POVERTY PROFILE WITHOUT POVERTY LINES: ROMANIA, 1994 TO 1997

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Abstract

This paper explores poverty trends in Romania from 1994 to 1997. It finds no reduction in poverty. Regional and other types of poverty decompositions are presented. The poverty profile relies on tests of stochastic dominance. This approach avoids the problem that poverty comparisons may not be robust to the subjective choice of a poverty line. In addition the use of tests of stochastic dominance avoids the potential that small movements across thresholds may have large impacts on poverty indexes. I compare the results of tests of stochastic dominance with the more traditional headcount indicator to determine the extent to which conclusions differ. I also examine the extent to which the findings are sensitive to the choice of equivalence scales.

Keywords: Poverty, stochastic dominance, transition economies

JEL Classification: I32, P2

I. Introduction

Romania's economic transition from a state-controlled to a market-oriented economy has been slow, characterized by a lack of commitment to reform and weak economic performance (OECD 2000). While all indications are that poverty is widespread in Romania, there is little information on how the level and characteristics of poverty have evolved during the period of generally weak, albeit variable economic growth of the post-reform era. In this paper, I will present findings on the evolution of poverty and inequality from 1994 through 1997. I explore whether poverty worsened during this period, as it has in some other transition economies of Eastern Europe, in addition to decomposing the characteristics of the poor along a variety of dimensions. The analysis is based on the Romanian Integrated Household Surveys, conducted for four consecutive years, and discussed further below.

I am also motivated by the question of whether it is practical to adopt an alternative approach to poverty analysis that does not rely on the subjective exercise of setting a poverty line. Specifically, I make use of tests of stochastic dominance to compare distributions of expenditures across time, regions and various population groups. Recent poverty literature that has shown that the use of poverty lines for making poverty comparisons can lead to findings that are not robust to what is arguably a subjective choice of where the poverty line is drawn (Ravallion 1994). Likewise, reliance on poverty lines to make comparisons over time and space are subject to small movements across thresholds that may have large impacts on findings (Davidson and Duclos 2000). [1] While reliance on a simple cut-off point is commended on the basis of simplicity, Deaton (1997) and others have argued that it is a crude device that contrasts sharply with the preferred use of stochastic dominance for policy analysis. Therefore, the poverty profile presented in this paper relies on tests of stochastic dominance, rather than the subjectively defined poverty lines that are generally employed in the literature. I will also compare the results of my poverty decompositions and inter-temporal comparisons of poverty that rely on tests of stochastic dominance, with the more traditional headcount indicator to determine the extent to which conclusions differ. I also examine the extent to which the findings are sensitive to the choice of equivalence scales.

2. Data

For decades under totalitarian rule, the National Commission of Statistics conducted a family budget survey. It was not representative of the population, both because the original sample frame was enterprise-based, not household-based, and because there was no serious attempt to update the permanent sample of households included from one year to the next. In the early 1990s, we designed the Romanian Integrated Household Survey with the National Commission of Statistics to respond to the deficiencies in the sampling and questionnaire design of the Family Budget Survey. Field testing took place in early 1994, and the survey officially went into the field in

[1] They show the sensitivity of international poverty comparisons to the choice of the poverty line.

April, 1994. The survey was thereafter repeated from 1995 through 1997. Each year's sample is nationally and regionally representative.[2]

3. Methodological Considerations

3.1 Creating Consumption Expenditures as a Metric of Utility

As with most efforts to measure poverty in poor countries, household consumption expenditures (normalized by household size and other equivalence scales), are used as the metric of welfare. The construction of real expenditure aggregates is of paramount importance, and a few key methodological points are worthy of some comment.[3] First, a large share of what is consumed in Romania is in the form of own consumption and gifts. These are valued at the regional open market price. Second, the consumption expenditure figure does not include purchases of durables during the month of the interview. Rather, I calculate the flow of services from assets and durables owned, based on a ten-year constant depreciation schedule. Third, the choices regarding adjusting household expenditures for differences in size and composition are more a reflection of a researcher's value judgment given the well-documented identification problem (Deaton and Muellbauer 1980, 1986; Lanjouw and Ravallion 1995; Browning 1992; Blundell and Lewbel 1991). Yet, we know that such subjective judgments are critical to the results of research that both defines the poor and examines how they are affected by policy (see for example, Dreze and Srinivasian 1997, Sahn and Younger 2000). In this report, I therefore employ three equivalence scales: per capita expenditures, the equivalence scale used by OECD, and a Romanian nutrient-need based scale that is widely applied and recommended by the National Commission of Statistics. (See Appendix A for the details on the OECD and NCS scales). Most frequently, I define equivalent incomes using the per capita measure. In order to preserve space, I only report results using the other scales when they differ in any important way.

3.2 Poverty Line and Dominance Testing

Tests of stochastic dominance are employed to make poverty comparisons across time and space, as well as profiling the poor; although, I also present headcount indicators as a source of comparison.[4] The most general method for comparing the cumulative density functions (CDFs) that summarize the levels and distribution of income is to test for stochastic dominance (Atkinson 1970; Shorrocks 1983; Yitzhaki

[2] See Mills et al. (1992) and National Commission for Statistics (1993) for a discussion of the survey design. For copies of the questionnaire, information on the sample design and interviewer manual, see: http://www.worldbank.org/lsms/country/romania/rm94docs.html

[3] This is especially true since my numbers deviate from the official statistics presented by the National Commission of Statistics.

