



Accounting for Different Needs when Identifying the Poor and Targeting Social Assistance

Ludovico Carraro (Oxford Policy Management, UK)

Martin Castro Cumpa

Paper Prepared for the IARIW 33rd General Conference

Rotterdam, the Netherlands, August 24-30, 2014

Session 2B

Time: Monday, August 25, Afternoon

ACCOUNTING FOR DIFFERENT NEEDS WHEN IDENTIFYING THE POOR AND TARGETING SOCIAL ASSISTANCE

Ludovico Carraro and Martin Cumpa Castro

30 July 2014

Abstract: In many developing countries the standard approach to analyse poverty and inequality is still to adjust household income or consumption expenditure by the number of household members (per capita approach). However, when we want to identify the poor and target them with specific policies it becomes apparent how the per capita approach tends to under-estimate poverty among small households and over-estimate it in large ones. Indeed, households incorrectly excluded from social assistance benefits because considered better-off are more likely to make complaints and the exclusion of small households usually is also noted by social workers. Moreover, when social protection policies are considered, it is very important to determine the specific needs of sub-groups of the population who tend to have extra needs. In particular this applies to people with disabilities who otherwise tend to be excluded from certain types of social assistance.

This paper explores these issues by analysing rich household survey data and administrative targeting data for social assistance from two different countries: Moldova and Mongolia. It estimates equivalence scales using different methods: expert opinions, use of subjective assessments and the living standard approach. In particular we measure equivalence scales for people with disabilities and we find substantial extra costs that should be accounted for when assessing their living conditions. Although every estimate represents a simplification, we assess the average performance of such estimates against subjective assessments of household living conditions made by social agents, who visited households in their homes to determine their eligibility to social assistance, and compare the relative performance of the proposed equivalence scales against the per capita approach.

Results show that it is extremely important to use equivalence scales and economies of size when calculating welfare living conditions and that the simplicity of the per capita approach should not justify its use since it generates large targeting mistakes.

Introduction

People live in households of different size and composition and consumption, income and assets are somehow shared among household members. Usually welfare measures are made at the household level: income and consumption expenditure are calculated for the whole household and then to make welfare comparisons between different types of households it is necessary to make an adjustment using some form of equivalence scales. In this sense equivalence scales can be defined as budget deflators used to calculate the amount of money required by two households to reach the same standard of living.

In many countries the 'standard approach' is to divide household level measures by household size to obtain a per capita indicator. The argument for this approach is that the procedure is intuitive and, importantly, easily understood. However, the per capita approach goes against some general understanding that needs are different, and that they depend on the age of people and their specific life cycle: before education, during education, in working age, or in pension age. The recognition of this typically comes from the different nutritional needs of household members of different age and sex. Moreover, it is known larger households have more opportunities to save (economies of scale) allowing them to spend proportionally less than smaller ones to enjoy the same level of welfare.

However, the fundamental problem is the lack of a recognised methodology that allows the estimation of equivalence of scales and/or economies of scale. We confront a basic problem in which observed consumption behaviour is not only affected by household composition, but also by their living conditions, and by the choice of household size, and so suffers from a fundamental identity problem. Pollak and Wales (1979) argue that while consumption expenditure can be used for demand analysis, this is incorrect to make welfare comparisons because in such cases we are dealing with unconditional equivalence scales. Moreover, Nelson (1992) argues for the importance of assumptions on intra-household distributions.

Unconditional equivalence scales can be estimated using subjective estimates of income or spending required to reach a minimum living as a method pioneered by Van Praag (1968). These scales go a certain way in recognising that for welfare analysis it is important to deal with socially adequate equivalence scales.

An indirect way to address the equivalence scale adjustment is to conduct some sensitivity analysis. This means making different hypothesis of equivalence of scale checking the extent to which corrections would alter welfare rankings between population sub-groups, such as different household groups, rural and urban areas, etc. and whether different rankings could lead to critically different policy conclusions (see for example Deaton and Zaidi (2002) and Lanjouw et al. (2006)).

The World Bank uses the per capita approach when providing world poverty estimates and make country comparisons, but also when generating the country poverty analysis and poverty profiles. Furthermore, the per capita approach is used in many countries, for example, in large countries like China, Indonesia and India.

The issue is not only whether the per capita approximation is more appropriate than other adjustments, but also knowing the specific risks of a per capita approach and whether these are somewhat smaller in certain economic conditions. Indeed, usually it is recognised that in better-off countries (such as OECD countries), the scope of economies of size is much larger than in other countries, but it seems that there is still an under-estimation of the possible effect of such economies of size in poor economies.

We want to explore these issues by proposing some empirically grounded approaches to the measurement of equivalence scales and apply them to two different countries: Moldova and Mongolia. We have then the opportunity to compare how different welfare indicator assessments, based on per capita and per adult equivalent adjustments, differ from those made by subjective assessments of social agents and social workers.

In fact, in both countries the Government offers social assistance targeted to the poor, and while in general this seems to work relatively well, it is common to observe that social workers report that the system seems to be biased towards large households and excludes instead small ones. Both in Moldova and Mongolia, as part of the administrative data collected to assess the households living standards and thus their eligibility to social assistance, it was also collected information on the social agents/social workers' own assessment of the household living conditions. Such subjective assessments can be compared to more formal assessments influenced by the choice of the household size adjustment. We then analyse how the per capita welfare assessment differs from that of the estimated equivalence scales when compared to subjective assessments made by social workers.

To some extent we see this approach as a way to verify that the method selected to adjust for household size and composition is socially acceptable and it is not biased towards some households (see Olken (2002) for a similar approach).

The rest of the paper is organised as follows. The next section provides some background information on the data used in our analysis and the characteristics of the country. Section 2 computes equivalence scales using different methodologies, the consumption patterns approach, the minimum income question and the living standard approach. Section 3 indirectly assesses the effect of equivalence scales comparing the welfare assessment of social workers with a quantitative assessment which uses either per capita or per adult equivalent adjustments. In particular we look at how the two differ across different household typologies. A final section summarises the findings and draws policy implications.

1 Description of data

Both Moldova and Mongolia have a good system of household surveys conducted as a continuous exercise in which every month households are interviewed. These surveys are designed to provide estimates primarily on an annual basis, and some on a quarterly basis. They are multi-purpose surveys with an emphasis on measuring living conditions and household consumption, producing poverty estimates, weights for consumer price indexes and some inputs for the National Accounts.

These surveys are also used in the design of poverty targeted benefits, namely an income support programme in Moldova and a food stamp programme in Mongolia.

More specifically in Moldova the Household Budget Survey was used to identify the appropriate level for the income eligibility threshold for social assistance and for some proxy indicators of household living standards, which represent a cross-check for eligibility and indirectly verify that people don't under-report their income. A household is eligible to social assistance if their income is below the 'guaranteed minimum income' and their living conditions, measured through the proxies, are those of a relatively poor household. This verification through the proxies is necessary because of the level of informal income.

In Mongolia the Household Socio-Economy Survey was used to design a proxy means test based on household characteristics, living conditions and assets to establish the eligibility of the household to the receipt of Food Stamps.

In both cases, welfare is measured using a household consumption expenditure aggregate for welfare analysis which needs to be adjusted by household size and composition to make welfare comparison between households. Different adjustments (equivalence scales) identify different income thresholds as well as different proxies and the way these are combined together to predict living standards.

While the design relies on household survey data, the administration of the benefit then collects only limited information to actually assess eligibility and eventually administer the benefit. In some circumstances though, as part of the eligibility assessment, which involves a household visit, the administration collects social agents/workers' subjective opinion about the degree of poverty of the household.

We now describe in more detail the sources of data in the two countries.

