The Effect of Adjustment for Household Size and Composition on Poverty Estimates in Russia

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1. Introduction

Most of the studies investigating the extent of poverty in Russia ignore the heterogeneous consumption needs that different household members have or/and the economies of scale in household consumption (see survey of literature in Denisova, 2012). The official methodology for assessing the poverty that is calculated on a per capita basis also does not account the impact of household size and composition[2].

At the same time, a large body of literature on poverty measurement demonstrates the effect of adjustments for economies of scale or/and of adult/child consumption relativities on the profile of the poor. Lanjouw and Ravallion (1995) concluded that the positive correlation between household size and poverty in Pakistan can disappear once economies of size were employed. Dreze and Srinivasan (1997) found that the poverty ranking of different household types in India was invariant to the choice of equivalence scales, but was sensitive to the choice of economies of household size parameters. Meenakshi and Ray (2000) found that the introduction of economies of household size and equivalence of scale simultaneously lead to a sharp reduction in the estimates of poverty in India but did not affect poverty ranking of different States. Mok et al. (2010) demonstrated that the official approach in poverty measurement[3] overestimated the poverty rate in Malaysia. Betti and Lundgren (2012) found a positive impact of size economies on poverty reduction and inequality ranking in Tajikistan.

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[2] Poverty levels in Russia are calculated using an equivalent scale by age groups and regions. The coefficients of this scale were calculated as the ratio between the calories needs corresponding to each category and the highest caloric consumption, corresponding to the working age adult. Thus, each age and gender group has its own poverty line. The Rosstat uses weights equal to one for the working age adult, 0.5 for each child younger than 18 years old and 0.7 for pensioners.

[3] The Malaysian government estimated the household size economies of housing at 0.474

The importance of incorporating the household size and composition in poverty analysis has long been recognized, but the empirical work on Russian data has been scarce. Using data from the Russian Longitudinal Monitoring Survey, Mroz and Popkin (1995) found that 34.8 percent in 1992 and 37 percent in 1993 families with children were below the official poverty line. However, the poverty line used by Mroz and Popkin (1995) and developed by Popkin et al (1992) takes into account the nutritional needs of individuals but does not capture household scale economies from sharing consumption of public goods. Applying equivalence scales for poverty calculations from 1996 data of the Volgograd Oblast, Ovcharova et al. (1998) reported that share of poor families decreased by 4.3 percentage points compared to per capita approach. While Ovcharova et al. (1998) found sensitivity of poverty estimates, they concentrated on size economies parameter. Using data of Eastern Europe and Central Asia countries, Lanjouw et al. (1998) examined the sensitivity of the poverty profile to the choice of a range of possible values of scale economies parameters. While they found the evidence of negative correlation of poverty with household size at some critical value of scale economies, the authors did not estimate these parameters. Gan and Vernon (2003) utilized Russian Longitudinal Monitoring Survey over 1994–1998 to test the presence of economies of size. While confirming the existence of size economies in consumption, Gan and Vernon (2003) provide no estimations for size parameters. Moreover, they failed to examine the sensitivity of the poverty measures to the choice of a range of possible values of economies of size. Using Russian Longitudinal Survey data of 1994 and 2002, Takeda (2010) found significant economies of scale in children`s goods. The scales proposed by Takeda (2010) recognized the differences between children and adults consumption needs but did not adjust for scale economies with increasing household size.

Our paper focuses on the impact of allowing economies of household size and composition on the poverty calculations in Russia. The issue of sensitivity of poverty calculations is examined with respect to the poverty rate and poverty profile. To adjust the official poverty line for the household size and composition, we calculate alternative poverty line using calorie-based approach. In calculating the scales we concentrate on consumption and subjective based methods. We also investigate the Engel curve for Russia which has not been studied before using parametric, nonparametric and semiparametric techniques.

We show that using per capita approach gives a misleading picture of poverty since household welfare varies by size and composition. We find that, regardless of a method, the differences in needs between household members and economies of scale in household consumption are significant and have very different implications for the poverty rate and for the poverty profile compared to the official poverty estimates. In particular, we demonstrate that ignoring the scales results in a relevant overstatement of overall poverty and poverty among large households.

The knowledge about nonidentical needs between household members and scale economies in household consumption is crucial for poverty measurement and policy implementation. Such adjustments might change the focus of government policies and lead to re-evaluation of the effectiveness of government programs. Moreover, as correct identification of groups vulnerable to poverty is important for accurate assessment of poverty, the reliable demographic poverty profiles hold considerable policy interest.

The paper is organized as follows. After a brief description of the Russian Longitudinal Monitoring Survey in Section two, the methodologies and calculations for setting scales are illustrated in Section three. The implications of the estimated household equivalence coefficients on the poverty measures are discussed in Section four while Section five concludes.

2. Data

We used data from Russian Longitudinal Monitoring Survey (RLMS-HSE) from 2003 to 2013. These data are the detailed repeated surveys of households and individuals and can be analyzed as pooled cross-sections as well as a panel[4].

We selected those households that were observed and were part of the representative sample in 2003[5]. We excluded households that had no members over 18 years old, reported negative or zero total or food expenditures[6] and also deleted first and

[4] Details about survey RLMS HSE can be found in http://www.cpc.unc.edu/projects/rlms.

[5] We also kept those households that were created when a household splited up into two households from 2003. Both households remained in our sample.

[6] Our measure of total household expenditures is constructed from all RLMS categories including expenditures on food, alcohol and tobacco at home and out of home, clothing and foots, fuel, rent and utilities, services (except from loans, savings and bonds) plus consumption of home-produce foods. The value of home produced food is calculated as a product of multiplying of average monthly quantity of consumed home-grown foods and their mean price in given primary sampling unit. Mean prices are obtained in two steps. First, the household-specific market price of individual food item is calculated by dividing the cost of purchase by the amount purchased in the last 7 days. Then the mean price of individual food items is computed for each primary sampling unit. Rent expenses include imputations for the rent of

last 2.5 percent of the within-year household total and food expenditure. We obtained a final sample size of 3475 households, resulting in 21129 observations.