[4] The poverty headcounts are based on a poverty line defined as 66 percent of the median of the regionally and spatially pooled household expenditure per capita. The food energy intake method of calculating the poverty line (Greer and Thorbecke 1986) gave an estimate that was roughly 66 percent of median expenditure per capita. And depending on some of the underlying assumptions in implementing the CBN approach, the poverty line at a national level was also very similar.

and Slemrod 1991). More specifically, consider a CDF where the vertical axis is the cumulative share of the population, and the horizontal axis is consumption expenditures (a proxy for permanent income). The points along the horizontal axis, from zero to a maximum level, can also be designated as a complete set of plausible poverty lines. The proportion of poor is then found by reading off the proportion of the population from the vertical axis that consumes less than a given amount on the horizontal axis. In our case, the poverty line used for comparative purposes is 66 percent of median expenditures per capita. And in terms of the comparison of the distributions that form the basis of the tests of stochastic dominance, they are conducted up to the mean expenditures, thus designated the highest plausible poverty line.

Mechanically, consider two distributions of welfare indicators with cumulative distribution functions, F_A and F_B, with support in the nonnegative real numbers. Let

$$D_A^1(x) = F_A(x) = \int_0^x dF_A(y)$$

and

$$D_A^s(x) = \int_0^x D_A^{s-1}(y)dy\,,$$

for any integer $s \geq 2$. Now distribution A is said to (strictly) dominate distribution B at order s if $D_A^s(x) \leq (<)\ D_B^s(x)$, for all $x \in [0, z_{maz}]$, where z_{maz} is the maximum reasonable poverty line.[5]

Davidson and Duclos (2000) show that $D^s(x)$ can be equivalently expressed as

$$D^s(x) = \tfrac{1}{(s-1)!}\int_0^x (x-y)^{s-1} dF(y)\,.$$

Further, if we have a random sample of N independent observations on the welfare variable, y_i, from a population, then a natural estimator of $D^s(x)$ is

$$\hat{D}^s(x) = \tfrac{1}{N(s-1)!}\sum_{i=1}^{N}(x-y_i)^{s-1} I(y_i \leq x)$$

where $\hat{F}$ is the empirical cumulative distribution function of the sample, and $I(\cdot)$ is an indicator function which is equal to one when its argument is true, and equal to zero when false.

Because I apply this estimator to two independent samples,

[5] See Ravallion (1994) for an interpretation of the orders of dominance.

$$\text{var}(\hat{D}_A^s(x) - \hat{D}_B^s(x)) = \text{var}(\hat{D}_A^s(x)) + \text{var}(\hat{D}_B^s(x)),$$

it is easy to estimate since $\hat{D}^s(x)$ is a sum of *iid* variables. Simple *t* statistics are constructed to test the null hypothesis,

$$H_0 : \hat{D}_A^s(x) - \hat{D}_B^s(x) = 0,$$

for a series of test points (20, in our case), up to an arbitrarily defined highest reasonable poverty line – once again, I designate this as mean expenditures. In cases where the null hypothesis is rejected for each test point, and the signs on all of the *t* statistics are the same, then dominance of order *s* is declared. The tests are conducted up to *s* = 3, after which "no dominance" is declared.[6]

3.3 Choice of Deflator

The most crucial decision in updating poverty numbers over time is the choice of a deflator for calculating real consumption expenditures (or, updating the poverty line).[7] The NCS publishes official monthly food, non-food and services deflators, which are combined into a total national CPI that can be used to deflate consumption expenditures. I have three concerns with their deflator. First, the official CPI is available only at the national level, precluding accounting for price differences across regions. Second, my examination of the weights employed by NCS indicates that they are not consistent with actual consumption patterns of the poor, nor of the vast majority of the population. And third, the data are collected in a limited number of centers, and may not capture prices that are found in rural markets where a large share of product is purchased and most people live.

Therefore, I construct an alternative regional consumer price index. This alternative CPI differs in that I rely on weights from the household survey, rather than the weights used by the NCS, which diverge widely from actual reported patterns of consumption. I employ unit prices derived from the survey and divide the country into eight regions to derive regional food price deflators. Of course, among the many potential liabilities of relying on unit prices is the issue of endogeneity, particularly in terms of quality differences across regions. To deal with this potential endogeneity, I derive predicted prices based on regressing unit values on a vector on regional dummies variables and a range of household characteristics following the procedure developed by Chen and Ravallion (1996). Specifically, the regressions are as follows:

$$\text{Log } P_{ij} = \alpha_i + \beta_{zi} \log Y_j / N_j + \beta_{zi} [\log (Y_j / N_j)]^2 + \gamma_i R_j + \gamma_i D_j + \pi_i E_j + E_{ij}$$

[6] Foster and Shorrocks (1988) show that eventually one distribution will dominate the other at a higher order. But it is difficult to interpret orders of dominance greater than three.