Moldova

Household Budget Survey (HBS). The HBS is the main quantitative survey used for poverty estimates and poverty analysis in the country. Because of its comprehensive questionnaire, the HBS can be described as a multi-purpose survey; it contains modules on household demographic characteristics, employment, housing characteristics, education, health, income and expenditure. Importantly the survey also contains information on self-assessed needs and in particular a question known as the 'minimum income question' (MIQ) or 'minimum spending question' (depending on how the question is phrased). Each household is asked to report a monthly amount of income that would meet their essential needs.

The survey is nationally representative and the sample has a two-stage stratified cluster design with an annual sample size of approximately 6,000 households.

Households keep a diary for two weeks to record their daily expenditures and information is collected in three visits: one at the beginning of the month, another in the middle and the final at the end of the month. Data are considered of good quality given the extensive checks performed by the enumerators, supervisors and the central office. The data entry software also performs a number of consistency checks that alerts of possible problems, which are then resolved by the enumerators, who sometimes re-contact the household to clarify the answers provided.

The main welfare indicator is a comprehensive consumption expenditure, which includes food consumption (including food consumed from own production), education and health, utilities, clothing and other non-food expenditure. Nominal expenditure is corrected for price differences due both to price changes during the year and across different areas of the country. In order to make welfare comparisons the statistical office uses the old OECD equivalence scales, which are 1 for the first adult, 0.7 for other adults and 0.5 for children. The World Bank in an analysis conducted in 2006 prefers using a per capita adjustment.

Administrative data. In order to receive income support, households need to fill in an application form, which contains information about household members, the income of the applicant and other household members, and various indicators of welfare: education, housing characteristics and ownership of assets. The application is given to community social workers and then entered in computers to be processed and determine eligibility. In some cases families are then visited at home by a commission of three community members, one of whom is the social worker, household conditions are verified and a subjective assessment of household living conditions is made classifying the household as extremely poor, poor or non-poor and justifying the reasons for such assessment. We obtained both information contained in the application form and the household visit for about 8,000 households.

Mongolia

Household Socio-Economic Survey (HSES): The HSES is a nationally representative survey whose main objectives are to evaluate and monitor the income and expenditure of households, to estimate poverty, to update the basket and the weights for the consumer price index, and to offer inputs to the national accounts. The HSES is a permanent survey whose fieldwork is carried out from January to December. The survey collects information from households on demographic composition, education, health, migration, employment, agriculture and herding, non-farm family businesses, other income, savings and loans, housing and energy, durable goods, non-food expenditures and food consumption. The sample comprises around 12,000 households every year.

Consumption aggregate is the welfare indicator, which includes food (purchased and from own production), education, health, transport, communication, utilities, heating, rent and durable goods. A temporal and spatial price adjustment is applied to nominal consumption in order to convert it into real consumption. The National Statistical Office uses a per capita adjustment to correct for differences in household composition and for economies of scale. Thus official poverty estimates are based on per capita consumption.

Administrative data. As part of an effort to identify households in need of support, the Mongolian Government launched a campaign of registration in a socio-economic database. Households are visited in their dwellings to obtain information about household composition, education, employment status, ownership of livestock, housing conditions, and ownership of assets. This information is used to assign a living standard score, and if the household score is below a certain threshold, social workers contact the household to provide them with food stamps. As part of the assessment a social agent visits the household and makes an assessment of household living conditions, classifying household in a ladder with 6 steps, the first step being the poorest

households and the sixth the relatively well-off. We obtained such data for about 14,000 households.

2 Estimation of equivalence scales

While there is no universally accepted methodology for the calculation of equivalence scales, our approach is to use different methodologies and verify whether they point towards similar results, recognizing that this calculation inevitably involves some approximation and that the choice of equivalence scales is a policy decision which must be socially acceptable and it is linked with the specific policy under consideration.

In particular, we are interested to identify equivalence scales for children, for disabled people and for possible economies of scale. The methods we can implement are affected by the information available in each country. In Moldova we make use of the minimum income question and of the living standard approach, while in Mongolia we consider the consumption patterns prevailing in the country and some indirect assessment of what could be reasonable equivalence scales.

2.1 Estimation of equivalence scales parameters using the Minimum Income Question in Moldova

Answers to the minimum income question can be used to determine a 'subjective poverty line'. Rather than considering as poor all people that have an actual income below their declared subjective minimum income, in order to determine the poverty line, it is necessary to define a consistent poverty line based on the answers to the MIQ. In particular it is expected that the answer to the MIQ will be an increasing function of actual income, and the poverty line is usually determined at the intersection between the declared minimum subjective income and the actual income, adjusting for household characteristics that influence this relationship. A simplified relationship between minimum income and actual income is presented in figure 2.1.

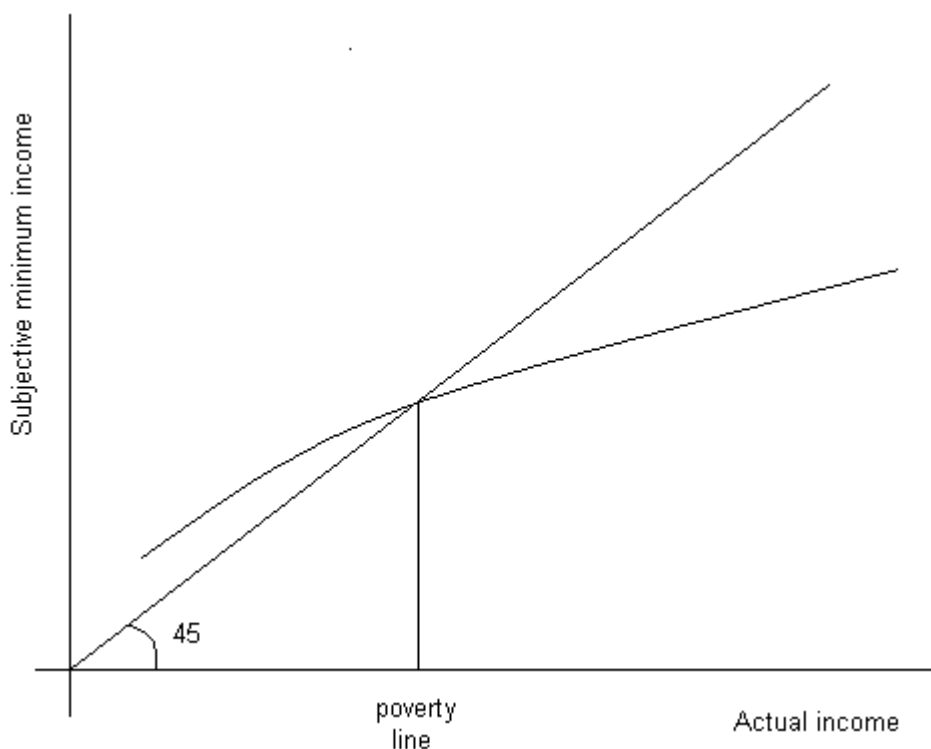
The estimation of the subjective poverty line requires a regression model in which the subjective minimum income is estimated as a function of actual income, household composition variables, and other variables that could influence the answer to the MIQ¹.

Moreover, determining the subjective poverty line using the regression model also allows the estimation of economies of size and equivalence scales, since the subjective poverty line can be computed for different household types. The advantage of this methodology is that it calculates unconditional equivalence scales and focuses specifically at the lower part of the distribution, thus making it particularly useful for social assistance benefits (see for example Garner and Short (2002)).

However, we should point out that 'subjective parameters' might differ from what theoretical needs are. In fact, people's own assessment of needs depends on their circumstances and especially for some groups this could result in an under-estimation of needs.

¹ It is generally also necessary to adjust for a potential selectivity bias if there are households who do not answer the MIQ.