Table 1 Appendix reports frequencies of observed expenditures. Fifty-three percent of our sample households participate in five of the 11 years, and about 13% in each of the 11 years. For panel estimates, an unbalanced panel design covering the years 2003–2013 is used. Once we drop households who do not participate in at least two waves, our sample size reduces to 2942 households. Summary statistics of the pooled data are given in Table 2 Appendix.

3. Calculation of equivalence scales

There are several different ways for setting scales. One of the most used methods in economic literature is Engel method which is based on the observation that the share of budget spent on food decreases with rising income. The Engel's scale is defined as a ratio in total expenditures of two households of different size or composition whose budget share of food is the same. It assumes that the consumption preferences of two different households can be compared by using a set of equivalence scales and two households of the same composition have identical preferences. The functional form of the relationship between food share and expenditure was known as Working-Leser model, where budget share is linear in the log total expenditure and food share curve is monotonic in total expenditure. Recent studies often rejected this assumption and found that the Engel curves can be more flexible than Working-Leser specification (Banks et al., 1997; Blundell et al. 2003, 2007; Imbens and Newey, 2009).

First, we graph nonlinear curve of food share against log (deflated) total expenditure. Figure 1 presents nonparametric kernel and quadratic polynomial regressions[7]. Although we find the negative relationship, as expected given Engel`s law, the regressions for food are not close to linearity and the nonlinear models provide a better approximation for the food share curve.

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house owners. To compute household consumption we treat missing values of the categories as zeros and convert them to a monthly basis. The value of total consumption is expressed in 2009 prices by dividing the current price of expenditures by the regional consumer price index.

[7] We use the Nadaraya-Watson kernel regression estimator with an Epanechnikov kernel and 100 points where the regression analysis is carried out. We evaluate many different sets of starting values before choosing 0.18 for estimation kernel regression. Smaller sample size and larger measurement errors may explain the behavior in the tails of the kernel regressions.

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Figure 1: Nonparamertic Engel curve for food shares

Since these methods do not allow for the control of other factors that may affect food share, semi-parametric method of pooling nonparametric Engel curves across different households are used to further develop results. The semi-parametric model involves partial linear specification for food share equation allowing total expenditure variable enters non-parametrically and all control variables enter linearly[8]:

$$w = X\beta + g(x) + \varepsilon \qquad (1)$$

where X represents the observable exogenous regressors including demographic characteristics (household size and composition), age and level of education, employment status, region of residence and level of urbanization, x indicates the log of household expenditure, $g(.)$ is unknown function, ε – error term.

Household expenditure is typically found to be endogenous due to measurement errors, unobserved heterogeneity when household preferences are correlated with household expenditure and joint decision about household expenditure and expenditure on food[9]. The endogeneity problem was solved in Blundell et al. (1998, 2003, 2007) and Hansen (2012) through using household income as an exogenous instrument for household expenditure. This instrument can eliminate measurement error problem if measurement errors of household expenditure and income are not correlated and can control for simultaneity if household first choose consumption in utility maximization problem and next, given total expenditure, decides about expenditures on food. To adjust for endogeneity of log total expenditure in the food share equation, we adapt two stage residual inclusion estimator (control function approach) which is more efficient in nonparametric case (Wooldridge, 2010) and try the log of household income and its square as the instruments[10]. The formal representation of partial linear model becomes:

[8] We allow for non-linearity of the Engel curve using Yatchew (1998) difference estimator. It starts by sorting the data according to log expenditure and then estimates the model in difference:

$$\Delta w = \Delta X\beta + \Delta g(x) + \Delta\varepsilon$$

Under the assumption that differences in expenditure values are close to zero, the parameter vector β can be estimated by OLS (Lokshin, 2007).

[9] Blundell and Duncan (1997) reported significant differences in the shape of Engel curves estimated with and without allowing for the endogeneity of total expenditure. Blundell et al. (2003) shows the importance of allowing for unobserved preference heterogeneity in Engel model.

[10] Although different types of measurement error are present in RLMS HSE data, the main reason of measurement errors is seasonal subsistence farming. As a result, the dependent and explanatory variables in food share equation include the value of home production. We found evidence for measurement error in the

$$w = X\beta + g(x) + \rho v + \eta \qquad (2)$$

where, in addition to the notations defined earlier, ν is the residuals obtained from the first stage parametric regression. The correction for endogeneity of expenditure is introduced in the model by regressing log of expenditure on log of income, its square and set of observable exogenous regressors in the first stage and using the fitted residuals obtained from this step as an additional covariate in the second stage. The significance of residuals from the first stage ρ indicates the presence of endogeneity.

Figure 2 displays semi-parametric estimation results for a differencing procedure with controls and correction for endogeneity of household expenditure. The semi-parametric Engel curve is quite consistent with the non-parametric curves and reflects the robustness nonlinear relationship between log total expenditure and food share for households[11]. The overall share of food remains stable and decreases slowly at a lower income level. According to Figure 2 the food shares start to decline significantly at expenditure value that corresponds to the median value in the data. This implies that 50 percent of the households in the sample have to spend all their additional income on food to maintain subsistence level.

Figure 2. Semi-parametric IV estimates of food share

In summary, these results demonstrate that the linear specification of Working-Leser model is not a reasonable choice for Russian households. Nonlinear relationship between food share and log expenditure is consistent with studies on developing countries (Hasan, 2012; Kedir and Girma, 2007).

To allow for sufficient observations for each demographic group, we focus attention on households with no more than 4 persons. Seven household types are used: childless single adults; childless two adults; childless three adults; childless four adults; couple with one child where the child is aged less than eighteen; couple with two children where both children are aged less than eighteen; couple with three children where

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RLMS HSE data and therefore used income as an instrument in our estimations. Income includes all the income of all the members from wages, salaries, self-employment investments, government transfers, other income including that from the pensions and excludes the monetary equivalent of subsistence agriculture.

