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IS POVERTY INCREASING IN THE DEVELOPING WORLD?

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We assess the developing world's progress in reducing poverty during the late 1980s using new data on the distribution of household consumption or income per person for 44 countries. Local currencies are adjusted to purchasing power parity. To assess robustness, restricted dominance tests are applied to the poverty comparisons. An overall decrease in poverty incidence is indicated over a wide range of poverty lines and measures. However the change is small, and numbers of poor increased at roughly the rate of population growth. The experience was diverse across regions and countries; poverty fell in South and East Asia, while it rose in Latin America and Sub-Saharan Africa.

1. INTRODUCTION

The question in our title is surprisingly difficult to address convincingly from existing data sources, not least because little effort has gone into compiling and analyzing the available distributional data on a reasonably comparable basis.[1] Yet the need to do so is evident, both to help monitor progress in reducing poverty, and as a first step toward understanding the causes and effects of changing distribution.

This paper offers an assessment of progress in reducing aggregate poverty during the late 1980s using a consistent compilation of recent distributional data, done for this purpose. This is of interest in its own right—particularly given that the 1980s have been a difficult decade for much of the developing world—but it also offers hope of laying a reasonably firm foundation for future poverty monitoring.

Note: These are the views of the authors, and should not be attributed to the World Bank. The authors are grateful to Gary Fields, Tim Marchant, Hamid Tabatabai, enumerable colleagues at the Bank and Governmental Statistical Agencies who have helped us in assembling the data set, and the *Review*'s referees. Address for correspondence: Martin Ravallion, World Bank, 1818 H Street NW, Washington DC, 20043, USA.

[1]The work of Paukert (1973), Adelman and Morris (1973), and Jain (1975) brought together data for a number of countries for the 1950s up to the early 1970s. While there have been some up-dates (usually drawing on secondary sources) these early tabulations have remained the main source of cross-country distributional data in subsequent research. [See, for example, Berry *et al.* (1983, 1989), Lecaillon *et al.*, (1984), Grosh and Nafziger (1986), Fields (1989), Yotopoulos (1989), Sundrum (1990), Waldmann (1992) and Anand and Kanbur (1993)]. Estimates of the world distribution of income have typically assumed that relative inequalities within countries are unchanged over time when up-dating estimates, and used only growth rates in each country's *mean* income, as derived from national accounts (for example, Berry *et al.*, 1983, 1989; Grosh and Nafziger, 1986; Yotopoulos, 1989). There have been compilations of independent estimates of poverty measures by country, such as in World Bank (1992a), UNDP (1991), and for the ILO by Tabatabai and Fouad (1993). However (as we shall argue below), the comparability of these estimates (both between countries and over time) is questionable. None of these sources appear then to offer a sound foundation for monitoring poverty.

Our concern in this paper is the comparison of poverty measures over time, for the principal regions of the developing world, rather than across individual countries at a given point in time. Nonetheless, to form meaningful aggregate poverty measures one should be confident that the underlying estimates for individual countries are reasonably comparable.

While estimates of various poverty measures are available from numerous studies at the country level, we do not use them here. The main difference between our estimates and those available in the literature is undoubtedly our attempt to use the same real poverty line across countries (though we allow the line to take any value within a wide range). Past work at the country level has naturally used poverty lines appropriate to each country. There is, however, a marked tendency for the real value of local poverty lines to increase with the average income of a country (Ravallion, Datt and van de Walle, 1991; hereafter RDV). This fact clouds attempts to compare and aggregate across countries using the poverty data available in standard (secondary) sources. In estimating the incidence of poverty in the world as a whole, why should one treat two individuals with an identical standard of living (by some agreed measure) differently according to where they happen to live? Here we turn instead to the primary data sources and re-estimate all poverty measures on a consistent basis.