Figure 2.1 The subjective poverty line



The regression model is estimated for different household types and controlling for location, age of the household head, education, marital status, number of earners and percentage of consumption expenditure coming from own production (the latter is an indicator to adjust for the fact that households with a higher percentage of consumption from own production might under-estimate their income needs, interpreting that primarily as cash income). A first calculation is done using data from 2006 and a second calculation is done using data from 2011, 2012 and 2013.

The average implicit equivalence scales for the two calculations are reported respectively in tables 2.1 and 2.2.

It is important to note that in 2006 the level of the obtained subjective poverty line is very similar to that of the absolute poverty line of 747 computed by the National Bureau of Statistics using the cost of basic needs approach, and that in the same year the implicit equivalence scales are also similar to those employed for the poverty analysis. Such equivalence scales consider a parameter equal to 1 for the first household member, 0.7 for any other adult member and 0.5 for any child less than 15 years old². The parameters implicit in the MIQ are lower, but overall quite close both for children and second adults³. One specific difference is the treatment of people in pension age for which the computed parameter is 0.9, while it is implicitly considered equal to 1 by the equivalence scales used for poverty analysis.

In the analysis of the 2011, 2012 and 2013 data, the official poverty line calculated in 2006 has been updated by inflation and is equal to 1093 per adult equivalent in 2011 prices. However, this is now substantially lower than subjective poverty line reported in table 2.2, and this could well

² These are also known as the old OECD equivalence scales.

³ We also tried to differentiate for the age of the child (0-5 and 6-14), but we did not find differences between the two.

reflect a change in people's expectations and the evolving nature of relative poverty and what is considered necessary. In general in 2011-2013 the implicit equivalent scales are similar to those found in 2006, with the exception that adults other than the first appear now to have a somewhat lower scale (0.6 being probably a more appropriate approximation), while the scale for children remains at 0.5. This change could be related to an observed change in socio-economic circumstances in the country: from 2006 to 2011-13 the food share fell and a substantial increase in house related expenses, in particular utilities, was observed. In addition, the average household size has decreased, from 2.8 members to 2.5.

Table 2.1 Subjective poverty lines and implicit equivalence scale parameters, 2006 data, Moldova

| | Subj. poverty line | Implicit equivalence scales | | | % (sum=100) | Obs |
|-------------------------------|--------------------|-----------------------------|-------|---------|-------------|-----|
| | | Adult | Child | Elderly | | |
| One adult | 740 | 1 | | | | |
| <i>Working age</i> | 784 | | | | 5.77 | 327 |
| <i>Pension age</i> | 723 | | | 0.92 | 14.89 | 867 |
| Two adults | 1209 | 0.63 | | | | |
| <i>Working age</i> | 1269 | 0.62 | | | 14.45 | 803 |
| <i>Pension age</i> | 1120 | 0.55 | | 0.88 | 9.88 | 579 |
| Three adults | 1805 | 0.72 | | | 11.5 | 656 |
| Four adults (or more) | 2140 | 0.63 | | | 7.95 | 438 |
| Adult and one child | 1298 | | 0.66 | | 2.58 | 163 |
| Adult and two (+) children | 1512 | | 0.46 | | 1.99 | 124 |
| Couple and one child | 1642 | | 0.48 | | 8.98 | 475 |
| Couple and two children | 1931 | | 0.42 | | 6.19 | 362 |
| Couple and three (+) children | 2041 | | 0.33 | | 1.48 | 93 |
| Other households | | | | | 14.32 | 861 |

Child is a person less than 15, whereas elderly is a person in pension age.
Source: Calculation of the authors based on the 2006 HBS.

Table 2.2 Subjective poverty lines and implicit equivalence scale parameters, 2011-2013 data, with values expressed at 2011 prices, Moldova

| | Subj. poverty line | Implicit equivalence scales | | | % (sum=100) | Obs |
|--|--------------------|-----------------------------|-------|---------|-------------|-----|
| | | Adult | Child | Elderly | | |

| | | | | | |
|------------------------------|------|------|------|-------|-------|
| One adult | 1475 | 1 | | | |
| Working age | 1543 | | | 9.56 | 1,490 |
| Pension age | 1408 | | 0.91 | 17.65 | 2,867 |
| Two adults | 2280 | 0.55 | | | |
| Working age | 2320 | 0.50 | | 11.03 | 1,776 |
| Pension age | 2240 | 0.59 | 0.97 | 15.97 | 2,626 |
| Three adults | 3240 | 0.60 | | 5.58 | 884 |
| Four adults | 4088 | 0.59 | | 1.49 | 230 |
| Five adults (or more) | 4417 | 0.50 | | 0.31 | 50 |
| Adult and one child | 2455 | | 0.66 | 4.27 | 677 |
| Adult and two children | 3199 | | 0.58 | 2.63 | 464 |
| Adult and three (+) children | 3810 | | 0.53 | 0.66 | 139 |
| Couple and one child | 3036 | | 0.51 | 10.58 | 1,594 |
| Couple and two children | 3665 | | 0.45 | 8.37 | 1,390 |
| Couple and three children | 4433 | | 0.49 | 2.16 | 358 |
| Couple and four (+) children | 4989 | | 0.46 | 0.47 | 92 |
| Other households | | | | 9.26 | 1605 |

*Child is a person less than 15, whereas elderly is a person in pension age.
Source: Calculation of the authors based on the 2006 HBS.*

The regression model that is used to estimate equivalence scales has the following general framework:

$$\ln(miq) = \beta_0 + \beta_1 \ln(cons) + \beta_i(\text{household type}) + \beta_j(\text{control variables}) + \varepsilon$$

The results of such models are reported in the annex. It should be noted that the various control variables are important in determining appropriate comparisons between household types, but do not have to be included in the calculation of subjective poverty lines. Instead, subjective poverty lines for different household groups are computed using the following formula:

$$Pline_i = \exp\left(\frac{\beta_0 + \beta_i Htype_i + 0.5\sigma^2}{1 - \beta_i}\right)$$

Then such values are adjusted by multiplying them with the ratio of the mean subjective household poverty line (using all explanatory variables) and the weighted sum of the above poverty lines.

The same model also tries to estimate whether we should use a specific equivalence scale parameter for disabled people to take into account their special needs. However, this method did not find very significant differences, and indeed in some cases the obtained result was the opposite: a lower subjective poverty line for disabled household members. This could be partly the result of disabled people and their households being relatively poorer than others, therefore we investigate this issue further through other methodologies.

2.2 The cost of disability and the living standard approach in Moldova and Mongolia

The situation of persons with disabilities requires specific attention since their needs may differ from those of the rest of the population, and traditionally in social protection it is important to take this into account. In order to evaluate this, we analysed whether there are any significant differences in the consumption patterns between households with at least one member with disabilities and other households. Then we assess the extra cost of disability using the living standard approach following the method presented in Zaidi and Burchardt (2005). We do this both for Moldova and Mongolia.