[11] The alternative specification (not reported) with quadratic term in log total expenditure and controls showed the log total expenditure and its squared term are significant at the 1% level.

children are aged less than eighteen. Subsample sizes of other household groups are not sufficient to obtain consistent curve estimates.

In Figure 3 and Figure 4 we report five semiparametric IV estimates of Engel curves for the food that correspond to different household types. Engel curves have a similar shape for households with different number of adults. We see the robustness inverted relationship between log total expenditure and food share for households across different demographic and non-demographic characteristics.

Figure 3. Semi-parametric IV estimates of food share for adults

Figure 4. Semi-parametric IV estimates of food share for couples with children

Having assessed the shape of the Engel curve, a complete equivalence scales are calculated by using our preferred specification (2) with nonlinear term in log total expenditure and controls. In order to compare different demographic types, we choose the food ratio that is average value for reference type and calculate for each household type the level of expenditure equals to the food ratio of reference type by projecting this food ratio onto the Engel curves. Table 1 presents the scale estimates for adults according to average food share of single adult. Relative equivalence scales can be derived from the ratio of expenditures across households. Higher values of equivalence coefficient mean lower differences in consumption needs. First additional adult increases household expenses by 70 percent for singles, by 37 percent and by 24 percent with respect to the two-adult and three-adult household respectively. Four-adult household need to spend three times more compared with lone adult to attain the same welfare level.

Table 1. Estimated equivalence scales with semi-parametric model at food ratio 0.47

	Scale	Expenditure	Number of hhs
1 Adult	1	8 462	2034
2 Adults	1,72	14 549	4806
3 Adults	2,35	19 867	1538
4 Adults	2,91	24 647	550

Notes: Reference household type is single adult. Expenditure levels are in 2009 rubles per month. All regressions are presented in Table 4 Appendix.

Table 2 presents the scale estimates for children according to average food share of couple with one child, as in the previous analysis. To preserve a degree of demographic homogeneity, we select a subset of couples with children. Our equivalence scales indicate low impact of children on household expenditure. The presence of a one more child increases household costs by 18 percent for couples with one child and by 20 percent for households with 2 children.

Table 2. Estimated equivalence scales with semi-parametric model at food ratio 0.45

	Scale	Expenditure	Number of hhs
Couple with 1 child	1	14 016	1763
Couple with 2 children	1,18	16 590	1108
Couple with 3 children	1,42	19 923	514

Notes: Reference household type is couple with one child. Expenditure levels are in 2009 rubles per month. All regressions are presented in Table 5 Appendix.

However, there are reasons to doubt that expenditure is a good indicator of current economic welfare. Another approach in estimating equivalence scales has been developed by Van Praag (1968) by asking respondents what amount of income they associate with very bad, bad, insufficient, sufficient, good or very goods welfare levels. In this method the welfare is directly measured since households` relative satisfaction level with their income represent the households` welfare level. RLMS HSE data set includes the question that indicate of perceived current economic welfare when respondents were asked to evaluate their own level of well-being on a nine rung ladder from ‘poor’ to ‘rich’[12] (Economic Welfare Question). To estimate equivalence scales we interpreted subjective economic welfare as a direct measure of the expenditure needed to attain a given utility level. We assume the subjective economic welfare of the household head to represent the welfare of the household. Figure 5 contains nonparametric estimates for the relation between subjective welfare and log(income). Although subjective welfare increases with income for all households, it increases faster at a low income level.

Figure 5. Nonparametric estimates for the relation between subjective economic welfare and household expenditure

Since these results do not correct for other households characteristics that are related to income and may affect subjective welfare, we will estimate a model taking additional explanatory variables into account. Besides household expenditure and its

[12] Please imagine a 9-step ladder where on the bottom, the first step, stand the poorest people, and on the highest step, the ninth, stand the rich. On which step are you today?

square there are differences in subjective welfare due to individual characteristics of household head, including age, education and employment status, household demographics, share of earners in household[13]. Suppose we express the individual economic welfare as a latent continuous variable *w*. This individual welfare is determined by observable individual and households characteristics and some unobserved factors. The model is given by

$$w^*_{it} = \beta' X_{it} + \varepsilon_{it} \qquad (3)$$

where w_{it} is economic wellbeing of individual i at time t; X_{it} is a vector of independent explanatory variables, and epsilon is unobserved. Since continuous latent variable w cannot be observed, an ordered categorical response variable C_{it} is measured with K categories (where $k=1..K$) and individual-specific thresholds c_{kit}, where the threshold are assumed to be strictly increasing. Assuming that error term has a normal standard distribution, we can estimate a latent variable model with ordered probit. One of the problems with subjective data is that subjective welfare is affected by unobserved factors leading to biased scales (Lokshin and Ravallion, 1999). This problem can be solved using panel structure of RLMS HSE data and allowing for household specific effects. We estimate the model by pooled ordered probit and fixed effect.

Table 3 and Table 4 present a subjective scale for adults and children. We find that larger households need additional income to be as satisfied with their income as a single adult. Turning to the fixed effect model, the scale became too flat in the sense that an increase in the household size leads to bigger drop in the satisfaction.

Table 3. Estimated subjective equivalence scales for adults

	Pooled ordered probit		Fixed effects	
	coef	st.error	coef	st.error
1 Adult	1		1	
2 Adults	1,73	*0,134*	1,49	*0,557*
3 Adults	2,26	*0,350*	1,67	*1,247*
4 Adults	2,61	*0,607*	1,66	*1,862*

Notes: Reference household type is single adult. All regressions are presented in Table 6.

[13] Ravallion and Lokshin (2002) also used the variables related to respondent's social setting, health status as well as attitudinal variables related to expectations about future welfare. We do not include these variables due to their possible endogeneity to subjective measure.

