Economics of Transition
Volume 12 (3) 2004, 509–536

Relative price shifts, economies of scale and poverty during economic transition[1]

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Abstract

Economic transition is associated with significant shifts in relative prices between private and public goods. If, as a result, public goods claim a larger share of total expenditures, economies of scale in consumption increase. We show how relative price changes might alter the welfare of different-sized households in the short run and over time. We illustrate, for a selection of transition economies, that conventional poverty profiles are quite sensitive to assumptions made about economies of scale in consumption. In particular, the common view that large households with many children are poor relative to small households (such as those comprising the elderly) is shown to be highly non-robust.

JEL classifications: I32, H41, O52.
Keywords: Poverty, public goods, transition economies.

[1] We would like to thank Mark Schankerman for detailed comments and suggestions for improvement of this paper. We are also grateful for the comments and suggestions of Jeanine Braithwaite, Francois Bourguignon, Angus Deaton, Chris Elbers, Gary Fields, Dean Jolliffe, Christine Jones, Sylvie Lambert, Thierry Magnac, Lant Pritchett, Martin Rama, Martin Ravallion, David Sahn and seminar participants at the World Bank, Vrije Universiteit, Amsterdam, CERGE, Prague, and DELTA-INRA, Paris and the 1998 Western Economic Association meetings. The views expressed in this paper are the authors' and should not be attributed to the World Bank or any affiliated organization.

1. Introduction

Debate about transition often centres on its distributional consequences. Building on the valuable groundwork provided by Atkinson and Micklewright (1992), there has been a considerable amount of research into the question of how poverty has evolved over time in the transition economies, who have been the winners and losers from this process and what policies are needed to protect the vulnerable.[2] One way to assess change is to monitor poverty levels over time and to track changes in the overall distribution of income. Arguably as important is the need to determine who the poor are and whether this has been changing during the process of transition. This focus, on the profile of poverty rather than on poverty levels, is generally of more immediate value to policy-makers concerned with prioritization of public spending and the design of safety nets.

Table 1 provides a simple example of a demographic profile of poverty in a set of transition countries based on per capita household expenditure. When conventional methods of poverty analysis are employed to construct the poverty profile, a consistent finding is the high incidence of poverty amongst households with many children and the relatively low incidence amongst the population comprising elderly households. This finding has prompted some to argue that government spending in the transition countries should focus more on transfers to children, possibly at the expense of government spending on pensions to elderly. This argument has drawn on two types of evidence: the seemingly moderate rate of decline in the real value of pensions in most transition countries (Milanovic, 1998; Cornia, 1995); and the strikingly higher rates of measured poverty amongst households with young children compared to households which comprise the elderly (Milanovic, 1998, pp. 101–104). The picture seems unambiguous: '. . . the idea that the old have suffered most from market reforms in Eastern Europe . . . is wrong . . . the demands of pensioners are taking the food out of the mouths of working people's children' (*Economist*, December 16, 1995).

In this paper we argue that conventional methods of poverty analysis may be misleading in the transition setting. The process of economic transition is associated with relative price shifts that have made certain goods and services increasingly expensive relative to other goods. Many of these relatively expensive goods embody 'public good' qualities. One person's consumption of the services provided by a given house, for example, may not significantly diminish the amount of housing that a second person could consume from that same house. The consumption of quasi-public goods implies that there are economies of scale, such that the per capita cost of reaching a given level of welfare might be significantly lower for a larger family than for a small one. As the relative price of these quasi-public

[2] For recent reviews, see Milanovic (1998), Braithwaite and Klugman (1998); Falkingham, Klugman, Marnie and Micklewright (1996) and World Bank (2000). See also the annual *Transition Reports* published by the EBRD.

Table 1. Poverty estimates (average poverty rate = 20 percent of the population; based on per capita expenditures)

	Bulgaria	Russia	Hungary	Kyrgyzstan	Poland	Estonia	Kazakhstan
Average % poor	20%	20%	20%	20%	20%	20%	20%
Household characteristics							
Elderly household	18%	17%	09%	09%	03%	10%	09%
Female-headed household	16%	19%	13%	15%	09%	16%	18%
Low dependency ratio	18%	18%	19%	18%	17%	15%	16%
High dependency ratio	24%	25%	25%	21%	24%	19%	24%
Low child ratio	16%	15%	11%	17%	09%	11%	14%
High child ratio	24%	24%	28%	21%	28%	21%	25%
Household with no child	15%	15%	11%	09%	07%	10%	12%
Household with one child	16%	18%	20%	14%	15%	16%	14%
Household with two children	27%	24%	26%	18%	26%	22%	19%
Household with three+ children	59%	47%	56%	25%	49%	34%	40%
Individual characteristics							
Children	25%	25%	29%	43%	31%	28%	25%
Elderly	20%	18%	13%	29%	10%	16%	16%
Average household size							
Among the poor	3.57	3.09	3.60	6.07	4.68	2.91	4.49
Among the non-poor	2.79	2.67	2.63	4.70	2.89	2.33	3.44

***Source*:** Authors' calculations.

goods rises over time as part of the transition process, economies of scale in consumption are likely to be changing over time as well.

We illustrate that, in the short run, the effect of an increase in the relative price of quasi-public goods is to increase economies of scale in consumption. In the longer run, the picture is less clear because consumption behaviour may change in response to relative price changes. Households may shift away from consuming those goods and services that have become relatively more expensive. However, under the most plausible assumptions economies of scale will rise even in the long run.

When economies of scale change, the profile of poverty also changes. Starting from a baseline poverty profile that assumes away any economies of scale (as in Table 1), we show that allowing for even modest economies of scale in consumption can radically alter the results. In particular the relatively high 'risk' of poverty amongst households with many children and the relatively low 'risk' amongst the elderly depicted in the table are highly sensitive to assumptions about economies of scale. Indeed, the presence of even modest economies of scale in consumption is, in most cases, sufficient to overturn this feature of the conventional poverty profile.[3]

Although the true level of scale economies in consumption is unknown, our analysis of the dynamics of this parameter in the face of relative price shifts implies that it is very difficult to justify simply assuming it away. This is particularly true when the focus is on a transition, a process typically associated with very large changes in relative prices.

For policy-makers the key lesson from this analysis is that certain dimensions of the poverty profile are quite fragile to underlying assumptions that have been made in their construction. Thus, policy-makers should be cautious when singling out for attention population groups defined in terms of demographic characteristics (size of family, age, gender, and so on). At a minimum it is important that sensitivity analysis be carried out when constructing poverty profiles and in basing policy recommendations on such profiles.

In the next section we examine how relative price changes might affect economies of scale in consumption. In Section 3 we discuss the magnitude of actual price

[3] Drèze and Srinivasan (1997) examined a similar set of issues for India. There, anthropological, demographic and sociological evidence points strongly to widows being a highly vulnerable group in Indian society. But poverty rates based on per capita consumption measures, calculated from household surveys, indicate that widow-headed households are among the least poor in Indian society. By relaxing slightly the assumption of no economies of scale, Drèze and Srinivasan (1997) overturned these poverty comparisons dramatically, bringing the consumption-based evidence much more into line with evidence from other sources. Deaton and Paxson (1997) have also investigated the sensitivity of poverty comparisons in a set of six developing countries (including one, Ukraine, among the transition economies). They note that particularly in the two richest countries of their sample (Ukraine and Taiwan), poverty rankings between the elderly and children were most sensitive to alternative assumptions regarding economies of scale in consumption.

changes in seven transition countries and their likely effect on scale economies. In Section 4 we examine the sensitivity of the demographic profile of poverty in those countries to alternative assumptions about the extent of economies of scale in consumption. In Section 5 we provide concluding remarks.

2. Economies of scale in consumption: A framework of analysis

Conventional poverty measurement starts with the construction of a consumption- or income-based indicator of individuals' well-being. The concept that underlies this approach is money metric utility, where different welfare levels are measured in terms of the resources needed to sustain them. Taking this approach, it is standard practice to adjust for differences in prices across locations and over time in constructing real expenditure. Further adjustments are sometimes made for the fact that different types of people have different needs, and therefore might require different amounts of expenditure to achieve the same utility level (summarized in equivalence scales). In the same spirit, the past decade has seen a growing literature bringing economies of scale into conventional poverty analysis (see Deaton and Paxson, 1998; Drèze and Srinivasan, 1997; Gan and Vernon, 2003; Lanjouw and Ravallion, 1995).[4] We follow this literature in noting that two factors determine the overall economies of scale in consumption enjoyed by a household: technical economies of scale, and budget shares.