Moldova

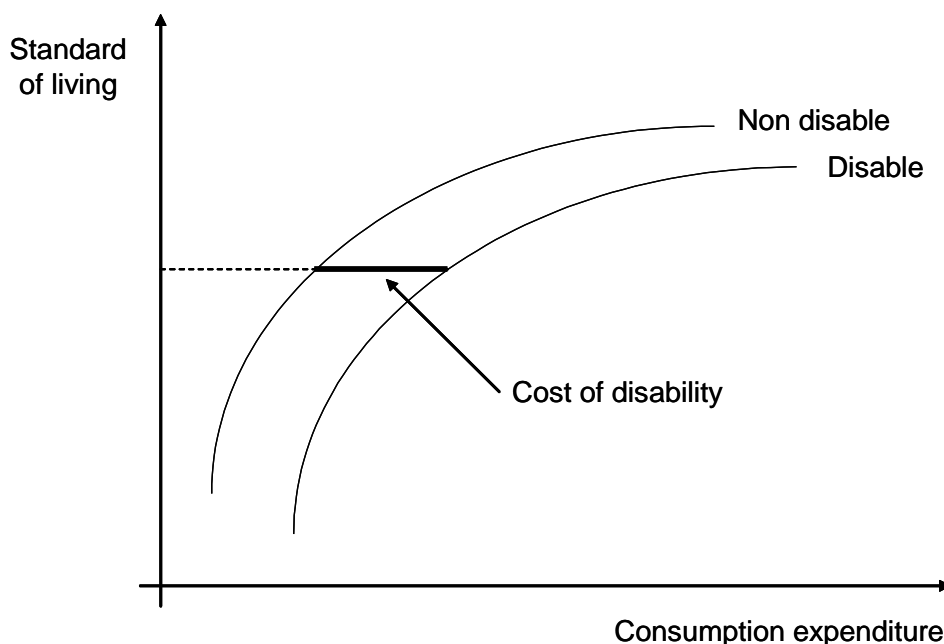
A simple comparison of consumption patterns between households with at least one member with disability and other households reveals substantial differences in health expenditures. Indeed, households with at least one disabled member spend a percentage of their budget that is twice as much as other households: 10% against 5% respectively. Such differences are present both in 2006 and in more recent years.

In the case of disabled people, together with health expenditure, we could think of other expenditure that is required but does not necessarily signal a higher living standard when compared to expenditure of other households (for instance special clothes, bathroom equipment, higher heating costs, etc.). It is for this reason that we can expect that people with disabilities would need to spend more than others to reach the same standard of living (see Berthoud, Lakey and McKay, 1993). A simplified relationship between expenditure and living standards is reported in figure 2.2, where the cost of disability (the difference in the level of expenditure that guarantees the same living standard between disabled and non-disabled people) could increase, be constant or decrease as one moves from low to high expenditure levels. The cost of disability can be estimated through a regression model, which requires variable identifying reliably the 'true' standard of living and those who are disabled.

We used two possible definitions of standard of living: a self-assessment of people living standards and an asset score. All households are asked to classify their living standards according to the following scale: very bad, bad, satisfactory, good and very good. Although this is a subjective assessment of living standards, it can be properly used when controlled for various factors and it has the advantage of representing a non-monetary judgement. The second variable capturing living standards is an asset score: households' living standards are influenced by ownership of

durable items as well as dwelling conditions⁴. A unique score is obtained through the weighted sum of all these assets, where weights are computed as the inverse frequency with which households own such assets, so that relatively rare items receive a higher weight. An alternative index was also computed using polychoric principal component analysis, following the approach suggested by Kolenikov and Angeles (2009).

Figure 2.2 Standard of living and the cost of disability



For what concerns the definition of disability, each household member is asked about having any disability and the degree of the disability (degree I, II or III). People with a first degree of disability have an infirmity that reduces normal ability for more than 75% and they require permanent care. For disabled of second degree, normal abilities are reduced by 50-75%, whereas for the third degree of disability, the reduction is between 25-50%, and unlike people with I and II degree of disability, disabled person in category III are able to take care of themselves and work⁵. Therefore, disability can be measured either by a simple variable that distinguishes between households where at least one member has some degree of disability or with a variable that captures also the degree of disability.

An account of the results obtained with these models is reported below. The conclusion is that although there are difficulties in the precision with which the cost of disability can be estimated, all models point out a presence of such extra costs for members with disabilities both in 2006 and in

⁴ The following items are included: phone, bath, garage, fridge, automatic washing machine, computer, colour TV, microwave, vacuum cleaner, car, camera, radio, stereo, and cassette player.

⁵ The household budget survey seems to provide very reliable estimates of both the number of disabled people in Moldova (175 thousand in 2006 compared to administrative estimates of 165 thousands in 2005) and the distribution of disabled people by degree of disability, which matches the one provided by administrative data (according to the HBS 20% of disabled have a I degree of disability, 67% a II degree of disability and the remaining 13 a III degree of disability).

2011-13. In 2006 estimates consistently show that for each disabled person needs increase by 45%. In 2011-13 one model shows even higher costs (using the subjective assessment of living standards) while the other has implicit lower equivalence scales (asset score). Therefore, for a single-disabled-person household the equivalence scale parameter is 1.45, while it is 1 for other single-person households. Similarly, for households with a different composition, the equivalence scale parameter of a person with disability would need to increase by 45%⁶.

The calculation of the cost of disability can be done using different econometric models:

- 1) At the aggregate level: a model is estimated for all households to identify the average cost of disability for households in which at least one member is disabled.
- 2) By type of households: different models are estimated considering each time different types of households.

Both methods are followed, but the second approach tends to have relatively few observations, especially for some household types, thus we present only some of them. Moreover, each model is run using the two definitions of living standards.

The general regression model is specified as follows:

$$liv_st_ind = \beta_0 + \beta_1 \ln(cons) + \beta_2 \text{disable} + \beta_i (\text{control variables}) + \varepsilon$$

The dependent variable (*liv_st_ind*) is either the asset score or the self-assessed living standard. The latter is expressed in binary mode (bad=0 and good=1) and therefore the regression model is estimated through a logistic function⁷. The cost of disability is obtained by dividing the coefficient of the disable dummy (β_2) by the coefficient of the consumption variable dummy (β_1), and since the consumption variable is estimated in logarithm terms, the actual cost is estimated as follows:

$$\text{Cost of disability} = \frac{1}{e^{\beta_1}} \beta_2$$

However, when we run a logit model the coefficient of the variable does not represent the marginal effect, which is instead computed differently as the change on the overall probability of being better-off.

The control variables are characteristics of the household head –age, education, marital status– and geographic location. When the cost of disability is estimated using all households, the model controls also for household type (one-member household – elderly or not, couple, couple with children, etc.).

⁶ There is evidence that needs increase with the degree of disability, in particular they are the highest for people with category I of disability, and then progressively lower when we consider people of category II and III. Such results indicate that needs increase by 68% for disabled in category I, by 41% for disabled in category II, and by 19% for disabled in category III. However, these results are less robust and are not used to differentiate the equivalence scales.

⁷ We also estimated an ordered logit that preserves all the answers to the original question (very bad, bad, satisfactory, good and very good), but the results of the model do not change significantly, thus the simplified model is preferred.

We start by reporting the results of these models for both definitions of living standards for models including all households (tables 2.3 and 2.4). Both models find a significant and substantial impact of disability, but the two models vary in the degree of the impact. When considering as the definition of living standards the household self-assessment, the cost of disability for the average household with at least one disabled member is 1.37/1.38, whereas it is 1.12/1.07 if living standards are based on the assets score. It is important to note that these costs are not equivalence scale parameters, but the estimate of the average extra cost for the whole household.

Table 2.3 Calculation of the cost of disability (all households) in Moldova, 2006

| Variables | Living standard self-assessment | | | Assets score | | |
|--------------------------------|---------------------------------|-----------|-------------|--------------|-----------|-------------|
| | Coef. | Std. Err. | t | Coef. | Std. Err. | t |
| Consumption expenditure (ln) | 1.18 | 0.11 | 10.92 | 9.16 | 0.29 | 32.07 |
| Whether disabled household | -0.35 | 0.10 | -3.31 | -1.02 | 0.42 | -2.42 |
| Control variables | Y | | | Y | | |
| Number of observations | | | 5748 | | | 5748 |
| Pseudo R-squared | | | 0.114 | | | 0.455 |
| Marginal effect of disability | | | -0.06 | | | -1.02 |
| Marginal effect of consumption | | | 0.20 | | | 9.16 |
| Cost of disability | | | 1.37 | | | 1.12 |

Source: Calculation of the authors based on the 2006 HBS.