Table 4. Estimated subjective equivalence scales for children

	Ordered probit		Fixed effects	
	coef	st.error	coef	st.error
Couple with 1 child	1		1	
Couple with 2 children	1,28	*0,053*	1,09	*0,357*
Couple with 3 children	1,47	*0,131*	1,07	*0,709*

Notes: Reference household type is couple with children. All regressions are presented in Table 6.

To summarize, our results show that the equivalence coefficients vary with the estimation method, the income level of household and with the reference group. Although the full comparison between consumption expenditure based scales and subjective scales is not possible due to the differences in the approaches, subjective estimates presents smaller weights for households with many members. The results are also consistent with findings of other authors about greater economies of scale in consumption estimated by subjective approach.

4. Implications for poverty incidence and poverty profiles

In this section we apply the results developed in the previous sections to the poverty analysis in 2013. The poverty analysis is performed using the poverty lines adjusted for the demographic composition of the household. To take account of economies of scale in the official poverty line, we have made adjustment with "expenditure coefficients" by estimating poverty line for households with different size.

In estimating poverty line for Russia we followed the recommendations made by the World Bank and defined the total poverty line (PL) as the sum of two components, namely a food poverty line (PLf) and non-food poverty line (PLnf): PL = PLf+PLnf = PLfood(1+Snf); where Snf the share of non-food spending in total consumption expenditure for poor households. The food poverty line was calculated by estimating the food basket which minimizes the cost of reaching age and gender-specific nutritional requirements. The costs of non-food consumption for poor household were then used to obtain non-food poverty line. The minimum calorie requirements by age and gender published by Popkin et al. (1992) were taken as a starting point in deriving of food poverty line. The nutritional requirements were specified for active males aged 18-59 (2729 calories per capita); active females aged 18-54 (1955 calories per capita); retired persons (2165 calories per capita for male and 1955 calories per capita for female);

children 0-7 years old (1581 calories per capita); and children 8 to 17 years old (2385 calories per capita). The caloric requirements of children were less than those of adults and requirements of women are less than those of male. The computed average per capita daily calorie requirement was equal to 2214 calories in 2013. The actual calorie intake of each household was calculated by multiplying the household consumed food in 2013 on food calorie conversion factors available from FAO statistics.

The household-specific calorie cost was obtained by dividing household food expenditure by calorie consumed. Thus, supposing that people with different consumption patterns would have different calorie costs, we can compare households with the same utility level. The calorie costs for each household type for the middle quintile of the distribution are presented in Table 5.

Table 5: Calorie cost by household type for the middle quintile in 2013

Household, consisting of	Calorie cost (rubles per 1000 calories per capita)
one member	40
two members	42
three members	43
four or more members	42

We used the price of food for households in the middle quintile because those households were close to the poverty line. Table 5 shows the differences in calorie cost between households with different size. Differences in calorie costs can be caused by the differences in the composition of food baskets. The food poverty line for each type of household is then equal to the calorie requirement multiplied by the calorie cost (Table 6).

Table 6: Calculated food poverty line for each household type in 2013

Household, consisting of	Food poverty line (rubles per capita)
one member	2841.8
two members	2983.35
three members	3059.36
four or more members	3024.31

The food poverty line is just one part of the overall poverty threshold. To add non-food component we should find the level of non-food expenditure that would be typical of a household whose actual food consumption is equal to the food poverty line.

We use the following way to do this. We define of the poverty line when per capita food expenditure equals the per capita food poverty line (the ratio of the household`s food expenditure to the food poverty line is between 0.9 and 1.1 with a value of 1 when food expenditure equals the food poverty line). Given the food and non-food poverty line, the overall poverty line can then be derived straightforwardly. Table 7 shows the estimated poverty line for different household size. Table 7 also provides "expenditure coefficients" for households of different size. Coefficients are calculated by normalizing to the poverty threshold of the reference household type (reference type – household consisting of one member). For example, one-person households have an expenditure coefficient of 1, two-person households 1.05, three-person households 1.08, four or more-person households – 1.06. Finally, to modify the official poverty line, the normalizing coefficient for each household is applied to the official subsistence minimum (7306 rubles in 2013). In this way we made some modifications to the official poverty line, taking into account the economies of scale. Given that there are substantial differences in needs between household members and scale economies in consumption regardless of the methods used, it is necessary to examine how poverty profiles might change if the scales are adopted.

Table 7: Poverty lines by household size in 2013 (per month)

Household, consisting of	Estimated poverty line (per person in rubles)	Expenditure coeff	Adjusted official poverty line (per person in rubles)
one member	3899.74	1	7306
two members	4105.26	1.05	7691.02
three members	4198.20	1.08	7865.14
four or more members	4145.09	1.06	7765.65

Within the framework set, we have two different versions of the poverty line, namely, (a) unadjusted official poverty line when subsistence minimum level takes on their official value (7306 rubles in 2013); (b) adjusted official poverty line when official poverty line are modified using the "expenditure coefficients" assuming presence of size economies. But allowance also has to be made for household composition.

Using the equivalence and economies of scale coefficients we can calculate equivalized expenditure that is defined as household expenditure divided by the effective number of household members. If the whole household falls below the poverty line, the entire household is classified as being 'poor'. According to the types of poverty line, we obtain several scenarios (Table 8). Results indicate that the poverty incidence is highly sensitive to introduction of economies of scale and equivalence scales. Moreover, the poverty is sensitive to choices among different equivalence and scale economies coefficients. It follows from the Table 9 that 15.6 percent of individuals are poor using per capita approach implicit in the Rosstat. The adopting of the nonparametric equivalence scales to consumption and to poverty line leads to a reduction in the total estimates of poverty by 2 percentage points. If we use the subjective equivalence scale, then the share of poor decreases by 3 percentage points compared to per capita approach.