For simplicity assume that total household expenditure, Y, is allocated between two goods: expenditure on food, Y_F, and on housing, Y_H. A given amount of housing may be more valuable to a larger household than to a smaller household because it can be shared at little cost. Effectively the price of a unit of per-person housing consumption is lower when that person lives with several others. There may also be some public good quality to food expenditure, associated with bulk purchasing discounts or food preparation. Thus we model the effective value of total housing and food expenditures for an n-member household as $Y_H^* = n^{\beta_1} Y_H$ and $Y_F^* = n^{\beta_2} Y_F$, respectively. For a single person household $Y_H^* = Y_H$ and $Y_F^* = Y_F$. The parameters β_1 and β_2 indicate economies of scale in the consumption of each good, with $\beta_1, \beta_2 \in [0, 1]$ and a higher value representing greater economies of scale.

Overall economies of scale depend on the share of household spending allocated to the two goods. Let $s_F = Y_F/Y$ be the budget share devoted to food. Analogous to a Paasche price index, the ratio of real household expenditure, Y^*, for an n-person household relative to a single person household, can be written as a weighted average of sub-components using the household's own expenditure shares as weights.

[4] Lanjouw, Milanovic and Paternostro (1998) present a unified framework that explores the impact of relative price changes on both economies of scale and equivalence scales.

$$\frac{Y^*}{Y} = s_H \frac{Y_H^*}{Y_H} + (1 - s_H)\frac{Y_F^*}{Y_F} = s_H n^{\beta_1} + (1 - s_H)n^{\beta_2}. \quad (1)$$

We approximate the required adjustment with the single parameter model

$$\frac{Y^*}{Y} = n^{\theta}, \quad (2)$$

and total household expenditure is multiplied by this factor to obtain real expenditure. By the definition given in (1),

$$\theta = G(\beta_1, \beta_2, s_H, n) = \frac{\ln[s_H n^{\beta_1} + (1 - s_H)n^{\beta_2}]}{\ln n}, \quad (3)$$

and $G_{\beta_1}, G_{\beta_2} > 0$. Most importantly for the discussion that follows, $G_{s_H} > 0$ given our assumption that economies of scale are greater in housing ($\beta_1 > \beta_2$).

As θ approaches 1, perfect economies of scale obtain and the best measure of *per capita* welfare for each member of an n-member household, is *household* income Y. When $\theta = 0$, there are no economies of scale, and the per capita welfare of each member of an n-member household is Y/n.

2.1 What happens when relative prices change?

Let p be the relative price of housing with the price of food normalized to one. How does an increase in p affect economies of scale in consumption? There is no reason to suppose that a change in relative prices would affect the technological parameters β_1 and β_2 – the extent to which a good is non-rival is not determined by prices. However, when relative prices change, demand for each good and thus budget shares may adjust to reflect the new prices. Further, households may respond with a change in family size in order to take advantage of scale economies. These adjustments may take time, however, so we consider short- and long-term effects.

It is likely that in the period directly following a price increase, households continue to consume the same amount of housing. Housing markets may not operate smoothly making it difficult to make desired changes quickly. Further, transactions costs are high and households may be unclear about whether a given change in prices is only transitory or will turn out to be persistent. Given this, they may wait some time before deciding to respond. Holding short-run housing consumption at $\bar{Q}_H$,

$$\frac{\partial s_H}{\partial p} = \frac{\bar{Q}_H}{Y} > 0. \quad (4)$$

It follows that θ increases and the advantages of being in a large household become more pronounced.

In the longer run, households will begin to respond to the new prices. How they respond depends on household preferences, in particular the elasticity of substitution between food and housing. To examine this further we turn to the

household utility maximization problem and consider three standard utility functions that allow for differing responses.

The utility of an individual in a household of size n depends upon real per capita consumption of housing and food, q_H^* and q_F^*, with unit prices p/n^{β_1} and $1/n^{\beta_2}$, respectively. Households are assumed to maximize individual utility subject to a per capita budget constraint, y.

2.1.1 Cobb–douglas utility

$$U = (q_H^*)^{\alpha}(q_F^*)^{1-\alpha},$$

$$s_H = \frac{\left[\frac{p}{n^{\beta_1}} q_H^*\right]}{y} = \frac{pq_H}{y} = \alpha, \tag{5}$$

and in this case a change in relative prices has no effect on economies of scale.

2.1.2 Constant elasticity of substitution (CES) utility

$$U = \frac{(q_H^*)^{\delta}}{\delta} + \frac{(q_F^*)^{\delta}}{\delta} \quad (\delta \leq 1, \delta \neq 0)$$

and

$$s_H = \frac{1}{1 + \left[n^{\beta_2}\left(\frac{p}{n^{\beta_1}}\right)\right]^{\sigma-1}}, \tag{6}$$

where $\sigma = 1/(1 - \delta)$ is the elasticity of substitution. When $\sigma < 1$ the degree of substitution between food and housing is low, and the housing share s_H increases with the relative price of housing. When $\sigma > 1$ households shift out of housing to such an extent when its relative price increases that the housing share actually falls. The Cobb–Douglas utility function is a special case with $\sigma = 1$.

With the CES utility function, the size of the household also affects the housing share through its effect on the relative price of housing versus food. Given our assumption that $\beta_1 > \beta_2$, a decrease in n has the same effect as an increase in p. Because the Cobb–Douglas and CES functions yield homothetic demands, the income level of the household has no role.

2.1.3 Linear expenditure system

This demand system is based on a generalization of the Cobb–Douglas utility function. Its attraction is that it does not impose homothetic demands. We know from Engel's law that the food share is declining in per capita expenditure, and this utility function is consistent with that fact. The form of the utility function

recognizes that individuals might require minimum expenditures on housing and food q^*_{H0} and q^*_{F0}:

$$U = (q^*_H - q^*_{H0})^{\alpha}(q^*_F - q^*_{F0})^{1-\alpha}.$$

After the minimum expenditures are attained, any remaining expenditure is allocated between the two goods to maximize utility. Let

$$y_0 = \frac{p}{n^{\beta_1}} q^*_{H0} + \frac{1}{n^{\beta_2}} q^*_{F0}$$

be the per capita expenditure required to attain the minimum requirements and define

$$\alpha_0 = \frac{\frac{p}{n^{\beta_1}} q^*_{H0}}{y_0}$$

as the share of housing in this minimum expenditure. Beyond what is spent on these requirements, $y_r = y - y_0$ of residual expenditure is available to allocate between the two goods. Because of the Cobb–Douglas form of the residual part of the utility function, the housing share in this residual expenditure is simply α (Equation 5). Thus, the overall share of expenditure devoted to housing is a weighted average,

$$s_H = \frac{\alpha y_r + \alpha_0 y_0}{y}. \tag{7}$$

In this case, an increase in the relative price of housing unambiguously increases the share of expenditure on housing.

$$\frac{\partial s_H}{\partial p} = \frac{(1-\alpha)}{n^{\beta_1}} \frac{q^*_{H0}}{y} > 0. \tag{8}$$

Economies of scale become more important as larger households are able to provide minimum housing to their members at lower cost.

As with the CES utility function, family size n again affects the housing share through its effect on relative prices. The effect is ambiguous.

$$\frac{\partial s_H}{\partial n} = \frac{1}{y}\left[(\alpha_0 - \alpha)\frac{\partial y_0}{\partial n} + y_0 \frac{\partial \alpha_0}{\partial n}\right].$$

From Engel's law we know that $\alpha > \alpha_0$, and minimum per capita expenditure y_0 falls in household size as large households take advantage of economies of scale. Thus the first term is positive. However, large families can devote relatively less of y_0 to housing, so α_0 falls in n and the second term is negative.

Finally, with $\alpha > \alpha_0$, the share of expenditure on housing – and thus economies of scale – increase as total per capita expenditure, y, grows.