Table 2.4 Calculation of the cost of disability (all households) in Moldova, 2011-13

| Variables | Living standard self-assessment | | | Assets score | | |
|--------------------------------|---------------------------------|-----------|-------------|--------------|-----------|-------------|
| | Coef. | Std. Err. | t | Coef. | Std. Err. | t |
| Consumption expenditure (ln) | 1.65 | 0.13 | 12.67 | 1.38 | 0.04 | 31.24 |
| Whether disabled household | -0.48 | 0.08 | -5.72 | -0.09 | 0.03 | -3.69 |
| Control variables | Y | | | Y | | |
| Household types | Y | | | Y | | |
| Constant | Y | | | Y | | |
| Number of observations | | | 16242 | | | 16242 |
| Pseudo R-squared | | | 0.113 | | | 0.596 |
| Marginal effect of disability | | | -0.08 | | | -0.09 |
| Marginal effect of consumption | | | 0.25 | | | 1.38 |
| Cost of disability | | | 1.38 | | | 1.07 |

Source: Calculation of the authors based on the 2011-13 HBS data.

Table 2.5 and 2.6 report the results of the model estimated using only one-member households, where the household extra cost represents also the equivalence scale of a disabled person. In 2006 this estimate is very similar for the two definitions of living standards, while in 2011-13 it is higher for the subjective assessment of living standard and much lower and non-significant for the asset score. Assuming that the equivalence scale for one single disabled is 1.45 and applying such equivalence scale to the first disabled member and modifying accordingly equivalence scales of other disabled adults (1.45×0.7) and disabled children (1.45×0.5), we can calculate the average extra cost for disabled households and compare such estimates with those presented in table 2.3 and 2.4. In 2011-13 we find that the extra costs for households where there is at least one person with disability is 1.22, which is somewhere in between the estimates of the two approaches. A similar finding is observed when using the 2006 data.

Table 2.5 Calculation of the cost of disability (one-member households) in Moldova, 2006

| Variables | Living standard self-assessment | | | Assets score | | |
|--------------------------------|---------------------------------|-----------|-------------|--------------|-----------|-------------|
| | Coef. | Std. Err. | t | Coef. | Std. Err. | t |
| Consumption expenditure (ln) | 1.26 | 0.19 | 6.68 | 4.37 | 0.42 | 10.42 |
| Whether disabled household | -0.45 | 0.26 | -1.76 | -1.63 | 0.81 | -2.01 |
| Control variables | Y | | | Y | | |
| Costant | Y | | | Y | | |
| Number of observations | | | 1194 | | | 1194 |
| Pseudo R-squared | | | 0.102 | | | 0.412 |
| Marginal effect of disability | | | -0.11 | | | -1.63 |
| Marginal effect of consumption | | | 0.29 | | | 4.37 |
| Cost of disability | | | 1.46 | | | 1.45 |

Source: Calculation of the authors based on the 2006 HBS.

Table 2.6 Calculation of the cost of disability (one-member households) in Moldova, 2011-13

| Variables | Living standard self-assessment | | | Assets score | | |
|--------------------------------|---------------------------------|-----------|-------------|--------------|-----------|-------------|
| | Coef. | Std. Err. | t | Coef. | Std. Err. | t |
| Consumption expenditure (ln) | 1.59 | 0.18 | 8.59 | 1.30 | 0.07 | 19.80 |
| Whether disabled | -0.84 | 0.18 | -4.77 | -0.01 | 0.06 | -0.22 |
| Control variables | Y | | | Y | | |
| Constant | Y | | | Y | | |
| Number of observations | | | 4357 | | | 4357 |
| Pseudo R-squared | | | 0.110 | | | 0.513 |
| Marginal effect of disability | | | -0.11 | | | -0.01 |
| Marginal effect of consumption | | | 0.17 | | | 1.30 |
| Cost of disability | | | 1.93 | | | 1.01 |

Source: Calculation of the authors based on the 2011-13 HBS data.

In 2011-13 we also tried to estimate a different effect based on the degree of disability. The results consistently show a higher cost for people with a first degree of disability and then a progressively lower effect for second and third degree of disability.

To conclude, although the effect does vary depending on the definition of living standard, all models point to an extra cost of disability that could be accounted for through a specific equivalence scale parameter. Based on our results such parameter could be computed by increasing current equivalence scales by 45%.

Mongolia

The consumption patterns approach is of limited use given the complications associated with linking expenditures to disability. A first exploration though comes from the comparison of the consumption between households with and without members with disabilities. As it was the case in Moldova, the most significant difference is on health expenditures. Households with at least one disabled member have a health share that is double that among households with no disabled members: 6% and 3% respectively.

The standard of living approach is better suited to estimate the extra costs associated with a disabled member in the family. Three main differences in the implementation of this approach exist with respect to Moldova. Firstly, the living standards indicator can be based only on an asset index because no self-assessment of living standards is available. Secondly, the survey records if a household member is disabled or not, but it does not collect information on the severity of the disability. Thirdly, just one point in time is available for these estimations.

The control variables are similar to those in Moldova: characteristics of the household head such as age, age squared, education, and having a spouse; and the geographic location of the household. When the cost of disability is estimated using all households, the model controls also for household type: one-member households, single parents, couples, couples with children, etc.

Table 2.7 shows the results of the model that includes all households. Both the consumption and the disability dummy are highly significant. The cost of disability for the average household with at least one disabled member is 1.14, a finding that is similar to the corresponding model in Moldova. It is useful to reiterate that this cost is the average extra cost for the entire household but it does not represent the equivalence scale parameter.

Table 2.7 Calculation of the cost of disability (all households) in Mongolia, 2012

| Variables | Assets score | | |
|------------------------------|--------------|-----------|-------|
| | Coef. | Std. Err. | t |
| Consumption expenditure (ln) | 5.57 | 0.08 | 72.91 |
| Whether disabled household | -0.74 | 0.12 | -6.40 |
| Control variables | Y | | |
| Household types | Y | | |
| Constant | Y | | |
| Number of observations | | | 12810 |
| Pseudo R-squared | | | 0.600 |

Cost of disability **1.14**

Source: Calculation of the authors based on the 2012 HSES data.

Table 2.8 shows the results of the models estimated using two-adult households, three-adult households and four-adult households. Unlike Moldova, the model using one-adult households is not shown because the number of disabled one-member households is fairly small, hence the findings are not robust. For simplicity at the moment of estimating the equivalence scale for disabled household members, in all of the three models presented there is at most one disabled member in each household. If it is assumed that the first adult in the household has an equivalence scale of 1.0 and that all adults other than the first have an equivalence scale of 0.7, the equivalence scale for disabled people is 1.29 in two-adult households and 1.40 in both three-adult and four-adult households. Hence, in Mongolia the presence of a disabled household member entails additional costs to the household that imply an equivalence scale for disabled member ranging between 1.29 and 1.40.

Table 2.8 Calculation of the cost of disability (various households) in Mongolia, 2012

| Variables | 2 adults | | | 3 adults | | | 4 adults | | |
|------------------------------|----------|-----------|-------------|----------|-----------|-------------|----------|-----------|-------------|
| | Coef. | Std. Err. | t | Coef. | Std. Err. | t | Coef. | Std. Err. | t |
| Consumption expenditure (ln) | 5.13 | 0.20 | 25.73 | 5.64 | 0.27 | 20.79 | 6.05 | 0.33 | 18.12 |
| Whether disabled household | -0.80 | 0.32 | -2.50 | -0.86 | 0.37 | -2.35 | -0.76 | 0.41 | -1.86 |
| Control variables | Y | | | Y | | | Y | | |
| Constant | Y | | | Y | | | Y | | |
| Number of observations | | | 1704 | | | 1140 | | | 768 |
| Pseudo R-squared | | | 0.59 | | | 0.55 | | | 0.61 |
| Cost of disability | | | 1.17 | | | 1.17 | | | 1.13 |

Source: Calculation of the authors based on the 2012 HSES data.