Table 8: Share of poor individuals under different definitions of welfare and poverty line

Expenditure	Poverty line	Share of poor
No adjustment is made for per capita expenditure	No adjustment is made for poverty line determined by Rosstat	15,6
Equivalized expenditure calculated using nonparametric Engel scales	Poverty line adjusted for household size using "expenditure coefficients" and for household composition using nonparametric equivalence scales	13,8
Equivalized expenditure calculated using subjective equivalence scales	Poverty line adjusted for household size using "expenditure coefficients" and for household composition using subjective equivalence scales	12,5

Note: Sample weights are applied when calculating the headcount ratio

As shown in Figure 6, large households are more likely to be poor when the welfare ratio is estimated on a per capita basis. We find that the percent of the poor generally increase with household size when no allowances are made for differences in needs between household members and for size economies. However, that correlation vanishes or even becomes negative when we use different scales. For example, the poverty rate among households with four or more members is close to 20 percent, whereas in the case of applying equivalence and scale economies coefficients, poor households with four or more members constitute 9-16 percent depending on the method. Among households with 2 or 3 members, which constitute 56 percent of the households observed, 30 percent are recognized as poor according to per capita method, although calculations based on our equivalence and scale economies coefficients give a levels from 18 percent to 26 percent.

5. Conclusion

More than 40 percent of Russia population received some kind of government assistance in 2011. Child allowance was the second largest social program after old-age pensions[14]. The official methodology for assessing the poverty status of Russian households relies on per capita measures of wellbeing ignoring potential economies of scale on household size. We suggest that Russian welfare programs might suffer from leakages and undercoverage because they overestimate the extent of poverty among large households. We find evidence of significant economies of household size in consumption in Russia. Provided range of economies of scales has very different implications for the poverty rates and profiles. The poverty rates fall with introduction of economies of scale. The adjustments for economies of scale lower the incidence of poverty among large households.

[14] Author`s calculations from Rosstat

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Tables and figures

Table 1: State frequencies in RLMS-HSE panel, 2003-2013

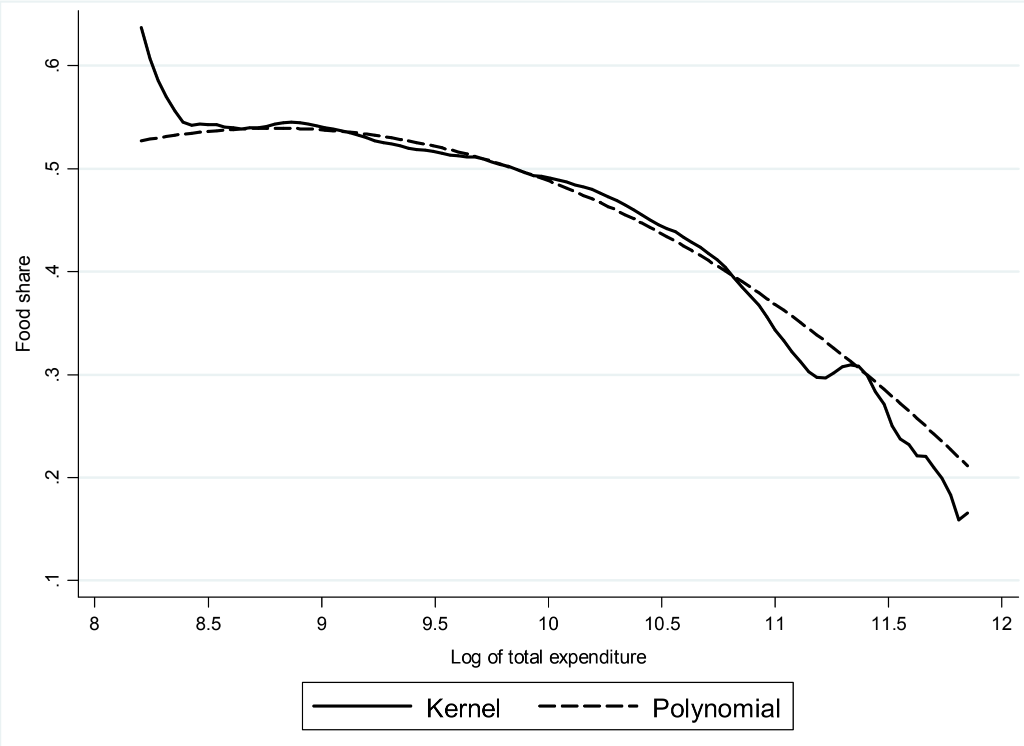
Number of years	Participating households	
	Frequency	Percent
1	533	15.34
2	361	10.39
3	318	9.15
4	292	8.40
5	325	9.35
6	242	6.96
7	286	8.23
8	227	6.53
9	311	8.95
10	135	3.88
11	445	12.81
	3475	100

Table 2: Summary statistics of main variables, panel 2003-2013

	Mean	Std_dev
Share of food expenditure in total expenditure	0,50	0,178
Log of total hh expenditure	9,67	0,551
Log of total hh income	9,74	0,756
Maximum age of hh members	58	15
Primary	0,02	0,151
Secondary incomplete	0,08	0,267
Complete secondary	0,26	0,439
College	0,30	0,457
University	0,34	0,474
Share of children 0-7 in hh	0,04	0,094
Share of children 7-18 in hh	0,10	0,165
Share of adults in hh	0,53	0,348
Share of pensioners in hh	0,33	0,395
Share of employed members	0,480	0,335
Metropolis	0,091	0,288
City	0,395	0,489
Town	0,291	0,454
Small Town	0,063	0,243
Village	0,252	0,434
Central fo	0,091	0,288
North-West fo	0,201	0,401
South fo	0,059	0,236
Volga fo	0,148	0,355
Ural fo	0,247	0,431
Siberia fo	0,083	0,276
Far East fo	0,125	0,331