[7] It is possible either to deflate all expenditures into real terms and apply a fixed poverty line, or update the poverty line based on the CPI and use nominal expenditures. Both will provide the same answer. We selected the former option.

where P_{ij} is the unit value of the food item i and household j, Y_j is the consumption expenditure of the household; N_j is the household size; R is a vector of regional dummy variables; E is the dummy variables for the education of the household head; D is a vector of household demographics. This model is then run for each of the 45 months for which data are available to calculate the unit values purged on the expected endogeneity. Then the regional unit value-based food CPI from this method are combined with the NCS non-food and services CPI, relying on the weights from the household survey.

3.4 Poverty and Inequality Measures and Decompositions

The methods for differentiating the extent to which changes in poverty over time are due to a change in the mean expenditures and to changes in the distribution of expenditures, was described in Datt and Ravallion (1992). More specifically, they decompose the total change in poverty between period t and $t+n$ as follows:

$$P_{t+n} - P_t = \underbrace{G(t, t+n; r)}_{\text{growth component}} + \underbrace{D(t, t+n; r)}_{\text{redistribution component}} + \underbrace{R(t, t+n; r)}_{\text{residual}}$$

where the growth component is defined as the change in poverty due to a change in the mean of the distribution, while holding the Lorenz curve constant at that of the reference year r,

$$G(t, t+n; r) \equiv P(z, \mu_{t+n}, L_r) - P(z, \mu_t, L_r).$$

Similarly, the redistribution component is defined as the change in the Lorenz curve while keeping the mean of the distribution constant at that of the reference year r,

$$D(t, t+n; r) \equiv P(z, \mu_r, L_{t+n}) - P(z, \mu_r, L_t).$$

As Datt and Ravallion (1992) point out, the residual $R(\,)$ is present whenever a change in the poverty measure due to changes in the mean (distribution) also depends on the precise distribution (mean) (i.e., when the poverty measure is not additively separable in μ and L).[8]

While this is a useful construct, the results of such a growth/distribution decomposition are potentially sensitive to the choice of the poverty line. Therefore, in addition to the standard Datt-Ravallion type of decomposition, I employ tests of stochastic dominance to address the question whether poverty would have worsened across time, holding the mean expenditure constant but allowing the distribution of expenditure to change as observed.

[8] Although the residual can be forced to disappear by averaging the components using the initial and final years as reference year, we do not do so to avoid arbitrarily apportioning this effect to either the growth or redistribution components.

4. Results

Figure 1 presents the cumulative distribution of real expenditures, using per capita expenditures, for 1994 through 1997.[9] On the horizontal axis is the headcount for any given poverty line, depicted by expenditure levels on the horizontal axis. As discussed above, if the cumulative distribution (or poverty incidence curve) for time period A lies everywhere above the curve for time period B, this represents first order dominance, and it implies that poverty is unambiguously lower in B than A.

The results that compare poverty over the four years of data, for the three equivalence scales, are shown in Table 1. In this and the following tables, I present the headcounts, as well as matrices that contain information on dominance results as well as statistical comparisons of headcount figures. Specifically, in terms of comparisons of headcounts, the "*" in the tables indicates that the *t*-statistics for differences in the headcount figures are significant at the 10% level. In the case of the dominance tests, a "1" in the cell indicates that the column first order dominates the row – or in other words, that poverty is less in the category heading of the column than row. "ND" indicates that it is not possible to reject the null of non-dominance up to the third order, and "2" represents second order, and "3" third order dominance. I have also ordered the rows/columns according to the poverty headcount shown in the table. This choice of ordering is actually arbitrary, but given the correspondence between more traditional headcount indicators and dominance results, it allows the presentation of dominance results to be limited to the upper right triangle of the tables.

The inter-temporal results of poverty in Romania are only slightly sensitive to the choice of equivalence scale. The ordering of the headcounts are the same, although, the difference in the spread being the year with the lowest headcount, 1996, and the year with the highest headcount, 1994, is less when using the per capita measure. There are also differences in terms of the statistical comparisons of the headcount figures. For example, using the per capita scale, it is not possible to reject the null that the headcount is the same between 1997 and 1995, or between 1997 and 1994. When I use the OECD scale, however, these differences are statistically significant. Turning to the dominance results, some differences are seen in the test results based on the varying equivalence scales. For example, when using the NCS scale, the expenditure distribution in 1995 first order dominates 1994. It is not possible to reject the null of non-dominance when using the OECD and per capita scales. Of greater interest is the number of cases where the statistical difference in the headcount comparisons are not supported when using dominance tests, indicating that the headcount results are not robust to the choice of poverty lines. For example, using the OECD scale, despite the fact that the 1995 headcount is lower than 1997 at a p-value of less than 1 percent, the null of non-dominance in comparing poverty between these two years cannot be rejected. A similar story applies to the comparisons between 1995 and 1997 based on the NCS scale.

[9] To save space, I do not present the CDF for the OECD and NCS scales.