To summarize, in the short run, one would expect an increase in the price of housing to make scale economies more important, as households spend a greater share of their resources to maintain an initial level of housing. If households have a CES utility function (with Cobb–Douglas a special case) longer-run economies of scale may move in any direction, or not at all, in response to an increase in the price of housing. Which of the possibilities occurs depends on the elasticity of substitution between the two goods. If it is low, as might be expected, then scale economies become more pronounced as the price of housing increases even after households have adjusted their expenditures. With the utility function that underlies the linear expenditure system this result is unambiguous. How quickly households adjust to price increases depends upon the functioning of the housing market, households' expectations about the nature of price changes, and whether the price changes are anticipated. If anticipated, households might begin to cut back on their consumption of housing earlier, dampening the short-run effects of the price rise.

Finally, because a greater part of their budget goes to housing, better-off households experience larger economies of scale in consumption.

Before turning to the data, we note that from Equation (3) and from the discussion above that $\theta(s_H(n), n)$. That is, there is a different economies of scale parameter for each household size. In the following section we show in an example that the differences are not large. Since the purpose of the simulations in Section 4 is to explore the robustness of poverty profiles, rather than to estimate specific parameters, in that section we follow the literature in treating θ as constant across households of different sizes.

3. The extent of relative price change during the transition

The typical pattern during transition in Eastern Europe and the former Soviet Union has been an increase in the relative price of quasi-public goods like housing, residential electricity and heating compared to private goods like food. For example, in Poland, between 1989 and 1993, the nominal rent increased by a factor of 39, heating and hot water costs increased by a factor of 230, household electricity by a factor of 116, while the nominal price of food rose by a factor of 18.[5] In Hungary, over the 1990–96 period the price of electricity, gas and other utilities increased by a factor of almost 7, and the price of food by a factor of 3.5.[6] Even in Russia, where relative utility prices are not thought to have increased as much as in the rest of Eastern Europe, between 1993 and 1997, rent per square metre increased by a factor of 18, the electricity kilowatt rate by a factor of 180 and household heating cost per square metre by a factor of 110, while average food prices increased by a

[5] Polish Central Statistical Office, *Statistical Yearbook 1994*, pp. 190–1.
[6] Hungarian Central Statistical Office, *Statistical Yearbook 1996*, p. 315.

Table 2. Change in the economies of scale for different household sizes, Poland 1989–93

	$N = 2$	$N = 3$	$N = 3.52$ (sample average)	$N = 4$	$N = 5$
Pre-transition θ	0.041	0.038	0.042	0.041	0.045
and s_H	[0.046]	[0.037]	[0.038]	[0.036]	[0.036]
Post-transition θ	0.192	0.199	0.226	0.229	0.261
and s_H	[0.228]	[0.211]	[0.233]	[0.228]	[0.250]
Change in θ	0.151	0.161	0.185	0.188	0.216

***Note*:** Calculations based on the following assumptions: $\beta_1 = 0.3$; increase in relative price of housing = 455 percent; workers' households only. s_H = share of housing expenditures in total expenditures. The average household size is 3.52.

***Source*:** Polish Central Statistical Office*: Household Budget Surveys* 1989, Table 9.

factor of about 9 (e.g., beef and pork by 7, sausages by 8, and cheese by a factor of 9.8).[7]

We illustrate for Poland what changes of this magnitude imply. The actual values for the housing share, s_H, before the transition for different household sizes (from the *1989 Household Budget Survey*) are held constant. We assume $\beta_1 = 0.3$, which represents a fairly high degree of technical scale economies in housing. It implies, for example, that four people living separately and each spending 1,000 on housing would be able to enjoy the same real housing consumption for just 660 per person if they were to live together. We further assume that economies of scale in food consumption are negligible ($\beta_2 = 0$). In 1993 (the year for which we have the Polish household survey data that we use in the empirical calculations in Section 4 below), the increase in the relative price of housing compared to food was 455 percent.[8] It can be easily calculated that, in the short run, a relative price increase of this magnitude boosts θ by 0.15 to 0.22 points (see last line of Table 2). Thus, if elasticities of substitution are low, a relative price change of this magnitude during the transition process could be associated with large and persistent increases in economies of scale.

As economies of scale increase, one might expect households to respond by staying together in larger family units. Children could remain at home longer and

[7] See *Russia in Figures: 1998*, Moscow: Goskomstat Rossii, pp. 347, 349–51.

[8] Calculated from the Polish Central Statistical office: *Statistical Yearbook 1994*, pp. 190–1. As mentioned above, food prices between 1989 and 1993 increased by a factor of 18, while the rent went up by a factor of 39, and central heating and electricity by factors of 230 and 116, respectively. Using the 1989 shares of rent, heating and electricity in total expenditures, the average housing costs increased by a factor of 100. Thus the price of housing relative to the food numeraire rose some 455 percent (100/18).

the elderly could rejoin younger families. Given the size of the change in θ suggested in Table 2, it may be possible to detect such a change in more recent data.

4. Poverty of the elderly *vis-à-vis* the young

How does the incorporation of economies of scale adjustments into poverty analysis affect the demographic profile of poverty in the transition economies? In this section we turn to an empirical assessment of how robust poverty comparisons between the elderly and children are to alternative assumptions regarding economies of scale. A convenient manner in which to assess their sensitivity is to reconstruct demographic profiles of poverty with alternative specifications of the value of θ. Recall that when $\theta = 0$ there are no economies of scale and a per capita measure of consumption is an appropriate indicator of individual welfare. Higher levels of θ represent increasing economies of scale.

In poverty studies carried out in Western Europe and the United States, it is common to assume a value of θ as high as 0.5 (Gottshalk and Smeeding, 1997; see also Triest, 1998). Thus, if we observe significant changes in our demographic profiles at values of θ below 0.4, it is reasonable to view the profiles as non-robust.[9]

The data we analyse belong to the *HEIDE (Household Income and Expenditure Data for Transition Economies*) database.[10] The database contains nationally-representative household surveys conducted by national statistical offices in seven transition countries in the early years of the transition (1993–94).[11] The variables from the surveys are divided into six large groups: expenditure, income, assets, household-descriptive (e.g., type of housing), individual-descriptive (e.g., level of education), and sample-related variables. The variables have been 'standardized' by a World Bank team so as to attain as far as possible the same definitions across the countries for a number of key variables (about a hundred). This is similar to the so-called process of 'lissification' conducted by the Luxembourg Income Survey where national-based household surveys are standardized into a comparable framework.[12] The *HEIDE* database was created expressly for cross-country work and was used as such in Braithwaite, Grootaert and Milanovic (1999).

In our analysis, we use consumption rather than income as the indicator of welfare. The definitions of consumption across countries are very similar. Even when they vary somewhat in terms of their degree of comprehensiveness, the

[9] Note that the value of θ implicit in subjective poverty lines for developed countries has been observed to be as high as 0.88. See Buhmann *et al*. (1988).

[10] These data are described in detail in Braithwaite, Grootaert and Milanovic (1999), with key characteristics given in Appendix 2 below. The data are available at: http://www.worldbank.org/research/transition/house.htm.

[11] The one exception is Estonia where the survey was conducted in 1995.

[12] See http://www.lisproject.org/techdoc.htm.

differences are minimal (e.g., food and clothing expenditures including expenditures on alcohol and tobacco, housing expenditures and most expenditures on consumer durables are the same across the surveys). Moreover, as we will be comparing poverty profiles across countries rather than actual consumption levels, the fact that the definitions do not match perfectly is of less concern. For example, Lanjouw and Lanjouw (2001) illustrate with reference to Ecuador that while poverty *levels* can vary sharply with the definition of consumption, poverty *profiles* tend to be much less sensitive.