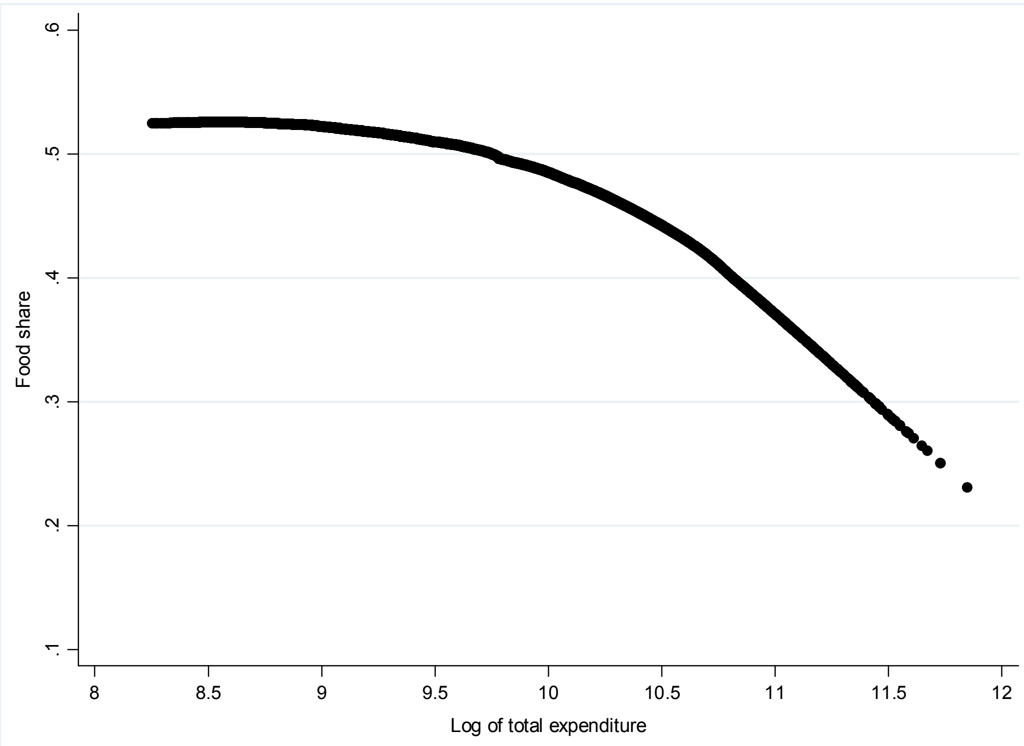
Notes: Means and standard deviations are calculated using household sampling weights.

Figure 1: Nonparamertic Engel curve for food shares



Notes: pooled sample RLMS HSE, 2003-2013.

Figure 2: Semi-parametric IV estimates of food share



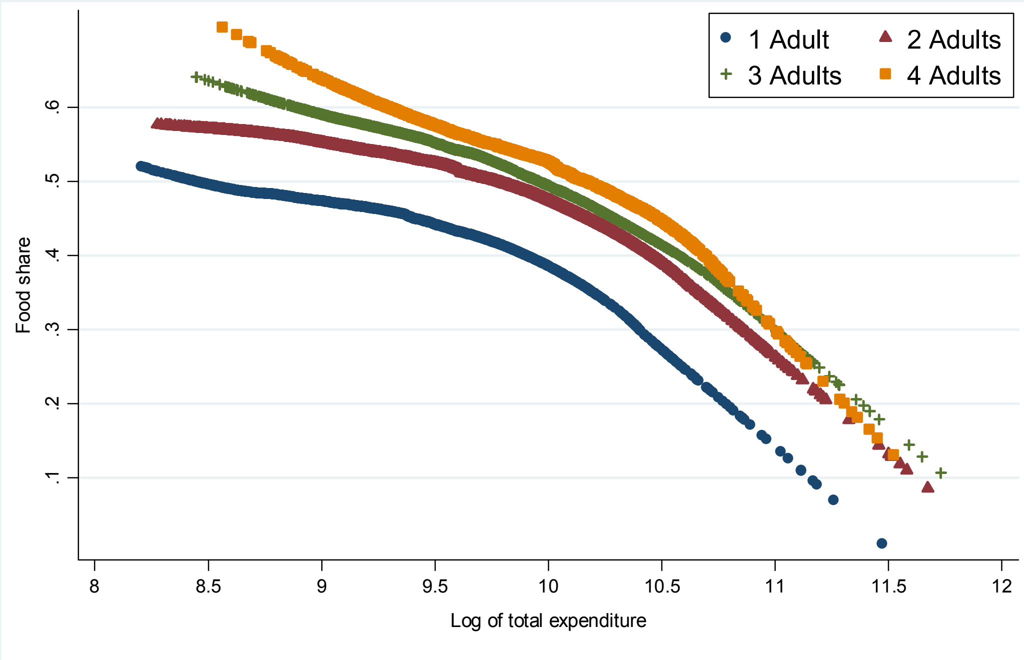
Notes: pooled sample RLMS HSE, 2003-2013. Full regression is presented in Table 3

Table 3: The impact of household income on food share. Semi-parametric IV estimates of food share

	CF approach		*First stage*	
	coef	*se*	coef	*se*
Residual	0,048***	*0,007*		
Income			-1,308***	*0,053*
Income 2			0,084***	*0,003*
Household Characteristics				
Max age of hh members	0,003***	*0,001*	0,004***	*0,001*
Max age of hh members	-0,003***	*0,000*	-0,005***	*0,001*
Max educational level of hh members				
Primary	0,042***	*0,009*	-0,031	*0,022*
Secondary incomplete	0,015***	*0,005*	-0,011	*0,013*
College	-0,010***	*0,003*	0,033***	*0,008*
University	-0,018***	*0,003*	0,084***	*0,008*
Complete secondary	reference			
Share of children 0-7 in hh	-0,192***	*0,015*	0,126***	*0,038*
Share of children 7-18 in hh	-0,164***	*0,010*	0,257***	*0,026*
Share of male adult in hh	-0,027***	*0,006*	0,054***	*0,014*
Share of pensioners in hh	reference			
Log of household size	0,101***	*0,004*	0,153***	*0,009*
Share of employed members	0,003	*0,005*	0,005	*0,012*
Moscow/Peter	-0,019**	*0,008*	0,209***	*0,018*
Type of locality				
City	-0,074***	*0,004*	0,201***	*0,009*
Town	-0,071***	*0,004*	0,070***	*0,009*
Small Town	0,015***	*0,005*	0,085***	*0,013*
Village	reference			
_cons			13,955***	*0,257*
Number of observations	19 832		19 839	
Log-Likelihood	8 264,40		-10 227,75	
Adjusted R2	0,150		0,439	