Table 2 presents the poverty numbers and dominance results for the per capita measure by the eight major regions of the country, pooling data from 1994 through 1997. According to the headcount, and dominance tests, based on all scales, Bucharest has the least poverty, while poverty is the most prevalent in the northeast region of Romania. But again, there are important differences observed when comparing the results of dominance tests to headcount comparisons. For example, based on the per capita indicators, there are 25 cases where statistically significance is found in comparing poverty between the different regions. In contrast, the null of non-dominance is rejected in only 15 cases. In the remaining 9 cases, results of headcount comparisons are not robust. For example, despite the headcount in the south, 0.302, being markedly greater than the headcount in the central region, 0.283, the null of non-dominance in these distributions is not rejected up the mean expenditures. Similarly, when the OECD scale is employed, there are 22 region pairs with headcounts that are significantly different from each other, while it is only possible to reject the null of non-dominance in 14 cases.

Examining changes in poverty across the four survey years by region reveals some marked differences (Table 3).[10] For example, in Bucharest, headcounts were the same between 1994 and 1995, worsening slightly in 1996, and jumping up sharply in 1997. Statistically, the 1997 headcount is worse than all other years, however, this is not the case when relying on dominance comparison. Only between 1995 and 1997 can the null of non-dominance be rejected, and only under second order conditions.

The worsening poverty in Bucharest over the years is not found in other regions of the country. In the south, for example, the poverty headcount in 1997 is statistically less than 1994 and 1995. It is also possible to reject the null of non-dominance between these pairs, but only based on second order conditions. In general, these inter-temporal comparisons, by region, reinforce that the headcount comparisons are not robust as indicated by their inconsistency with the dominance comparisons.

In addition to examining the temporal and regional aspects of poverty, we can use dominance tests to arrive at a profile of poverty across various other dimensions. For example, a decomposition of the poor by the employment status of the head is found in Table 4. The distributions up to the mean for salaried employees first order dominates all other categories of workers in the case where the OECD scale is used, but it is not possible to reject the null of non-dominance between salaried employees and pensioners when using the NCS and per capita scales. Dominance comparisons indicate that poverty is also less for the pensioners than all the household groups other than salaried workers, a result robust to the choice of equivalence scale. I also find a number of cases where the headcounts differ quite dramatically, and significantly, between household groups, but it is not possible to reject the null of non-dominance. For example, using the NCS scaling, the headcounts for those self-employed in non-

[10] Due to limitations in space, these results are presented only for the per capita measure. They do not differ much according to the other equivalence scales.

agriculture is 0.46 as compared to 0.58 for the unemployed. However, the null of non-dominance in comparing these two distributions is not rejected.

In Table 5, I decompose poverty by the sector of employment of the household head. There are large differences in the headcounts, with persons employed in agricultural and domestic work showing the high incidence of falling below the poverty line. Conversely, those in the financial sector, real estate, and working for international organizations, show the lowest headcounts. There are a number of cases where it is not possible to reject the null of non-dominance, despite the fact that the headcount numbers vary greatly and are significantly different from each other. For example, there is no statistical dominance of the construction sector workers over those in agriculture and domestic work, despite the fact that the headcount is 0.30 in the case of the former and 0.34 in the latter; likewise, even though the headcount in extractive industries is 0.27, versus 0.23 in processing industries, statistical comparisons fail to reject the null of non-dominance between these distributions.

The next poverty decomposition is by the age of the household head (Table 6). Once again I pool the data across years, since no difference is observed in the annual surveys. What is interesting here is that the group with the lowest poverty are households where the head is greater than 60 years of age, followed by those where the head is 51 to 60 years of age. These households are primarily comprised of the same well-off pensioners discussed above.

While all the above decompositions show a lack of robustness of headcount measures, this is not always the case, particularly when there are extremely large differences between groups. To illustrate this point, poverty decompositions by educational levels of the household head are shown in Table 7. The *t*-statistics for the differences in headcounts are significant in all the cells of the matrix, while first order dominance is also observed in all the cells.[11] Thus, even when using the more demanding dominance criteria, the unambiguously important role of education in determining poverty is highlighted.

As in the case of the education of the head of the household, there is no important difference in the poverty comparisons based on headcounts and dominance tests when we examine the impact of household size on poverty orderings (Table 8). However, while the effect of education on poverty is not sensitive to the choice of equivalence scales, this is not the case when I decompose poverty by household size. The results are for the pooled data since the story is the same for each individual year. When using the per capita measure and the NCS scale, poverty worsens as household size increases, the one exception being that poverty is not statistically greater in one-person households than two-person households, despite the larger headcount in the latter. This is in contrast to the OECD scale where the ordering from the dominance results shows that two-person households have the lowest poverty, followed by households with three persons. There is no statistical dominance between one- and

[11] This is also the case when using the OECD scale, although, in the case of the NCS scale, we are not able to reject the null of non-dominance in two pair-wise comparisons.

four-person households.[12] Poverty is greatest in households with five or more persons according to the OECD scale, which is consistent with the other equivalence scales. And while the headcount is much higher for households with six or more members as compared to five members, when employing the case of the OECD scale, it is not possible to reject the null of non-dominance between these two distributions.