Tables A1–A7 in Appendix 1 provide calculations of the relative incidence of poverty for various household types and across a range of values of θ, respectively in Estonia, Russia, Hungary, Kyrgyzstan, Poland, Bulgaria and Kazakhstan. For each country, and for each value of θ, the overall, national incidence of poverty in the population is set at 20 percent. This allows us to compare the incidence of poverty for a given household type at a given value of θ to the overall poverty rate. We are then able to observe how this relative poverty rate changes as θ is allowed to rise from 0 to 1. For example, in Table A1 we can observe that with a per capita measure of consumption ($\theta = 0$), the incidence of poverty in Estonia for households comprised solely of the elderly (row 1 in Table A1) is 10 percent while it is 20 percent for the population as a whole. At this value of θ, the incidence of poverty for the population residing in households with a larger than average number of children ('high child ratio') is 21 percent, and for those residing in households with three or more children the incidence of poverty is 34 percent. In the final column of Table A1 we can see that these three household groups represent 17, 53 and 9 percent of all households, respectively. When we allow θ to increase from 0 to, say, 0.3 we can see that poverty among elderly households is now 23 percent, for 'high child ratio' households it is 20 percent, and for households with three or more children it is down to 25 percent. By the time $\theta = 0.5$ poverty among elderly households is 39 percent, while among high child ratio households and households with three or more children it is below average (19 percent, respectively). From Table A1 we can also see that when $\theta = 0$ in Estonia the incidence of poverty among all children is 28 percent while it is 16 percent among all of the elderly (those living in households by themselves as well those living in households with younger members). Even with $\theta = 0.3$, these poverty rates have switched over to 21 percent for children and 22 percent for the elderly.

Figures 1 and 2 summarize the information in Tables A1–A7 for four key household groups: households comprising only elderly; 'high child ratio' households (with more than the average number of children); female-headed households; and households which have a higher than average dependency ratio (where dependents are assumed to include any family member not of an adult working age). We will confine our main remarks to the patterns observed in these figures, rather than Tables A1–A7. The broad patterns observed in these figures carry through in the tables.

4.1 Elderly households versus high child ratio households

Figures 1 and 2 illustrate the sensitivity of poverty rankings between elderly households and households with more than the average number of children to alternative values of θ. As was already observed in Table A1, the incidence of poverty among elderly households rises sharply in Estonia as θ rises from 0 towards 1. Once $\theta = 0.25$ the elderly are more likely to be poor than the average population. It is also at this value of θ that the elderly are observed to have a higher incidence of poverty than high child ratio households. In Estonia, the incidence of poverty among high child ratio households declines with higher values of θ, but quite slowly.

In Poland re-ranking between these two household groups does not occur until a value of θ of around 0.5. This is the most extreme 'switch' point and it is reflective of the relatively favourable position of pensioners in Poland. As has been noticed (Milanovic, 1998, pp. 94–7), Polish pensioners have done much better during the transition than their equivalents elsewhere in Eastern Europe; for example, the average pension-wage ratio increased from around 50 percent in 1987–88 to 65 percent ten years later. Thus, the elderly remain better off than households with many children for a very wide range of θ values. For the remaining five countries re-ranking between these two household groups occurs at $\theta = 0.3$ or lower. In Bulgaria, in particular, the elderly are better-off almost only in case of per capita measurement. For any $\theta > 0.1$ (that is, for any realistic value of θ) their relative position is worse.[13]

4.2 Female-headed households

Female-headedness is a household characteristic that tends to be closely correlated with low overall household size. Thus we would expect to see the incidence of poverty among this type of household rise fairly rapidly as θ moves from 0 toward 1. Indeed, this is what can be observed for the seven countries examined in Figures 1 and 2. Interestingly, this group appears to be more poor on average than the elderly at all levels of θ, which implies that a re-ranking between this group and the high child ratio group occurs earlier than was observed between elderly households and high child ratio households. Of course there may well be considerable overlap between female-headed households and elderly households. The key finding here is that whereas female-headed households in transition economies look relatively well-off when a per capita measure of consumption is employed as the welfare indicator, this conclusion is rapidly overturned once some economies of scale are allowed for. The point at which female households look more poor than the population average is often only slightly above the $\theta = 0$ value. Again, Poland stands out with a rather favourable position of female-headed households whose poverty headcount is less than the national average for all $\theta \geq 0.5$ (Figure 2.2). For all other countries, if substantial economies of scale are assumed (e.g., $\theta = 0.5$ or higher) then

[13] The average pension-wage ratio decreased from 44 percent in 1987–88 to a little over 30 percent in 1997–98.