2.3 Consumption patterns and equivalence scales

This method derives equivalence scales based on the actual consumption patterns of the population. This approach faces two main empirical challenges when mapping the different components of the consumption aggregate of the household to the household members. Firstly, which consumption components can be shared and which cannot. Secondly, what consumption could be attributable to the first adult, what to the rest of adults and what to children. These

problems are compounded by the fact that household surveys typically gather consumption data at the household level and not by individual.

The first task is then to divide the consumption aggregate into two main groups: consumption from public goods and consumption from private goods. Public goods are those that can be consumed by a household member without affecting the consumption of other members, whereas private goods are those that once are consumed by one member, they cannot be consumed by any other member. Durable goods, rent of the dwelling, utilities and heating can be considered public goods, while food, alcohol, tobacco, clothing, education, health, transport, communication and other consumption can be considered private goods. Table 2.9 shows the division of the consumption aggregate into private and public goods for different groups of the population according to the 2012 HSES. Given that social assistance is targeted at those with the lowest living standards, it is useful to examine how consumption varies among them because equivalence scales might differ depending on which group is targeted. The data however display remarkably stable consumption patterns for different groups at the lower end of the consumption distribution.

Table 2.9 Consumption shares of public and private goods, Mongolia 2012

| | All | Bottom 40% | Bottom 30% | Bottom 20% | Bottom 10% | Bottom 5% |
|------------------|-----|---------------|---------------|---------------|---------------|--------------|
| Total | 100 | 100 | 100 | 100 | 100 | 100 |
| Private | 84 | 85 | 85 | 85 | 84 | 84 |
| Food | 34 | 46 | 47 | 49 | 49 | 49 |
| Clothing | 17 | 16 | 15 | 15 | 14 | 14 |
| Transport, comm. | 13 | 9 | 8 | 7 | 7 | 7 |
| Alcohol, tobacco | 1 | 2 | 2 | 2 | 1 | 1 |
| Education | 5 | 4 | 4 | 4 | 4 | 4 |
| Health | 5 | 2 | 2 | 2 | 2 | 1 |
| Other | 8 | 7 | 7 | 7 | 7 | 7 |
| Public | 16 | 15 | 15 | 15 | 16 | 16 |

The second task is to determine how much of the consumption could be ascribed to the first adult, how much to the other adults and how much to the children. Each consumption component will be treated differently.

Food. Based on the caloric requirements by age and gender set by the Ministry of Health in 2008 and the demographic composition of the population, estimates indicate that a child less than 15 years needs on average 77% of the number of kilocalories a person 15 years or more needs.

Clothing. The HSES asks separately for clothing consumption of men, women and children. The scales implied by analysing different types of households suggest that children's spending is around half of that of adults.

Transport and communication. Although the data are collected at the household level, the analysis by type of expenditure indicates that expenditures on children could represent on average a quarter of the consumption of adults in these two categories.

Alcohol and tobacco. These expenditures are attributable evenly to all adults. It is assumed that children do not consume any alcohol or tobacco.

Education. The average expenditure of children is 72% of that of adults. The cost of primary and secondary education is relatively low, but tertiary education is considerably more expensive. The first adult and the rest of adults in the household are treated similarly.

Health. Children spend on average 25% of the expenditure of adults. No differences are made between adults.

Other private consumption. The assumption is that all members consume evenly these expenditures.

Durable goods, rent, utilities and heating. These components are considered public goods, hence they are be ascribed only to the first adult.

The final step is to match the shares of the consumption components with the different scales in order to estimate an average set of equivalence scales. Table 2.8 shows the results for different groups of the population. Compared to the first adult in the household, every other adult consumes on average 85% of his or her consumption, and every child between 50% and 60%.

Table 2.10 Equivalence scales based on consumption patterns, Mongolia 2012

| | First adult | Other adults | Children under 15 |
|------------|-------------|--------------|-------------------|
| All | 1.00 | 0.84 | 0.56 |
| Bottom 40% | 1.00 | 0.85 | 0.59 |
| Bottom 30% | 1.00 | 0.85 | 0.59 |
| Bottom 20% | 1.00 | 0.85 | 0.59 |
| Bottom 10% | 1.00 | 0.84 | 0.59 |
| Bottom 5% | 1.00 | 0.84 | 0.59 |

3 Indirect assessment of equivalence scales

In order to indirectly test to what extent the estimated equivalence scales respond to socially acceptable standards, we match the household ranking based on welfare estimates made with different equivalence scales and the living standard assessment of the same households made by enumerators and social workers, who visited households in their dwellings to assess their eligibility to social welfare. We do this both for Moldova and Mongolia using the administrative data described earlier in section 1.

3.1 Moldova

Administrative data do not attempt to collect a direct measure of consumption expenditure as this would be too costly and also ineffective in the case of people being assessed for eligibility to social welfare. Instead consumption expenditure is predicted using a number of household characteristics through a regression in which consumption could be adjusted using different adult equivalence corrections. In particular we want to compare a model that makes use of per capita expenditure (household consumption divided by household size) and per adult equivalent consumption (whereby household consumption is divided by an adult equivalent household size using the equivalence scales identified in section 2).

These different estimates of household well-being produce different household rankings, which we want to compare with the ranking of social workers' assessments. We do not expect the social workers' assessments to be without mistakes. Inevitably such assessment will be biased by the own living standards and perceptions of the social workers.

Nevertheless, the purpose of the comparison is to single out whether there is a clear pattern in the differences between the per capita and per adult equivalent quantitative assessment and the social workers' assessment. In particular we look at differences across household types and household size. We have 6,381 social workers assessments and the corresponding administrative data based on which the household is assessed to be 'very poor', 'poor' or 'non-poor': 756 households were considered to be very poor, a majority of 4,146 poor and the remaining 1,479 non-poor. We are interested in making a relative rather than an absolute comparison of the households' ranking between the social workers assessment and the quantitative assessment. Therefore, in both quantitative assessments first we create three groups of the same relative size of the social workers' assessment (the same percentage of 'very poor', 'poor' and 'non-poor'), and then we compare their relative matching with the social workers' assessments.

We select households classified as extremely poor by social workers in order to compare the percentage who are considered very poor also by the two assessments. We then repeat the same exercise for the non-poor.

Results are presented in table 3.1. It is clear that in the case of the per capita approach there are large variations in the matching between quantitative assessment and subjective assessment of social workers: among single people and couples there are very few households considered very poor by the quantitative assessment, which classifies those households as non-poor. The opposite situation occurs, for instance, to couples with three children. On the other hand, for the per-adult equivalent approach the relationship is much more balanced than the per capita approach.

The same is true when we look at the matching based on household size (see table 3.2).