We next turn to the decompositions of changes in the poverty indexes in terms of the contribution of changes in economic growth versus distribution. Table 8 presents the Datt-Ravallion decompositions that distinguish between the growth and redistribution component for per capita expenditure. Qualitatively, the results are the same regardless of the choice of equivalence scale. Between each pair of years, the redistribution component has contributed to an improvement in the headcount, albeit, the differences between years, especially 1994 and 1995, is very small. Between 1996 and 1997, the increase in poverty of 3.1 percent would have been 5.5 percent, if the positive impact of the redistribution component hadn't reduced the adverse growth effect. A similar finding also applies to where the redistribution component is the major contributor to a decline in poverty between 1995 and 1996.

Like poverty indexes, the Datt-Ravallion decompositions are potentially sensitive to the choice of a poverty line. Therefore, I conduct a simulation where the mean income is held constant, and then test whether one curve dominates the other across survey years. Dominance results indicate that when holding mean income constant, poverty would be lower in 1995 through 1997 than in 1994, given the changing nature of the income distribution, although the 1995 improvements are only in terms of second order dominance. Likewise, comparisons of 1996 and 1997 relative to 1995 indicate that the changes in the income distribution unambiguously reduces poverty. I fail to reject the null of non-dominance between 1996 and 1997, signifying that holding the mean income constant, I cannot say unambiguously that the change in the income distribution reduced poverty in the latter of those two years. Note, that this failure to reject the null of non-dominance is in contrast to the Datt-Ravaillion decompositions presented above which indicate that the shift in the income distribution, in fact, mitigated the poverty increase between 1996 and 1997.

5. Discussion

In this paper I employ tests of stochastic dominance to construct a poverty profile for Romania. Since I am interested in exploring the feasibility of using dominance testing, rather than poverty lines for poverty comparisons, I also present the results of more traditional headcount measures. My purpose was to determine whether the results of these two approaches differ, and more specifically, to address whether poverty profiles are robust to the somewhat arbitrary choice of poverty lines. My findings suggest first, that it is quite feasible and informative to construct a poverty profile on the basis of dominance tests that compare the distribution of income among different groups of households. Furthermore, the use of dominance testing makes

[12] The former would dominate the latter if I restricted the dominance test to exclude the lowermost ordinate pair.

clear that many of the conclusions reached by the application of poverty line based indexes are not supported when testing for dominance. In many of the decompositions, a third or more of the conclusions arrived at through statistical comparisons of headcount indexes did not hold up to the application of dominance testing. This lack of robustness indicates that there is both a need for caution when interpreting headcount index numbers, as well as a need for future poverty profiles to consider application of dominance testing procedures instead.

I also examined the effect of the choice of equivalence scale on the results of the poverty profile. In most cases, using a per capita measure, nutrition-based measure, or the standard OECD scale resulted in similar findings. However, there are some important exceptions. Most pronounced, differences are observed when I decompose poverty by the size of households. As expected, the less the economies of scale implied by the equivalence scale (e.g., using a per capita measure), the better off will be households with fewer people. Similarly, certain decompositions, such as employment status and age of household head, which have strong correlations with household size, display sensitivity to the choice of equivalence scale.

The results of the poverty profile from Romania indicate that there was a decline in poverty from 1994 to 1996, which was reversed in 1997. At the end of the four-year period, poverty remained basically unchanged. While the underlying causes of fluctuations in poverty are not examined, they undoubtedly reflect the uneven performance of the economy, coupled with the substantial instability in prices, including periods of high inflation, in an environment where wages adjust slowly to the price level. Somewhat surprising is the improvement, albeit small, in the income distribution over the years. In contrast to most other transition economies, at least for the period studied, economic liberalization was not accompanied by a worsening of the income distribution. This may reflect the failure to liberalize, and thus may be the corollary of the slow rate of increase in household incomes, rather than some unexpected success of Romania in maintaining equity concurrent with increased reliance on market forces.

In general, the profile of the poor corresponds to expectations. And in contrast to the level of poverty, the characteristics of the poor remained largely unchanged over the period 1994 through 1997. Regionally, poverty is less in urban areas, and particularly in the capital, Bucharest. This being said, it also is true that Bucharest's performance, in terms of recorded changes in poverty indexes, has been worse than all other regions. In fact, while all other regions showed a decline in poverty in 1996, followed by an upturn in 1997, poverty steadily worsened in Bucharest.

This paper highlights the critical role that human capital of the household head, and her/his position in the labor market, plays in determining household welfare. The findings on poverty by employment status of the head also suggest that the system of social insurance, particularly in the form of pensions, is doing a good job at keeping poverty low among this potentially vulnerable group. In contrast, the unemployed are

at highest risk of being poor, despite the presumed availability of unemployment benefits and supplemental allowances.[13]

While this paper provides considerable information on levels and characteristics of poverty and their evolution over time, it only begins to suggest modalities for reducing poverty. Obvious recommendations revolve around identifying the most efficient and equitable means of investing in human resources and targeting of state transfers. Clearly more work needs to be done on the links between policy and poverty, both in terms of examining how to achieve sustainable growth that includes the poor, and how to better prepare and protect human resources as Romania follows a path of greater economic openness and reform.

[13] While unemployment benefits and supplementary allowances are better targeted than pensions, they are far smaller in magnitude (Sahn, Younger and Simler, 2000).

References

Atkinson, A.B. (1970), 'On the Measurement of Inequality', *Journal of Economic Theory*, 2, pp. 244-63.