Figure 1. Country estimates

Figure 1.1. ESTONIA

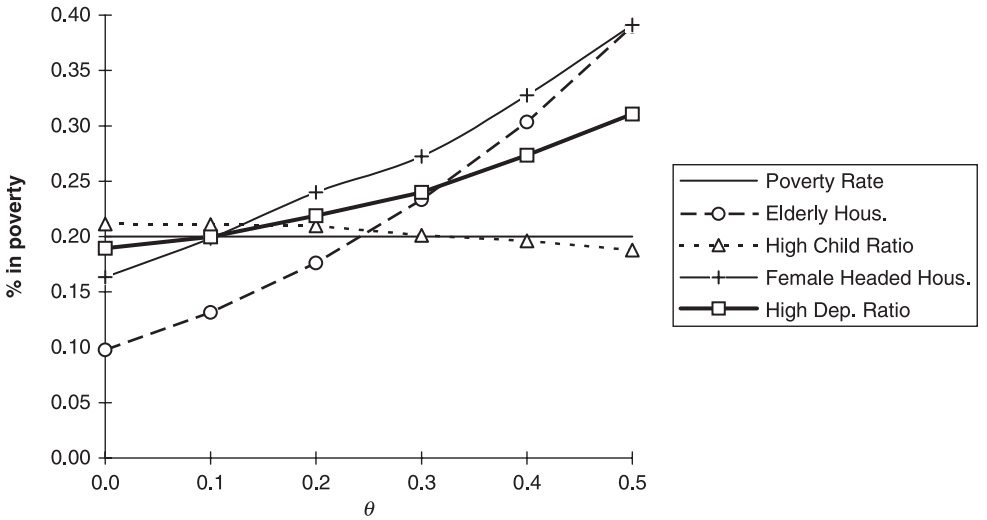


Figure 1.2. RUSSIA

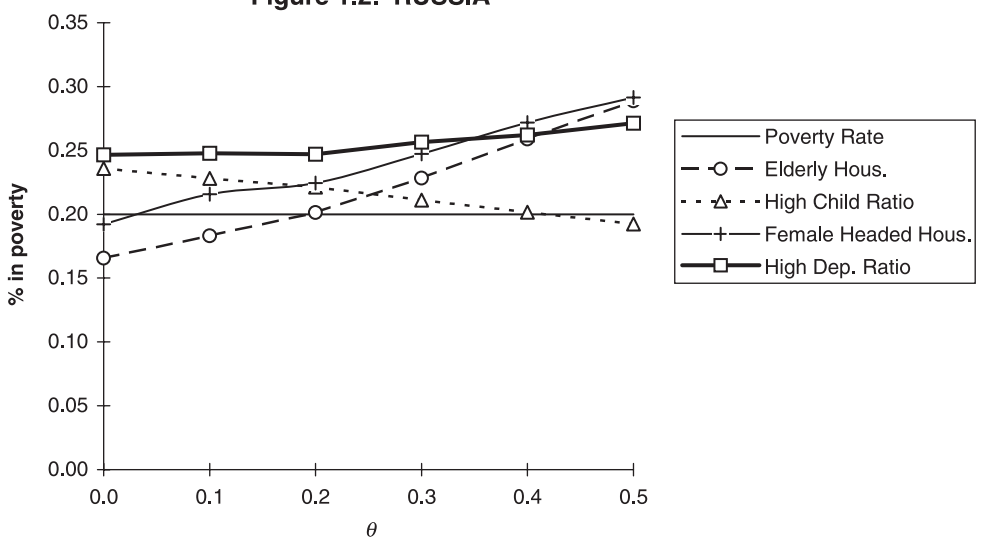


Figure 1. (cont) Country estimates

Figure 1.3. HUNGARY

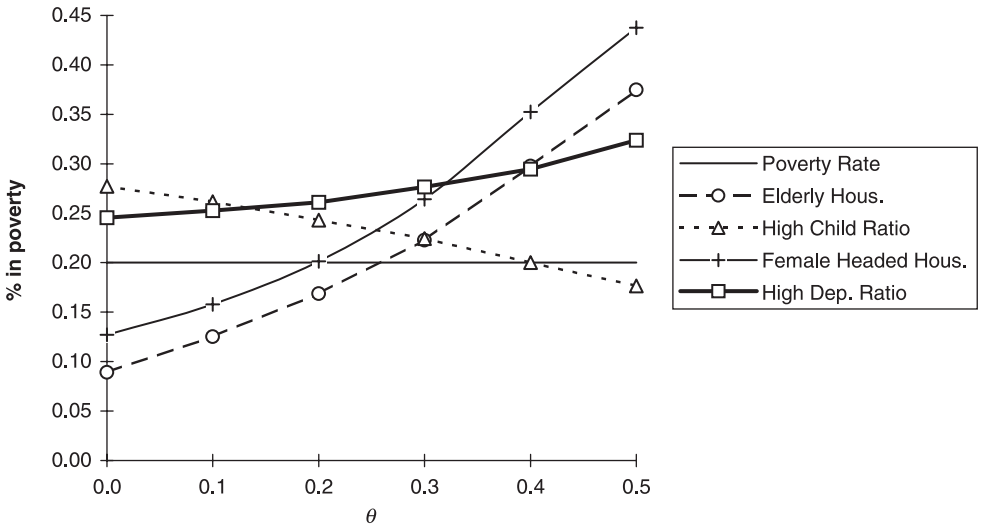


Figure 1.4. KYRGYZSTAN

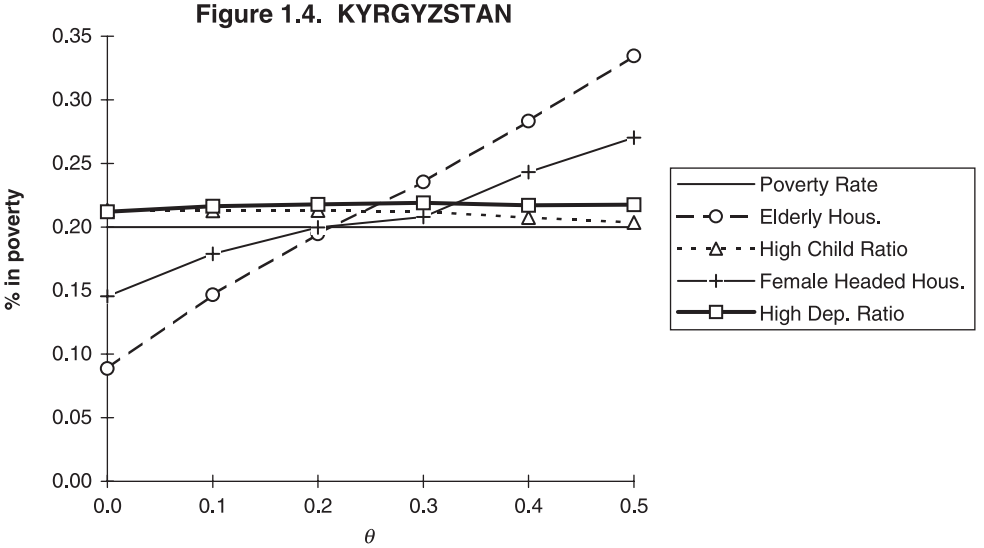


Figure 1. (cont) Country estimates

Figure 1.5. POLAND

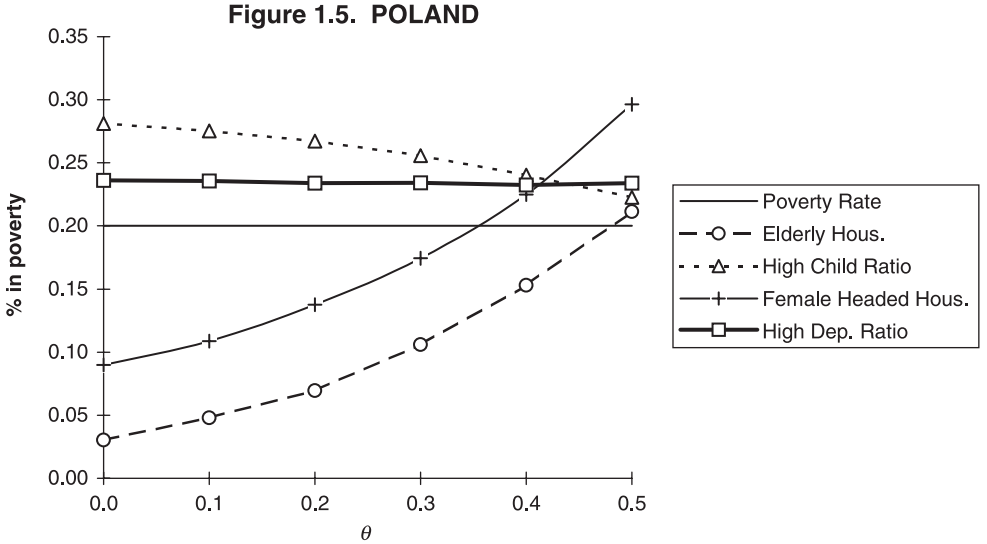


Figure 1.6. BULGARIA

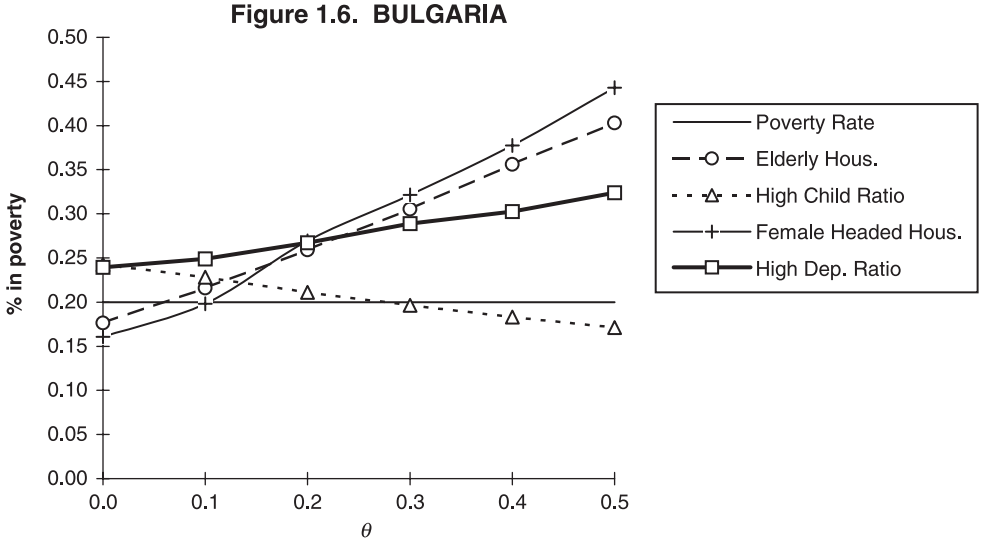
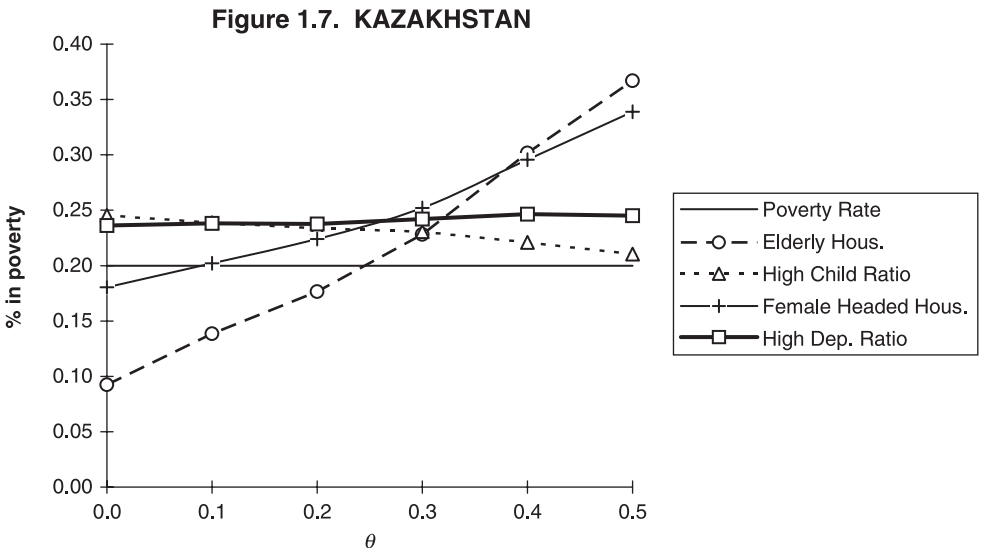