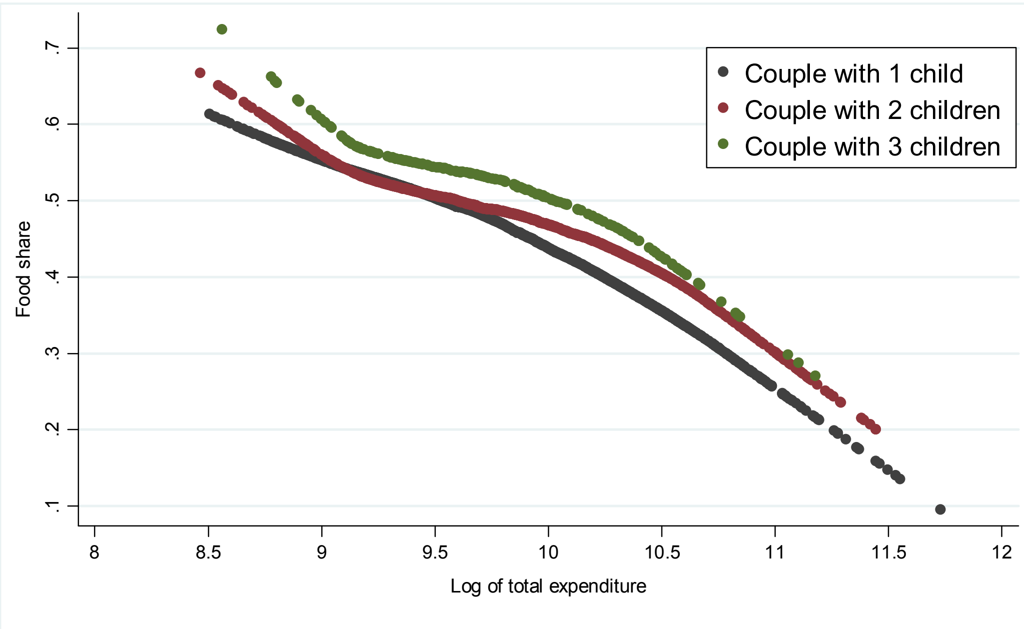
Note: All regressions include time and region fixed effects, as additional variables.
Standard errors are clustered at psu level
*** p<0.01, ** p<0.05, * p<0.1

Figure 3: Semi-parametric IV estimates of food share for different family types



Notes: pooled sample RLMS HSE, 2003-2013. Full regression is presented in Table 4

Figure 4. Semi-parametric IV estimates of food share for different family types



Notes: pooled sample RLMS HSE, 2003-2013. Full regression is presented in Table 5

Table 4: Semi-parametric IV estimates of food share for different family types: CF approach

	1 Adult		*2 Adults*		*3 Adults*		*4 Adults*	
	coef	*se*	coef	*se*	coef	*se*	coef	*se*
Residuals	0,006	*0,026*	0,045***	*0,016*	0,078***	*0,021*	0,073**	*0,033*
Household Characteristics								
Max age of hh members	-0,001	*0,002*	0,002*	*0,001*	0,001	*0,002*	-0,005	*0,005*
Square of max age of hh members	0,001	*0,002*	-0,002**	*0,001*	-0,000	*0,002*	0,003	*0,004*
Max educational level of hh members								
Primary	0,023	*0,014*	0,000	*0,021*	0,178***	*0,053*		
Secondary incomplete	-0,007	*0,011*	0,019*	*0,010*	0,078***	*0,021*	-0,014	*0,044*
College	-0,009	*0,010*	0,009	*0,007*	0,001	*0,010*	-0,016	*0,016*
University	-0,029***	*0,011*	0,001	*0,007*	-0,004	*0,010*	-0,003	*0,017*
Complete secondary	reference							
Share of adults 18-24 in hh	-0,081***	*0,031*	-0,045***	*0,014*	-0,054**	*0,022*	-0,100***	*0,036*
Share of adults over 65 in hh	-0,001	*0,013*	0,011	*0,011*	-0,068**	*0,027*	-0,074	*0,061*
Share of employed members	0,013	*0,011*	-0,008	*0,009*	-0,007	*0,015*	-0,011	*0,025*
Moscow/Peter	-0,064***	*0,024*	-0,075***	*0,017*	-0,004	*0,020*	0,017	*0,037*
Type of locality								
Town	0,033***	*0,010*	0,019***	*0,007*	-0,021*	*0,011*	-0,025	*0,017*
Small Town	0,099***	*0,016*	0,112***	*0,012*	0,028	*0,017*	0,147***	*0,029*
Village	0,149***	*0,013*	0,110***	*0,008*	0,056***	*0,012*	0,038**	*0,019*
City	reference							
Number of observations	3 285		6 431		3 016		1 187	
Log-Likelihood	1 346,80		2 824,95		1 526,10		628,88	
Adjusted R2	0,169		0,138		0,098		0,129	

Note: All regressions include time and region fixed effects, as additional variables.
Standard errors are clustered at psu level *** p<0.01, ** p<0.05, * p<0.1