Blundell, R. and A. Lewbel (1991), 'The Information Content of Equivalence Scales', *Journal of Econometrics*, 50, pp. 49-68.

Browning, M. (1992), 'Children and Household Economic Behavior', *Journal of Economic Literature*, 30(3), pp. 1434-75.

Chen, Shaohua and Martin Ravallion. (1996), 'Data in Transition: Assessing Rural Living Standards in Southern China', *China Economic Review*, 7(1), pp. 23-56.

Datt, Gaurav and Martin Ravallion. (1992), 'Growth and Redistribution Components of Changes in Poverty Measures: A Decomposition with Applications to Brazil and India in the 1980s', *Journal of Development Economics,* 38(2), pp. 275-295.

Davidson, Russell, and Jean-Yves Duclos. (1998), 'Statistical Inference for Stochastic Dominance and for the Measurement of Poverty and Inequality', mimeo. Queens University, Kingston, Ontario.

Deaton, A. and J. Muellbauer. (1980), *Economics and Consumer Behavior,* Cambridge: Cambridge University Press.

Deaton, A. and J. Muellbauer. (1986). 'On Measuring Child Costs: With Applications to Poor Countries', *Journal of Political Economy,* 94(4), pp. 720-44.

Deaton, Angus. (1997), *The Analysis of Household Surveys: Microeconometric Approach to Development Policy*, Baltimore, MD: Johns Hopkins University Press (for the World Bank).

Dreze, Jean and P.V. Srinivasian. (1997), 'Widowhood and Poverty in Rural India: Some Inferences from Household Survey Data,' *Journal of Development Economics,* 54(2), pp. 217-34.

Davidson, Russell and Jean-Yves Duclos. (2000), 'Statistical Inference for Stochastic Dominance and for the Measurement of Poverty and Inequality', *Econometrica*, 68(6), pp. 1435-64.

Foster, J., J. Greer, and Erik Thorbecke. (1984), 'A Class of Decomposable Poverty Measures', *Econometrica* 52(3), pp. 761-66.

Foster, James E. and Anthony F. Shorrocks. (1988), 'Poverty Orderings', *Econometrica,* 56(1)(January), pp. 173-77.

Greer, Joel and Erik Thorbecke (1986), 'A Methodology for Measuring Food Poverty Applied to Kenya', *Journal of Development Economics*, 24(1), pp. 59-74.

Lanjouw, P. and M. Ravallion. (1995), 'Poverty and household size', *The Economic Journal*, 105(433), pp. 1415-34.

Mills, Bradford, Juan Muñoz, David Sahn, and Christopher Scott, (1992), 'Design of the Romania Integrated Household Survey', mimeo, Cornell University, Ithaca, NY.

National Commission for Statistics. (1993), *Households Integrated Survey*, Romania.

Organisation for Economic Co-operation and Development (OECD) (2000), *Labour Market and Social Policies in Romania*, Paris: OECD.

Paternosto, Stefano and David E. Sahn (1999), 'Wage Determination and Gender Discrimination in a Transition Economy: The Case of Romania', Policy Research Working Paper No. 2113, Washington, D.C.: World Bank.

Ravallion, Martin and Monika Huppi. (1991), 'Measuring Changes in Poverty: A Methodological Case Study of Indonesia during an Adjustment Period', *The World Bank Economic Review*, 5(1), pp. 57-82.

Ravallion, Martin. (1994), *Poverty Comparisons*, Chur, Switzerland: Harwood Academic.

Sahn, David E. and Stephen D.Younger. (2000), 'Expenditure Incidence in Africa: Microeconomic Evidence', *Fiscal Studies*, 21(3), (September), pp. 329-47.

Sahn, David E., Stephen Younger, and Kenneth Simler. (2000), 'Dominance Testing of Transfers in Romania', *Review of Income and Wealth* 46(3)(September), pp. 309-27.

Shorrocks, Anthony F. (1983), 'Ranking Income Distributions', *Economica*, 50(197), (February), pp. 3-17.

Wodon, Quentin. (1998), 'Micro Determinants of Consumption, Poverty, Growth and Inequality in Bangladesh', draft. Washington, D.C.: World Bank.

World Bank. (2000) 'Documentation for the 1994 Romanian Integrated Household Survey', Living Standards Measurement Study (LSMS), http://www.worldbank.org/lsms/country/romania/rm94docs.html

Yitzhaki, S. and Slemrod, J. (1991), 'Welfare dominance: An application to commodity taxation', *American Economic Review*, 81(3), pp. 480-496.

Appendix I: Difference with NCS data

A number of important methodological considerations are embedded in the tables presented above that in part explain differences between these results, and those reported in official reports of the National Commission of Statistics. Most obvious, is that some of the decompositions of the characteristics of the poor are sensitive to choices regarding equivalence scale. While the general trends, and profile of the poor, are quite robust to household scaling, decompositions by household size, age of the household head and gender show a marked difference when using the per capita and NCS scales, versus the OECD scale. Since ultimately the choice of equivalence scale comes down to a subjective judgement, it is best to be aware of the sensitivity of findings to the equivalence scale assumptions, particularly when considering designing interventions targeted to the poor.