Figure 1. (cont) Country estimates



***Source*:** Authors' calculation.

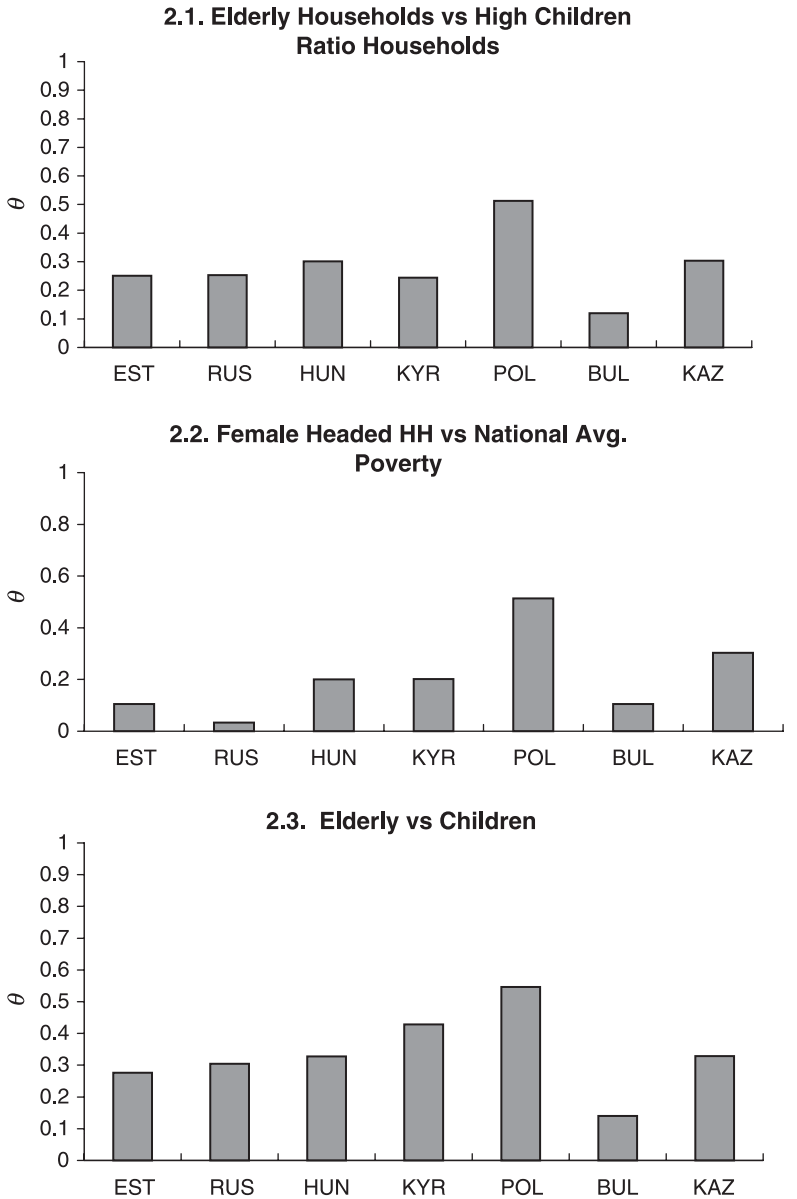
the population residing in female-headed households is generally much poorer than the population on average. At $\theta = 0.5$ the incidence of poverty among such households ranges from about 27 percent in Russia to about 43 percent in Bulgaria (holding the respective average incidence of population in these counties at 20 percent).

To further illustrate our findings, we show in Figure 2.3 the values of θ for which re-ranking occurs for elderly versus children in the population as a whole. The 'switch points' are close to those of elderly households versus high children ratio households, the only exception being Kyrgyzstan for which the critical value of θ rises from 0.25 to 0.43.

4.3 High dependency ratios

Scrutiny of Figure 1 also reveals another relatively robust finding: the incidence of poverty among the population residing in households with high dependency ratios tends to be above average over all values of θ. In these figures a household is defined as having a high dependency ratio if the proportion of dependents (either children or elderly) relative to the total household size is greater than the mean proportion for that country. This finding suggests that as conclusions regarding the poverty of the elderly compared to the young do not seem to be very robust, it might be more meaningful to consider dependents as a group rather than to try to distinguish between children and the elderly.

Figure 2. Values of θ for which re-ranking occurs between selected pairs



5. Conclusions

Since the onset of economic transition, all Eastern European and FSU countries have been under intense pressure to rationalize their public expenditures in order to meet tight budget constraints. The pursuit of a more efficient allocation of relatively scarce resources has led to a global reconsideration of public expenditure priorities. In this context, there have been calls for a re-design of welfare expenditures that would curtail pensions in favour of transfers to families with children. Such recommendations have drawn, at least in part, on evidence which seems to show that pensioners are better off during the transition process than children.

We have shown in this paper that the empirical analysis behind such claims is based on implicit assumptions that may be misleading. In particular, one important assumption underpinning the conventional application of a per capita measure of income or consumption is that there are no economies of scale. This assumption may be increasingly less reasonable as large shifts in relative prices raise the relative cost of goods and services that embody at least some public good characteristics. It is certainly problematic when trying to understand the welfare effects of change itself. We have demonstrated this point within a framework where economies of scale are explicitly modeled to be a function of relative prices. We have shown that in the short run the impact of the kind of relative price changes observed in transition economies is to increase economies of scale in consumption significantly. In the longer run, the picture is less clear-cut, as consumers may substitute away from those goods and services that have become relatively expensive. However, the effect is likely to be dampened rather than reversed.

Ideally, our next step would have been to estimate the 'true' economies of scale before the transition and after. However this poses formidable challenges both conceptually and in terms of available data, and there is no generally accepted method. In the empirical part of the paper, we have therefore applied simulations to see how the use of alternative θ's might affect the poverty rates of the elderly and of children. We have shown that, in many instances, only a small departure from a per capita measure may be sufficient to overturn the conventional ranking of poverty headcounts. Thus an important topic for future research is to develop reliable methods for measuring economies of scale directly. Calculated poverty rates could then be based on 'true' economies of scale parameters before and after the transition.

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Appendix 1

Poverty profiles

Table A1. Estonia

	$\theta = 0.0$	$\theta = 0.1$	$\theta = 0.2$	$\theta = 0.3$	$\theta = 0.4$	$\theta = 0.5$	$\theta = 0.6$	$\theta = 0.7$	$\theta = 0.8$	$\theta = 0.9$	$\theta = 1.0$	
Household characteristics												**populat.**
% in poverty												**Shares**
Elderly household	0.10	0.13	0.18	0.23	0.30	0.39	0.47	0.53	0.61	0.65	0.69	0.17
Female headed household	0.16	0.20	0.24	0.27	0.33	0.39	0.44	0.48	0.54	0.57	0.61	0.22
Low dependency ratio	0.15	0.16	0.16	0.17	0.18	0.18	0.18	0.19	0.20	0.21	0.22	0.67
High dependency ratio	0.19	0.20	0.22	0.24	0.27	0.31	0.35	0.38	0.41	0.42	0.44	0.33
Low child ratio	0.11	0.13	0.15	0.19	0.22	0.26	0.30	0.34	0.39	0.42	0.45	0.47
High child ratio	0.21	0.21	0.21	0.20	0.20	0.19	0.18	0.17	0.17	0.16	0.16	0.53
Household with/no child	0.10	0.12	0.15	0.18	0.22	0.26	0.31	0.34	0.39	0.42	0.45	0.47
Household with one child	0.16	0.17	0.18	0.18	0.18	0.18	0.17	0.17	0.18	0.18	0.20	0.25
Household with two child	0.22	0.22	0.21	0.21	0.21	0.20	0.19	0.17	0.16	0.15	0.14	0.19
Household with three+ child	0.34	0.31	0.29	0.25	0.22	0.19	0.18	0.16	0.13	0.12	0.09	0.09
Average % poor	0.20	0.20	0.20	0.20	0.20	0.20	0.20	0.20	0.20	0.20	0.20	
Average household size												
Poor	2.91	2.71	2.51	2.29	2.13	1.97	1.86	1.78	1.69	1.65	1.62	
Non-poor	2.33	2.35	2.39	2.44	2.49	2.57	2.64	2.72	2.84	2.92	2.98	
% in poverty												
Children	0.28	0.26	0.24	0.21	0.19	0.17	0.16	0.14	0.13	0.12	0.12	
Elderly	0.16	0.18	0.20	0.22	0.25	0.28	0.31	0.33	0.35	0.36	0.37	

