these indicators were replaced by the possession of technical goods: PC, video, large flat screen TV, mobile telephone, private car, etc. Now the main characteristics of deprivation are the quality and comfort of dwelling; health and education also. We concentrate on the living conditions from the energy poverty point of view.

Russian Federation has huge reserves of natural resources. Russia accounts for a fifth of the world's natural resources in general: Russia ranks first in the forest area, the first place in term of gas reserves, the second largest fresh water, the first place on the reserves of peat, the seventh largest oil reserves.

Despite the tremendous energy potential the situation in regions in term of energy supply is quite different. Multidimensional index for each region was calculated on the base Household Budget Survey 2009, using the Alkire and Foster approach (Alkire and Foster, 2001; Alkire and Foster, 2011). The components of this index are the following indicators: x1 - the presence of regular power outages (more than once a month, lasting more than

two hours), x_2 - regular interruptions in heat, x_3 - no hot water (central or individual sources), x_4 - use as a fuel for heating the wood, coal and coke. The energy poverty index is not-weighted average from these indicators (assuming equal weights for simplicity). In Russia as a whole all these deprivations cover more than 10% of households. The regional differences in the values of the energy poverty index are very large – from 35.9% in Tuva Republic to 0.6 % in Saint Petersburg.

Energy poverty has provided many social and economic consequences and influences on the level of general poverty.

Our methodology can be introduced in several steps as a common to many multidimensional poverty measures; as a more specific to our aim. The unit of analysis is households per region. Then we selected the variables which are measurement and appropriate to this research. It is convenient to take these variables by authoritative because of for these is data available with the required characteristics. The descriptive statistics for four variables is shown in Table 1.

Table 1 - The descriptive statistics

	x_1	x_2	x_3	x_4
Mean	10.64	1.50	16.77	3.35
Median	9.85	0.59	20.27	1.71
Standard deviation	15.59	2.00	14.74	5.93
Excess	3.40	1.18	1.14	25.14
Asymmetry	1.64	1.43	0.94	4.30
Interval	76.84	8.20	69.83	43.21
Min	0	0	0	0
Max	76.84	8.20	69.83	43.21
Number	79	79	79	79

Coefficients of variation are over than 100% for all variables. It means great differences between regional conditions.

Beside we include the additional four variables for absolute poverty, life quality and employment:

x_5 – population with income less than the cost of minimal consumer basket in 2009, percent;

x_6 – aging population, percent;

x_7 – non-comfortable, dilapidated, old house, percent;

x_8 – unemployment, percent.

Indicators are chosen for each dimension on the principles of accuracy (using as many indicators as necessary so that analysis can properly guide policy) and parsimony (using as few indicators as possible to ensure ease of analysis for policy purposes and transparency). Statistical properties are often relevant - for example, when possible and reasonable, it is best to choose indicators that are not highly correlated.

The first point of our methodology is that energy poverty affects the level of absolute poverty increasing it. The other methodological positions follow from the first. All regions were divided on three groups following the value of energy poverty index for region. The first group includes the regions with value of index less than average for Russia (45 regions). The level of poverty in the region of the first group was not corrected. The poverty level in the regions of the second group adjusted to the coefficient (25 regions). This coefficient is the ratio the regional energy poverty index to the Whole-Russian energy poverty index in power $\frac{1}{2}$ (for more soft correction). The third group includes the regions for which the level of energy poverty was higher than absolute poverty. In this case the adjusted for the poverty in region was calculated as the geometrical mean of the two regional indices – absolute and energy poverty (9 regions).

The descriptive statistics for additional variables and energy poverty index (on the base of four variables) present in Table 2.

Table 2 - The descriptive statistics

	<i>EPI</i>	x_5	x_6	x_7	x_8
Mean	10.14	16.57	20.83	4.41	8.77
Median	8.93	16	21.5	2.9	8.0
Standard deviation	7.40	4.91	4.13	4.14	5.44
Excess	3.32	3.04	0.60	5.47	41.88
Asymmetry	1.58	1.22	-0.95	2.20	5.73
Interval	36.13	28.20	18.40	20.47	48.00
Min	0.59	8.30	9.00	0.33	1.70
Max	36.72	36.50	27.40	20.80	49.70
Number	79	79	79	79	79

x) According to Official Statistics (Rosstat) the level of poverty in RF in 2009 was equal to 13%. The difference is explained by the use of data by regions not by households. We can see more homogeneity in absolute poverty than in living condition. The correlation coefficients between variables are in Table 3.

Table 3– Correlation matrix

	x_1	x_2	x_3	x_4	x_5	x_6	x_7	x_8
x_1	1							
x_2	0.067	1						
x_3	0.707	-0.026	1					
x_4	0.143	0.448	0.159	1				
x_5	0.389	-0.159	0.570	-0.040	1			
x_6	-0.291	-0.221	-0.366	-0.446	-0.338	1		
x_7	0.362	0.206	0.395	0.590	0.242	-0.701	1	
x_8	0.202	-0.057	0.389	0.407	0.435	-0.537	0.610	1

The highest correlation is between breaks with electricity and absence of hot water. Absolute poverty has more close correlation with comfortable housing.

The multiple regression was undertaken to check the directions of relations. Results of regression analysis:

$$\ln EPI = -1.46 + 0.63 \ln x_5 + 0.27 \ln x_7 + 0.70 \ln x_8 + \varepsilon \quad R^2 = 0.42, \quad n = 79$$

(t) (-1.94) (2.04) (2.63) (3.03) $F=18.09$

White test

$$\varepsilon^2 = -1.43 + 3.26 \ln x_5 - 0.70 (\ln x_5)^2 + 0.33 \ln x_7 - 0.13 (\ln x_7)^2 - 2.23 \ln x_8 + 0.61 (\ln x_8)^2 + \delta$$

$F=2.00$

We don't have heteroscedasticity. The regression analysis confirms the linear positive relation between absolute and energy poverty (the regression coefficient is significant on the 5%-level). Regression of absolute poverty as the dependent variable showed significance depending on the two variables – the energy poverty index and the unemployment rate:

$$\ln x_5 = 2.09 + 0.08 \ln EPI + 0.25 \ln x_8 + \varepsilon \quad R^2 = 0.29, \quad n = 79$$

(t) (14.69) (2.11) (3.06) $F=15.78$

White test

$$\varepsilon^2 = -0.05 - 0.01 \ln IEP + 0.01 (\ln EPI)^2 + 0.07 \ln x_8 - 0.01 (\ln x_8)^2 + \delta$$

$F=1.16$

3. Conclusion

Summing up the results of the analysis we can conclude that energy poverty is significant for the regions of Russia. Its presence increases the level of poverty by 1.2% in general. The adjustment in the regions is quite substantially – from 0.5% to 10.3%. In further research it is necessary to improve the methodology and to consider indicators of energy poverty within the measurement of poverty.

References

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