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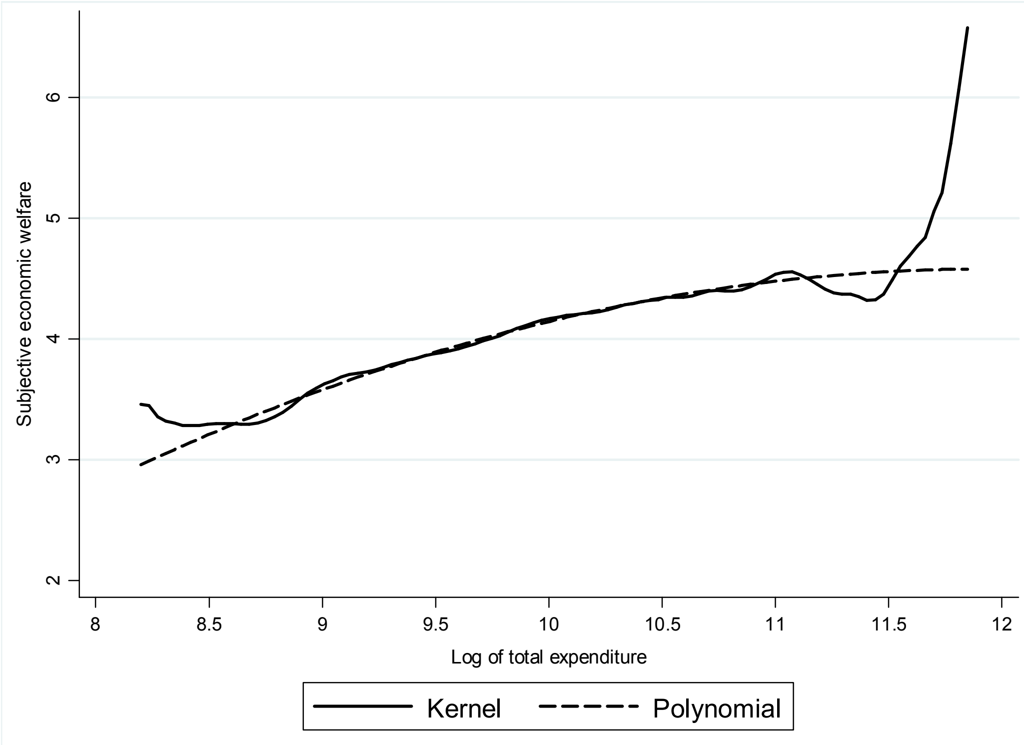
Table 5: Semi-parametric IV estimates of food share for different family types: CF approach

	Couple with one child		*Couple with two children*	
	coef	*se*	coef	*se*
Residuals	0,062***	*0,017*	0,043*	*0,023*
Max age of hh members	0,005	*0,004*	0,003	*0,007*
Square of max age of hh members	-0,004	*0,004*	0,001	*0,008*
Max educational level of hh members				
Primary	0,423***	*0,112*		
Secondary incomplete	0,049**	*0,022*	0,020	*0,025*
College	0,002	*0,009*	-0,016	*0,012*
University	-0,007	*0,010*	-0,004	*0,012*
Complete secondary	reference			
Share of children 0-5 in hh	0,023	*0,038*	0,191*	*0,101*
Share of children 6-14 in hh	-0,037	*0,030*	-0,040	*0,039*
Share of adults 18-24 in hh	0,007	*0,028*		
Share of adults over 65 in hh	-0,072	*0,082*	-0,133	*0,264*
Share of employed members	0,019	*0,021*	-0,016	*0,035*
Moscow/Peter	0,004	*0,023*	-0,015	*0,029*
Type of locality				
Town	-0,012	*0,009*	-0,023*	*0,013*
Small Town	0,036**	*0,017*	0,019	*0,025*
Village	0,031**	*0,012*	0,009	*0,016*
City	reference			
Number of observations	3 028		1 613	
Log-Likelihood	1 478,38		843,60	
Adjusted R2	0,051		0,059	

Note: All regressions include time and region fixed effects, as additional variables. Standard errors are clustered at psu level *** $p<0.01$, ** $p<0.05$, * $p<0.1$

Figure 5. Nonparametric estimates for the relation between subjective economic welfare and household expenditure



Notes: pooled sample RLMS HSE, 2003-2013

Table 4: Subjective equivalence scale estimates

	Pooled ordered probit		Fixed effects	
	coef	*se*	coef	*se*
ln_total_exp_pc	1,174*	*0,625*	0,339	*0,500*
ln_total_exp_pc2	-0,052	*0,035*	-0,010	*0,027*
Max age of hh members	-0,033***	*0,004*	-0,030***	*0,008*
Square of max age of hh members	0,025***	*0,004*	0,025***	*0,008*
Maximum education level of hh members				
Primary	-0,182**	*0,085*	-0,333*	*0,179*
Secondary incomplete	-0,158***	*0,056*	-0,194**	*0,085*
College	0,025	*0,032*	-0,061	*0,048*
University	0,149***	*0,033*	0,051	*0,065*
Complete secondary				
Number of children in hh	0,101***	*0,018*	0,081***	*0,022*
Number of adults in hh	0,153***	*0,011*	0,093***	*0,031*
Share of employed members	0,216***	*0,044*	0,360***	*0,049*
Moscow/Peter	-0,401***	*0,116*		
Type of locality				
Town	0,081	*0,056*	0,371	*0,491*
Small Town	0,128	*0,087*		
Village	0,075	*0,067*	-0,123**	*0,056*
City				
_cons			1,947	*2,295*
/cut1	3,450	*2,759*		
/cut2	4,011	*2,761*		
/cut3	4,672*	*2,768*		
/cut4	5,440**	*2,773*		
/cut5	6,132**	*2,777*		
/cut6	6,974**	*2,783*		
/cut7	7,594***	*2,783*		
/cut8	8,294***	*2,804*		
/cut9	8,870***	*2,883*		
Number of observations	26 799		25 852	
Log-Likelihood	-46 926,72		-38 637,77	
Adjusted/Pseudo R2	0,022		0,013	

note: *** p<0.01, ** p<0.05, * p<0.1