Table A2. Russia

	$\theta = 0.0$	$\theta = 0.1$	$\theta = 0.2$	$\theta = 0.3$	$\theta = 0.4$	$\theta = 0.5$	$\theta = 0.6$	$\theta = 0.7$	$\theta = 0.8$	$\theta = 0.9$	$\theta = 1.0$	
Household characteristics												**populat.**
% in poverty												**shares**
Elderly household	0.17	0.18	0.20	0.23	0.26	0.29	0.31	0.34	0.37	0.40	0.43	0.14
Female headed household	0.19	0.22	0.22	0.25	0.27	0.29	0.31	0.33	0.35	0.38	0.41	0.14
Low dependency ratio	0.18	0.18	0.18	0.18	0.18	0.17	0.17	0.16	0.16	0.16	0.16	0.72
High dependency ratio	0.25	0.25	0.25	0.26	0.26	0.27	0.28	0.29	0.30	0.31	0.31	0.28
Low child ratio	0.15	0.16	0.17	0.18	0.20	0.21	0.22	0.23	0.25	0.26	0.27	0.42
High child ratio	0.24	0.23	0.22	0.21	0.20	0.19	0.19	0.18	0.17	0.16	0.15	0.58
Household with/no child	0.15	0.16	0.17	0.18	0.20	0.21	0.22	0.23	0.25	0.26	0.27	0.42
Household with one child	0.18	0.18	0.18	0.18	0.17	0.17	0.16	0.16	0.15	0.15	0.14	0.28
Household with two child	0.24	0.23	0.23	0.21	0.20	0.19	0.18	0.17	0.16	0.15	0.14	0.23
Household with three+ child	0.47	0.44	0.39	0.37	0.33	0.30	0.28	0.27	0.25	0.22	0.19	0.07
Average % poor	0.20	0.20	0.20	0.20	0.20	0.20	0.20	0.20	0.20	0.20	0.20	
Average household size												
Poor	3.09	2.96	2.86	2.73	2.60	2.47	2.38	2.27	2.19	2.10	2.02	
Non-poor	2.67	2.70	2.72	2.76	2.79	2.83	2.86	2.90	2.94	2.98	3.02	
% in poverty												
Children	0.25	0.24	0.23	0.22	0.21	0.20	0.20	0.19	0.18	0.17	0.16	
Elderly	0.18	0.19	0.21	0.22	0.24	0.26	0.28	0.30	0.31	0.33	0.35	

Table A3. Hungary

	$\theta = 0.0$	$\theta = 0.1$	$\theta = 0.2$	$\theta = 0.3$	$\theta = 0.4$	$\theta = 0.5$	$\theta = 0.6$	$\theta = 0.7$	$\theta = 0.8$	$\theta = 0.9$	$\theta = 1.0$	
Household characteristics												**populat.**
% in poverty												**shares**
Elderly household	0.09	0.13	0.17	0.22	0.30	0.37	0.43	0.49	0.54	0.57	0.60	0.15
Female headed household	0.13	0.16	0.20	0.26	0.35	0.44	0.51	0.56	0.61	0.65	0.67	0.10
Low dependency ratio	0.19	0.18	0.18	0.17	0.16	0.15	0.14	0.13	0.13	0.12	0.11	0.73
High dependency ratio	0.25	0.25	0.26	0.28	0.29	0.32	0.33	0.35	0.35	0.37	0.37	0.27
Low child ratio	0.11	0.13	0.14	0.17	0.19	0.22	0.25	0.27	0.29	0.30	0.32	0.44
High child rati	0.28	0.26	0.24	0.22	0.20	0.18	0.15	0.13	0.11	0.10	0.08	0.56
Household with/no child	0.11	0.13	0.14	0.16	0.19	0.22	0.24	0.27	0.29	0.30	0.32	0.44
Household with one child	0.20	0.19	0.19	0.18	0.16	0.15	0.14	0.13	0.12	0.12	0.11	0.24
Household with two child	0.26	0.25	0.22	0.20	0.18	0.16	0.13	0.11	0.10	0.07	0.06	0.25
Household with three+ child	0.56	0.53	0.49	0.45	0.39	0.33	0.23	0.19	0.12	0.09	0.07	0.08
Average % poor	0.20	0.20	0.20	0.20	0.20	0.20	0.20	0.20	0.20	0.20	0.20	
Average household size												
Poor	3.60	3.36	3.09	2.80	2.52	2.28	2.09	1.95	1.83	1.74	1.68	
Non-poor	2.63	2.66	2.71	2.77	2.85	2.93	3.02	3.09	3.16	3.22	3.27	
% in poverty												
Children	0.29	0.28	0.27	0.25	0.22	0.20	0.17	0.15	0.13	0.11	0.09	
Elderly	0.13	0.16	0.19	0.23	0.27	0.33	0.37	0.41	0.44	0.47	0.49	

Table A4. Kyrgyzstan

	$\theta = 0.0$	$\theta = 0.1$	$\theta = 0.2$	$\theta = 0.3$	$\theta = 0.4$	$\theta = 0.5$	$\theta = 0.6$	$\theta = 0.7$	$\theta = 0.8$	$\theta = 0.9$	$\theta = 1.0$	
Household characteristics												**populat.**
% in poverty												**shares**
Elderly household	0.09	0.15	0.19	0.24	0.28	0.33	0.39	0.45	0.50	0.53	0.57	0.03
Female headed household	0.15	0.18	0.20	0.21	0.24	0.27	0.30	0.32	0.36	0.39	0.41	0.05
Low dependency ratio	0.18	0.17	0.17	0.17	0.17	0.17	0.17	0.17	0.16	0.16	0.17	0.38
High dependency ratio	0.21	0.22	0.22	0.22	0.22	0.22	0.22	0.22	0.23	0.22	0.22	0.62
Low child ratio	0.17	0.17	0.17	0.17	0.18	0.19	0.20	0.21	0.21	0.22	0.22	0.32
High child ratio	0.21	0.21	0.21	0.21	0.21	0.20	0.20	0.19	0.19	0.19	0.19	0.68
Household with/no child	0.09	0.11	0.13	0.15	0.18	0.21	0.23	0.27	0.30	0.33	0.34	0.13
Household with one child	0.14	0.14	0.14	0.14	0.16	0.17	0.17	0.18	0.17	0.19	0.20	0.15
Household with two child	0.18	0.18	0.19	0.19	0.19	0.19	0.19	0.19	0.20	0.20	0.20	0.19
Household with three+ child	0.25	0.25	0.24	0.24	0.22	0.21	0.20	0.19	0.18	0.17	0.17	0.53
Average % poor	0.20	0.20	0.20	0.20	0.20	0.20	0.20	0.20	0.20	0.20	0.20	
Average household size												
Poor	6.07	5.69	5.47	5.27	4.92	4.64	4.39	4.16	3.96	3.78	3.68	
Non-poor	4.70	4.77	4.81	4.85	4.93	5.00	5.08	5.16	5.25	5.33	5.38	
% in poverty												
Children	0.43	0.43	0.42	0.42	0.41	0.40	0.39	0.38	0.37	0.36	0.35	
Elderly	0.29	0.33	0.35	0.37	0.40	0.43	0.47	0.51	0.55	0.57	0.59	