Another critical issue that is alluded to in the beginning of the paper is the choice of deflator for updating poverty over time, and comparing poverty across regions. Using the official government deflators would give different results, both because they do not account for regional price differences, and because the official CPI does not do a good job in capturing the actual price level faced by poor consumers.

A variety of other techniques employed in this paper are known to differ from those reflected in reports that have been published by Romanian authorities. These include careful cleaning of the data to remove implausible outliers, and the fact that I valued home consumption using prices faced by individual households in the community, as opposed to using national prices for valuing home consumption as is done in government publications. However, given the limited knowledge of the methods employed in government publications, it is not possible to provide a full accounting of the inevitable discrepancies.

Appendix A

The OECD equivalence scale that assigns the following weights to each member of the household:

1.0 for the first adult over 17 years of age
0.5 for each additional child
0.3 for each child under the age of 18

The NCS equivalence scale was defined as follows:
0.28 for each child ages 0 to 1
0.36 for each child ages 2 to 3
0.47 for each child 4 to 6
0.58 for each child 7 to 9
0.69 for each child 10 to 12
0.78 for women 13 to 20

0.81 for women 21 to 56
0.58 for women > 56
0.86 for men 13 to 15
1.0 for men 16 to 20
0.97 for men 21 to 65
0.58 for men > 65

Table 1: Tests of restricted dominance by year.

Per capita

	Headcount	1994	1997	1995	1996
1994	0.299		3	2*	2*
1997	0.294			ND	1*
1995	0.289				1*
1996	0.263				

NCS

	Headcount	1997	1994	1995	1996
1997	0.341		3	ND*	1*
1994	0.334			1*	1*
1995	0.308				1*
1996	0.275				

OECD

	Headcount	1994	1997	1995	1996
1994	0.230		2*	1*	1*
1997	0.208			ND*	1*
1995	0.189				1*
1996	0.156				

Notes:

1 signifies that the column first order dominates the row
2 signifies that column second order dominates the row
3 signifies that column third order dominates the row
ND signifies no dominance
* signifies statistically significant difference in headcount

Table 2: Test of restricted dominance by region, pooled data.

Per capita

Region	Headcount	NE	S	SW	SE	CEN	NW	W	BUC
North East	0.374		1*	1*	1*	1*	1*	1*	1*
South	0.302			ND	ND*	ND*	ND*	ND*	1*
South West	0.295				ND	ND*	ND*	ND*	1*
South East	0.288					ND	ND*	ND*	1*
Central	0.283						ND*	1*	1*
North West	0.270							1*	1*
West	0.227								1*
Bucharest	0.153								

NCS

Region	Headcount	NE	S	SW	SE	CEN	NW	W	BUC
North East	0.385		ND*	1*	ND*	1*	1*	1*	1*
South	0.324			3	ND*	2	1*	1*	1*
South West	0.325				ND*	ND	ND*	ND*	1*
South East	0.312					3	2	1*	1*
Central	0.312						ND	ND*	1*
North West	0.302							ND*	1*
West	0.278								1*
Bucharest	0.188								

OECD

Region	Headcount	NE	S	SW	SE	CEN	NW	W	BUC
North East	0.237		ND*	1*	1*	ND*	1*	1*	1*
South	0.209			ND	2*	ND*	1*	1*	1*
South West	0.201				ND*	ND*	ND*	ND*	1*
South East	0.192					ND	ND	ND	1*
Central	0.189						ND	ND	1*
North West	0.184							ND	1*
West	0.183								1*
Bucharest	0.109								

Notes:

1 signifies that the column first order dominates the row
2 signifies that column second order dominates the row
3 signifies that column third order dominates the row
ND signifies no dominance
* signifies statistically significant difference in Headcount

Table 3: Tests of restricted dominance by region and year, using per capita scale.

North East

	Headcount	1995	1997	1994	1996
1995	0.3298		ND	ND	ND*
1997	0.3291			ND	ND*
1994	0.3198				2*
1996	0.2925				

West

	Headcount	1997	1994	1996	1995
1997	0.303		ND	ND*	ND*
1994	0.2872			ND*	ND*
1996	0.2531				3
1995	0.245				

South East

	Headcount	1997	1994	1995	1996
1997	0.3169		ND*	ND*	2*
1994	0.2805			ND	2*
1995	0.2646				2*
1996	0.2375				

North West

	Headcount	1994	1995	1997	1996
1994	0.3053		ND	ND*	ND*
1995	0.2896			ND	2*
1997	0.277				ND
1996	0.2644				

South

	Headcount	1994	1995	1997	1996
1994	0.2783		ND	2*	2*
1995	0.2777			2*	2*
1997	0.2497				ND
1996	0.2483				

Central

	Headcount	1994	1995	1997	1996
1994	0.3136		ND	3*	2*
1995	0.2928			ND	1*
1997	0.2804				1*
1996	0.2454				

South West

	Headcount	1994	1995	1997	1996
1994	0.3038		3	3*	2*
1995	0.2849			ND	3
1997	0.2787				ND
1996	0.2654				

Bucharest

	Headcount	1997	1996	1994	1995
1997	0.306		ND*	ND*	2*
1996	0.2576			ND	ND
1994	0.245				ND
1995	0.245				

Notes:

1 signifies that the column first order dominates the row
2 signifies that column second order dominates the row
3 signifies that column third order dominates the row
ND signifies no dominance
* signifies statistically significant difference in Headcount

Table 4: Tests of restricted dominance by employment status, pooled data.