Table 3.1 Matching of quantitative assessment and social workers assessment by household type, Moldova

| Household type | Very poor | | | Non-poor | | |
|-----------------------|------------|---------------|------|------------|---------------|-------|
| | Per capita | Per adult eq. | Obs. | Per capita | Per adult eq. | Obs. |
| Single (age<pension) | 0.0 | 23.2 | 138 | 83.7 | 45.4 | 86 |
| Single (pension age) | 0.0 | 19.3 | 197 | 70.6 | 50.9 | 330 |
| Couple (age<pension) | 12.5 | 31.3 | 16 | 20.6 | 20.6 | 73 |
| Couple (pension age) | 9.1 | 31.8 | 22 | 20.3 | 31.7 | 123 |
| Couple 1 child | 50.0 | 38.9 | 18 | 9.1 | 29.9 | 77 |
| Couple 2 children | 74.3 | 54.3 | 35 | 7.1 | 33.6 | 113 |
| Couple 3 children | 91.7 | 55.6 | 36 | 0.0 | 13.0 | 100 |
| Single 1 child | 16.7 | 12.5 | 48 | 20.9 | 54.7 | 86 |
| Single 2 children | 45.1 | 23.5 | 51 | 11.5 | 44.9 | 78 |
| Single 3+ children | 68.1 | 27.7 | 47 | 6.3 | 47.9 | 48 |
| Only adults | 27.0 | 48.7 | 74 | 18.8 | 24.3 | 144 |
| Other (with children) | 68.9 | 52.7 | 74 | 4.5 | 24.0 | 221 |
| Total | 27.3 | 31.0 | 756 | 28.9 | 35.7 | 1,479 |

Table 3.2 Matching of quantitative assessment and social workers assessment by household size, Moldova

| Household size | Very poor | | | Non-poor | | |
|----------------|------------|---------------|------|------------|---------------|-------|
| | Per capita | Per adult eq. | Obs. | Per capita | Per adult eq. | Obs. |
| One | 0.0 | 20.9 | 335 | 73.3 | 49.8 | 416 |
| Two | 15.7 | 28.6 | 140 | 22.2 | 35.3 | 374 |
| Three | 44.8 | 35.2 | 105 | 10.9 | 33.1 | 248 |
| Four | 69.4 | 47.1 | 85 | 4.9 | 32.1 | 224 |
| Five or more | 85.7 | 51.6 | 91 | 0.5 | 16.1 | 217 |
| Total | 27.2 | 31.0 | 756 | 28.9 | 35.7 | 1,479 |

3.2 Mongolia

Enumerators who visited households to conduct the Proxy Means Test and so determine their eligibility to the receipt of Food Stamps made a subjective assessment of the living conditions of the household. The data at our disposal came from two main groups of households: those that filed grievances and hence were revisited, and to households that were not located during the first wave of data collection efforts. We have such data for a total of 13,005 households.

Enumerators assessed the living conditions of households on a scale from 1 to 6, where 1 represents the poorest people in the country and 6 represents the richest people in the country. The first step to implement the proposed comparison is to convert the subjective assessment into an index comparable to the Proxy Means Testing score. Given that the scale has six possible values, each value would represent approximately 17% when translating the scale into another

going from 0 to 100. The second step is to limit the sample to the 4,330 households that were considered the poorest in Mongolia by the enumerators, that is, the bottom 17% in the subjective score. The final step is to inspect how these households rank in terms of their Proxy Means Testing scores.

Tables 3.3 and 3.4 show the results of the comparison. Among the poorest households according to the enumerators, 65% of them belong to the same ranking based on the per adult equivalent approach compared to only 50% when using per capita consumption. By contrast, households severely mismatched between their objective and subjective classifications now stand at 13%, down from 25% when using the per capita approach. This overall improvement occurs across all groups of the population but it is particularly remarkable for households with two, three and four members; and for household types such as couples without children, single parents with children and grandparents living with their grandchildren. The bias against small households persists but to a significantly lesser extent than before.

Table 3.3 Matching of quantitative assessment and social workers assessment by household type, Mongolia

| Household type | Very poor | | Non-poor | |
|--------------------------------|------------|---------------|------------|---------------|
| | Per capita | Per adult eq. | Per capita | Per adult eq. |
| Total | 49.5 | 64.5 | 25.3 | 13.3 |
| Single person | 0.0 | 7.4 | 94.3 | 54.4 |
| Couple without children | 0.9 | 40.2 | 63.6 | 21.5 |
| Couple with children | 77.9 | 80.9 | 3.1 | 2.0 |
| Single parent with children | 49.1 | 65.1 | 15.2 | 10.7 |
| Grandparents with children | 26.5 | 64.7 | 26.5 | 11.8 |
| Three generations | 81.8 | 90.6 | 3.5 | 1.6 |
| All adults | 16.7 | 55.7 | 36.9 | 14.0 |
| Other households with children | 71.7 | 85.4 | 4.9 | 2.7 |

Table 3.4 Matching of quantitative assessment and social workers assessment by household size, Mongolia

| Household size | Very poor | | Non-poor | |
|----------------|------------|---------------|------------|---------------|
| | Per capita | Per adult eq. | Per capita | Per adult eq. |
| Total | 49.5 | 64.5 | 25.3 | 13.3 |
| One | 0.0 | 7.4 | 94.3 | 54.4 |
| Two | 2.7 | 39.8 | 53.1 | 24.4 |
| Three | 38.3 | 62.9 | 17.8 | 7.6 |
| Four | 67.0 | 77.5 | 4.9 | 3.4 |
| Five | 81.7 | 88.4 | 1.5 | 1.0 |
| Six | 89.4 | 93.8 | 0.8 | 0.8 |
| Seven | 95.3 | 99.0 | 1.0 | 0.0 |
| Eight or more | 95.4 | 96.9 | 0.0 | 0.0 |

4 Conclusion

While in developing countries it is common to use a per capita approach to compare households of different size and composition arguing that this is intuitive and easily understood, this results in a clear bias: very large households are most often found to be poor and very small households are almost never considered poor.

We have shown evidence on how in the case of Moldova and Mongolia the per capita approach provides such bias comparing the quantitative assessment of living standards and the subjective assessment of social workers and social agents involved in assessing household eligibility to social assistance.

For the two countries we also made an attempt to estimate equivalence scales using different approaches: the minimum income question, the living standard approach and indirect assessment based on the consumption structure in the country. This provides an alternative measure of living standards to compare the welfare of households of different composition. Using such equivalence scales we find a significantly higher matching with the subjective assessment of people involved in the assessment of households' eligibility to social assistance. In particular, we find fewer discrepancies between the two approaches (quantitative and subjective) in relation to household composition/type and household size.

Mongolia uses a per capita approach for poverty measurement and poverty analysis and the same was used in determining eligibility for poverty targeted social assistance. However, complaints from people and social workers clearly pointed towards a bias in the assessment of household eligibility, whereby deserving small households tended to be excluded, and relatively better off large households tended to be included. The use of subjective assessments on household living standards made by agents involved in visiting households to collect administrative forms used to determine eligibility for food stamps confirmed the bias of the per capita approach.

At the same time the estimation of equivalence scales provided an alternative approach, which was then adopted for the eligibility assessment.

Moldova is already using equivalence scales for poverty measurement and these were also adopted for the eligibility assessment to social assistance. Furthermore, for eligibility assessment specific equivalence scales were also introduced for people with disabilities, which proved to be socially acceptable because they are a population group traditionally recognised to have special needs.

The main policy recommendation is that the adequacy of the per capita approach should be assessed very carefully, its simplicity does not match the actual judgement of what is socially acceptable and in the targeting of social assistance generates substantial bias. In transition economies, such as Moldova and Mongolia, the use of equivalence scales should be adopted as standard. Moreover, also in other countries the use of subjective assessments of survey enumerators and social workers could be a promising source of information for the estimation of socially acceptable equivalence scales.

References

De Vos, K. and T. I. Garner (1991): An evaluation of subjective poverty definitions: comparing results from the U.S. and the Netherlands; *Review of Income and Wealth*, Series 37, No. 3.