Table A5. Poland

	$\theta = 0.0$	$\theta = 0.1$	$\theta = 0.2$	$\theta = 0.3$	$\theta = 0.4$	$\theta = 0.5$	$\theta = 0.6$	$\theta = 0.7$	$\theta = 0.8$	$\theta = 0.9$	$\theta = 1.0$	
Household characteristics												**populat. shares**
% in poverty												
Elderly household	0.03	0.05	0.07	0.11	0.15	0.21	0.28	0.36	0.42	0.49	0.54	0.12
Female headed household	0.09	0.11	0.14	0.17	0.22	0.30	0.39	0.47	0.54	0.60	0.65	0.08
Low dependency ratio	0.17	0.17	0.17	0.17	0.17	0.17	0.17	0.17	0.17	0.17	0.17	0.43
High dependency ratio	0.24	0.24	0.23	0.23	0.23	0.23	0.24	0.24	0.24	0.25	0.25	0.57
Low child ratio	0.09	0.10	0.11	0.13	0.15	0.18	0.21	0.25	0.28	0.31	0.33	0.39
High child ratio	0.28	0.28	0.27	0.26	0.24	0.22	0.20	0.19	0.17	0.15	0.14	0.61
Household with/no child	0.07	0.08	0.10	0.12	0.15	0.18	0.22	0.25	0.29	0.32	0.35	0.37
Household with one child	0.15	0.16	0.16	0.16	0.17	0.16	0.16	0.16	0.16	0.16	0.15	0.23
Household with two child	0.26	0.26	0.25	0.24	0.23	0.22	0.21	0.19	0.17	0.15	0.14	0.24
Household with three+ child	0.49	0.46	0.43	0.39	0.35	0.30	0.25	0.21	0.17	0.14	0.10	0.17
Average % poor	0.20	0.20	0.20	0.20	0.20	0.20	0.20	0.20	0.20	0.20	0.20	
Average household size												
Poor	4.68	4.45	4.18	3.83	3.46	3.09	2.75	2.49	2.30	2.16	2.05	
Non-poor	2.89	2.92	2.95	2.99	3.05	3.14	3.24	3.35	3.46	3.56	3.64	
% in poverty												
Children	0.31	0.30	0.29	0.27	0.25	0.23	0.21	0.18	0.17	0.15	0.13	
Elderly	0.10	0.11	0.12	0.14	0.17	0.20	0.24	0.28	0.31	0.35	0.37	

Table A6. Bulgaria

	$\theta = 0.0$	$\theta = 0.1$	$\theta = 0.2$	$\theta = 0.3$	$\theta = 0.4$	$\theta = 0.5$	$\theta = 0.6$	$\theta = 0.7$	$\theta = 0.8$	$\theta = 0.9$	$\theta = 1.0$	
Household characteristics												**populat.**
% in poverty												**shares**
Elderly household	0.18	0.22	0.26	0.31	0.36	0.40	0.45	0.48	0.52	0.56	0.60	0.17
Female headed household	0.16	0.20	0.27	0.32	0.38	0.44	0.50	0.52	0.55	0.59	0.63	0.07
Low dependency ratio	0.18	0.18	0.17	0.16	0.15	0.15	0.14	0.13	0.13	0.12	0.12	0.70
High dependency ratio	0.24	0.25	0.27	0.29	0.30	0.32	0.35	0.35	0.36	0.38	0.39	0.30
Low child ratio	0.16	0.17	0.19	0.20	0.22	0.23	0.25	0.26	0.28	0.29	0.31	0.50
High child ratio	0.24	0.23	0.21	0.20	0.18	0.17	0.15	0.14	0.12	0.11	0.09	0.50
Household with/no child	0.15	0.17	0.19	0.20	0.22	0.23	0.25	0.26	0.28	0.30	0.31	0.50
Household with one child	0.16	0.15	0.15	0.14	0.13	0.12	0.10	0.10	0.09	0.08	0.07	0.24
Household with two child	0.27	0.25	0.23	0.21	0.19	0.18	0.17	0.15	0.12	0.12	0.09	0.22
Household with three+ child	0.59	0.56	0.53	0.49	0.46	0.41	0.37	0.31	0.26	0.20	0.20	0.04
Average % poor	0.20	0.20	0.20	0.20	0.20	0.20	0.20	0.20	0.20	0.20	0.20	
Average household size												
Poor	3.57	3.30	3.02	2.78	2.54	2.36	2.21	2.09	1.99	1.87	1.80	
Non-poor	2.79	2.83	2.89	2.95	3.02	3.10	3.17	3.23	3.30	3.38	3.45	
% in poverty												
Children	0.25	0.24	0.22	0.21	0.19	0.18	0.16	0.15	0.13	0.12	0.10	
Elderly	0.20	0.22	0.25	0.27	0.30	0.32	0.35	0.37	0.39	0.41	0.43	

Table A7. Kazakhstan

	$\theta = 0.0$	$\theta = 0.1$	$\theta = 0.2$	$\theta = 0.3$	$\theta = 0.4$	$\theta = 0.5$	$\theta = 0.6$	$\theta = 0.7$	$\theta = 0.8$	$\theta = 0.9$	$\theta = 1.0$	
Household characteristics												**populat.**
% in poverty												**3shares**
Elderly household	0.09	0.14	0.18	0.23	0.30	0.37	0.42	0.49	0.52	0.56	0.62	0.05
Female headed household	0.18	0.20	0.22	0.25	0.30	0.34	0.37	0.40	0.44	0.47	0.51	0.09
Low dependency ratio	0.16	0.15	0.15	0.15	0.15	0.15	0.15	0.14	0.15	0.15	0.15	0.47
High dependency ratio	0.24	0.24	0.24	0.24	0.25	0.25	0.25	0.25	0.25	0.25	0.25	0.53
Low child ratio	0.14	0.15	0.15	0.16	0.17	0.19	0.19	0.20	0.21	0.22	0.23	0.42
High child ratio	0.25	0.24	0.23	0.23	0.22	0.21	0.20	0.20	0.19	0.18	0.18	0.58
Household with/no child	0.12	0.13	0.15	0.16	0.19	0.22	0.25	0.27	0.29	0.32	0.34	0.24
Household with one child	0.14	0.15	0.14	0.15	0.15	0.16	0.16	0.15	0.15	0.16	0.15	0.28
Household with two child	0.19	0.18	0.18	0.18	0.16	0.15	0.14	0.14	0.14	0.14	0.13	0.28
Household with three+ child	0.40	0.38	0.36	0.34	0.32	0.29	0.28	0.27	0.23	0.21	0.19	0.20
Average % poor	0.20	0.20	0.20	0.20	0.20	0.20	0.20	0.20	0.20	0.20	0.20	
Average household size												
Poor	4.49	4.26	4.06	3.81	3.56	3.32	3.13	3.02	2.86	2.73	2.62	
Non-poor	3.44	3.47	3.51	3.56	3.62	3.69	3.75	3.79	3.86	3.92	3.98	
% in poverty												
Children	0.25	0.24	0.24	0.23	0.22	0.21	0.21	0.20	0.19	0.18	0.17	
Elderly	0.16	0.18	0.20	0.22	0.25	0.28	0.31	0.33	0.35	0.37	0.39	

Appendix 2

General survey information

Country	Name of survey conducted	Period covered	Sample design	Sample coverage	Sample size	Sampling weights required?	Price information	Exchange rate: 1 USD =	Time period of monetary variables; relevant currency unit
Bulgaria	Bulgarian Integrated Household Survey	Jan–Jun, 1995	stratified random sample	national	2,466 households; 7,195 individuals	no	nominal (1995) prices; expenditure variables (except rent) regionally adjusted; income variables not regionally adjusted	66.123 leva	monthly; 1 leva
Estonia	Household Budget Survey, 1995	Jul–Sep, 1995	stratified random sample	national	2,818 households; 8,758 individuals	yes	July 1995; not regionally adjusted	11.1 EEK	monthly; 1 EEK
Hungary	Household Budget Survey, 1993	Jan–Dec, 1993	stratified random sample	national	8,105 households; 22,062 individuals	yes	nominal (1993) prices; not regionally adjusted	92 ft	monthly; 1 forint
Kyrgyz Republic	Kyrgyzstan Multipurpose Poverty Survey, 1993	Oct–Nov, 1993	stratified, multi-stage procedure, with number of stages dependent on whether household drawn from urban or rural	National	1,937 households; 9,547 individuals	no	Oct 1993; not regionally adjusted	7 som	monthly; 0.01 som
Poland	Household Budget Survey, 1993	Jan–Jun, 1993	stratified random sample	national	16,051 households; 52,190 individuals	yes	June 1993; regionally adjusted (Warsaw=1)	17300 zlt	monthly; 1000 zlt.
Russia	Russian Longitudinal Monitoring Survey, Round 4	Oct 93–Feb 94	stratified random sample	national	5,915 households; 16,291 individuals	no	Nov 1993; regionally adjusted (Moscow and St. Petersburg=1)	1194 rb	monthly; 1 ruble