Per capita

Occupation		Headcount	1	2	3	4	5	6
1	Unemployed	0.551		1*	ND*	ND*	1*	1*
2	Self employed agriculture	0.524			ND*	ND*	1*	1*
3	Self employed non-agriculture	0.440				ND*	1*	1*
4	Other	0.351					2*	2*
5	Pensioner	0.239						ND
6	Salaried employer	0.234						

NCS

		Headcount	1	2	3	4	5	6
1	Unemployed	0.584		1*	ND*	ND*	1*	1*
2	Self employed agriculture	0.557			ND*	ND*	1*	1*
3	Self employed non-agriculture	0.457				ND*	1*	1*
4	Other	0.361					ND*	2*
5	Salaried employer	0.269						ND*
6	Pensioner	0.253						

OECD

		Headcount	1	2	3	4	5	6
1	Unemployed	0.366		ND	ND*	ND*	1*	1*
2	Self employed agriculture	0.365			ND*	ND*	1*	1*
3	Self employed non-agriculture	0.303				ND	3*	1*
4	Other	0.288					2*	1*
5	Pensioner	0.225						1*
6	Salaried employer	0.103						

Notes:

1 signifies that the column first order dominates the row

2 signifies that column second order dominates the row

3 signifies that column third order dominates the row

ND signifies no dominance

* signifies statistically significant difference in Headcount

Table 5: Tests of restricted dominance by economic sector of the head of household, pooled data.

Per capita

	Activity	Headcount	1	2	3	4	5	6	7	8	9	10
1	Agric/domestic	0.343		ND*	1*	1*	1*	1*	1*	1*	1*	1*
2	Construction	0.299			2*	1*	1*	1*	1*	1*	1*	1*
3	Extract iNDus	0.271				ND*	ND*	1*	1*	1*	1*	1*
4	Transport	0.234					ND	1*	1*	1*	1*	1*
5	Process iNDus	0.232						1*	1*	1*	1*	1*
6	Retail trade	0.179							ND	ND	ND*	1*
7	Edn/hlth/othserv	0.175								ND	ND*	1*
8	Elect heat	0.169									ND*	ND*
9	Public admin	0.145										2
10	Fin/realest/int	0.121										

Notes:

1 signifies that the column first order dominates the row

2 signifies that column second order dominates the row

ND signifies no dominance

* signifies statistically significant difference in Headcount

Table 6: Test of restricted dominance by the age of household head, pooled data.

Per capita

Age	Headcount	31-40	41-50	<30	51-60	>60
31-40	0.324		ND*	1*	1*	1*
41-50	0.315			1*	1*	1*
<30	0.287				ND*	2*
51-60	0.273					1*
>60	0.235					

Notes:

1 signifies that the column first order dominates the row

2 signifies that column second order dominates the row

ND signifies no dominance

* signifies statistically significant difference in Headcount

Table 7: Test of restricted dominance by education level of household head, pooled data.

Per capita

		Headcount	1	2	3	4	5	6	7
1	No School Graduated	0.512		1*	1*	1*	1*	1*	1*
2	Primary (1-4)	0.389			1*	1*	1*	1*	1*
3	Gymnasium (5-8)	0.348				1*	1*	1*	1*
4	Secondary (8-12)	0.290					1*	1*	1*
5	Vocational, apprentice	0.199						1*	1*
6	Formen technical	0.101							1*
7	Short- and long-term technical	0.035							

NCS

		Headcount	1	2	3	4	5	6	7
1	No School Graduated	0.494		1*	1*	1*	1*	1*	1*
2	Primary (1-4)	0.414			ND*	1*	1*	1*	1*
3	Gymnasium (5-8)	0.394				ND*	1*	1*	1*
4	Secondary (8-12)	0.329					1*	1*	1*
5	Vocational, apprentice	0.210						1*	1*
6	Formen technical	0.144							1*
7	Short- and long-term technical	0.050							

OECD

		Headcount	1	2	3	4	5	6	7
1	No School Graduated	0.495		1*	1*	1*	1*	1*	1*
2	Primary (1-4)	0.330			1*	1*	1*	1*	1*
3	Gymnasium (5-8)	0.229				1*	1*	1*	1*
4	Secondary (8-12)	0.138					1*	1*	1*
5	Vocational, apprentice	0.100						1*	1*
6	Formen technical	0.046							1*
7	Short- and long-term technical	0.020							

Notes:

1 signifies that the column dominates the row

ND signifies no dominance

* signifies statistically significant difference in Headcount

Table 8: Decompositions of changes in the headcount index using per capita expenditures.

Intervals	Growth component	Redistribution component	Residual	Total
1994-1995	-0.003	-0.007	0.001	0.010
1995-1996	0.005	-0.030	-0.001	-0.026
1996-1997	0.055	-0.024	-0.001	0.031

Note: These decompositions use 1994 as the consistent base reference year.