Deaton A. and S. Zaidi (2002): Guidelines for constructing consumption aggregates for welfare analysis; LSMS Working Paper No. 135, The World Bank.

Garner, T.I. and Short (2002): "Personal Assessments of Minimum Income and Expenses: What Do They Tell Us about 'Minimum Living' Thresholds and Equivalence Scales?", downloadable on www.bls.gov/ore/abstract/ec/ec050050.htm

Kolenikov and Angeles (2009): Socioeconomic status measurement with discrete proxy variables; *Review of Income and Wealth*, Series 55, No. 1

Lanjouw P., B. Milanovic and S. Paternostro (1998): Poverty and economic transition: How do changes in economies of scale affect poverty rates of different households? The World Bank

Lanjouw P. and M. Ravallion (1995): Poverty and household size; *The Economic Journal*, Vol. 105 (November).

Nelson, J.A. (1992): Methods of estimating household equivalence scales: an empirical investigation; *Review of Income and Wealth*, Series 38, No. 3.

Olken, B.A. (2002): Revealed community equivalence scales; Harvard University, mimeo.

Pollak, R. A. and T. J. Wales (1979): Welfare Comparisons and Equivalence Scales; *American Economic Review*, Vol. 69, pp. 216-21.

Van Praag, B.M.S. (1968): *Individual Welfare Functions and Consumer Behaviour*, North-Holland Publishing Company, Amsterdam.

Zaidi A. and T. Burchardt (2005): Comparing incomes when needs differ: equalization for the extra costs of disability in the U.K.; *Review of Income and Wealth*, Series 51, No. 1.

Annex A Statistical annex

Table A.1 Subjective minimum income (logarithm), 2006

| Variables | Coef. | Std. Err. | t | P>t |
|--|--------|-----------|-------|-------|
| Consumption expenditure (ln) | 0.28 | 0.03 | 9.82 | 0.000 |
| One member household in working age | -0.35 | 0.05 | -6.72 | 0.000 |
| One member household in pension age | -0.40 | 0.05 | -8.25 | 0.000 |
| Two member hhold, at least one in pension age | -0.09 | 0.04 | -2.03 | 0.044 |
| Three adults household | 0.25 | 0.03 | 7.43 | 0.000 |
| Four or more adults | 0.37 | 0.04 | 10.50 | 0.000 |
| One adult and one child | 0.02 | 0.05 | 0.33 | 0.742 |
| One adult and two or more children | 0.13 | 0.07 | 1.86 | 0.064 |
| Couple with one child | 0.18 | 0.04 | 5.20 | 0.000 |
| Couple with two children | 0.30 | 0.04 | 7.77 | 0.000 |
| Couple with three or more children | 0.34 | 0.07 | 4.74 | 0.000 |
| Three adults and one child | 0.31 | 0.04 | 8.48 | 0.000 |
| Three or more adults and two or more children | 0.42 | 0.05 | 8.35 | 0.000 |
| Four adults and one child | 0.43 | 0.05 | 8.41 | 0.000 |
| Four or more adults and two or more children | 0.47 | 0.08 | 5.95 | 0.000 |
| Age of household head | 0.01 | 0.00 | 2.31 | 0.022 |
| Squared age of household head | 0.00 | 0.00 | -2.61 | 0.010 |
| Number of earners | 0.02 | 0.01 | 1.17 | 0.242 |
| Whether disabled member | -0.04 | 0.02 | -1.80 | 0.075 |
| Head attained primary education or less | -0.06 | 0.04 | -1.48 | 0.140 |
| Head attained incomplete secondary education | -0.11 | 0.03 | -3.12 | 0.002 |
| Head attained secondary (general) education | -0.10 | 0.03 | -3.55 | 0.001 |
| Head attained secondary (vocational) education | -0.08 | 0.03 | -2.66 | 0.009 |
| Female head is divorced | -0.01 | 0.04 | -0.26 | 0.796 |
| Female head is widow | 0.01 | 0.03 | 0.25 | 0.806 |
| Female head is married | 0.09 | 0.03 | 2.97 | 0.003 |
| Female head is single | -0.01 | 0.05 | -0.17 | 0.865 |
| Large cities (Chisinau and Balti) | 0.41 | 0.07 | 5.64 | 0.000 |
| Towns | 0.25 | 0.08 | 3.14 | 0.002 |
| Centre | 0.04 | 0.07 | 0.62 | 0.535 |
| South | 0.15 | 0.08 | 1.90 | 0.059 |
| Constant | 4.63 | 0.26 | 18.16 | 0.000 |
| Number of observations | 5748 | | | |
| R-squared | 0.4860 | | | |
| Root MSE | 0.5264 | | | |

Source: Calculation of the authors based on the 2006 HBS.

Table A.2 Subjective minimum income (logarithm), 2011-13

| Variables | Coef. | Std. Err. | t | P>t |
|--|--------|-----------|-------|-------|
| Consumption expenditure (ln) | 0.28 | 0.03 | 9.82 | 0.000 |
| One member household in working age | -0.35 | 0.05 | -6.72 | 0.000 |
| One member household in pension age | -0.40 | 0.05 | -8.25 | 0.000 |
| Two member household, both in pension age | -0.09 | 0.04 | -2.03 | 0.044 |
| Three adults household | 0.25 | 0.03 | 7.43 | 0.000 |
| Four or more adults | 0.37 | 0.04 | 10.50 | 0.000 |
| One adult and one child | 0.02 | 0.05 | 0.33 | 0.742 |
| One adult and two or more children | 0.13 | 0.07 | 1.86 | 0.064 |
| Couple with one child | 0.18 | 0.04 | 5.20 | 0.000 |
| Couple with two children | 0.30 | 0.04 | 7.77 | 0.000 |
| Couple with three or more children | 0.34 | 0.07 | 4.74 | 0.000 |
| Three adults and one child | 0.31 | 0.04 | 8.48 | 0.000 |
| Three or more adults and two or more children | 0.42 | 0.05 | 8.35 | 0.000 |
| Four adults and one child | 0.43 | 0.05 | 8.41 | 0.000 |
| Four or more adults and two or more children | 0.47 | 0.08 | 5.95 | 0.000 |
| Age of household head | 0.01 | 0.00 | 2.31 | 0.022 |
| Squared age of household head | 0.00 | 0.00 | -2.61 | 0.010 |
| Number of earners | 0.02 | 0.01 | 1.17 | 0.242 |
| Whether disabled member | -0.04 | 0.02 | -1.80 | 0.075 |
| Head attained primary education or less | -0.06 | 0.04 | -1.48 | 0.140 |
| Head attained incomplete secondary education | -0.11 | 0.03 | -3.12 | 0.002 |
| Head attained secondary (general) education | -0.10 | 0.03 | -3.55 | 0.001 |
| Head attained secondary (vocational) education | -0.08 | 0.03 | -2.66 | 0.009 |
| Female head is divorced | -0.01 | 0.04 | -0.26 | 0.796 |
| Female head is widow | 0.01 | 0.03 | 0.25 | 0.806 |
| Female head is married | 0.09 | 0.03 | 2.97 | 0.003 |
| Female head is single | -0.01 | 0.05 | -0.17 | 0.865 |
| Large cities (Chisinau and Balti) | 0.41 | 0.07 | 5.64 | 0.000 |
| Towns | 0.25 | 0.08 | 3.14 | 0.002 |
| Centre | 0.04 | 0.07 | 0.62 | 0.535 |
| South | 0.15 | 0.08 | 1.90 | 0.059 |
| Constant | 4.63 | 0.26 | 18.16 | 0.000 |
| Number of observations | 16242 | | | |
| R-squared | 0.6806 | | | |
| Root MSE | 0.3303 | | | |

Source: Calculation of the authors based on the 2011-13 HBS.