However, the comparability of distributional data across countries and over time remains an issue. Survey methods differ, and there are difficulties in comparing monetary units over time and space. We do not pretend to solve all these problems here, though improvements in data and methods allow us to address some. For example, the UN's International Comparisons Project has greatly improved our knowledge about differences in the consumption purchasing-power of incomes denominated in local currencies. Also, there has been substantial improvement and standardization in household-survey methodologies over the last decade or so; the comparability problems that have plagued interpretations of the data from 1950–70 are still there, but are almost certainly less worrying. Nonetheless, we shy away from comparing our results with those in the various compilations done 20-plus years ago (Adelman and Morris, 1973; Paukert, 1973; Jain, 1975). The long-term comparison is certainly of interest. However, to do so convincingly would be a major undertaking. Here we confine ourselves to the short-term comparison over the 1980s, for which data are of higher quality, and we can at least iron out some of the comparability problems by screening data sources, and estimating consistently from the available data at the country level.

Our concern here is with poverty outcomes for the developing world as a whole and its principal regions. To some extent the errors arising from differences between countries in survey methods, and errors in price data, will be "washed out" by our aggregation across countries. However there are some regional fixed effects which will remain, such as the tendency to rely more on income-based surveys in Latin America (while other regions rely more on expenditure-based surveys). There may also be a tendency for countries where data are unavailable to have worse poverty outcomes. We will test for biases due to some of these differences, and when necessary try to make corrections.

In the following section we review the methodological issues, and the strengths and drawbacks of the approach we have adopted. Section 3 presents

our new estimates of the cumulative distribution of consumption 1985–90. Our conclusions are found in Section 4.

2. Methodological Issues

International comparisons of poverty statistics are plagued with both conceptual and practical problems. There are comparability problems across countries in the underlying household surveys, though these problems are becoming less worrying over time, as survey methodologies are both improving and becoming more standardized, particularly under the auspices of the development agencies.[2] All of the primary data sets used here are nationally representative household surveys and use the same living standards indicator—either expenditure or income per person—over time. In cases where we know of a serious comparability problem between two surveys for the same country, we have deleted one. In all cases we have estimated poverty incidence from the primary data source (tabulations or household level data), rather than relying on existing estimates. We end up with a data set covering 44 countries between 1981 and 1992, 19 of which have observations for two points in time within this period. The data set is considerably expanded over the 22 country data set used in RDV.[3] This section gives details on the methods we have used in compiling and analyzing these data.

2.1. *International Comparisons of Poverty*

Comparisons of absolute poverty should ideally use a poverty line which is fixed in terms of the living-standards indicator being used.[4] It is not clear what meaning can be attached to absolute-poverty comparisons across countries in which the real value of the poverty line varies widely. Yet that is almost certainly the case in the poverty statistics reported in standard sources, including the various issues of *Social Indicators of Development* (for example, World Bank, 1992a), the *Human Development Report* (for example, UNDP, 1991), and the useful compendium of estimates from diverse secondary sources by Tabatabai and Fouad (1993) (for the ILO). The potential anomalies are plain. We give two examples: (i) Tyler *et al.* (1993) quote and compare estimates from existing sources indicating far higher poverty incidence in Brazil than India, although at a constant real poverty line the reverse is almost certainly true [Datt and Ravallion (1992)]; (ii) If one were to rely on the official poverty estimates for (say) the U.S. and Indonesia one

[2]Substantial efforts at improving data quality and country coverage have been made by the United Nations (under the Household Survey Capability Programme) and the World Bank (the Living Standards Measurement Study and the Social Dimensions of Adjustment in Sub-Saharan Africa Project).

[3]The main difference in methodologies between this study and RDV is that the latter study used distributional data for fewer countries (22, instead of our 40), and relied instead on econometric extrapolations for 64 countries. We have only used extrapolations over time when we do have at least one survey observation of the distribution. However, our use of the recent Summers and Heston (1991) revisions to the 1985 PPP rates has entailed some changes at the country level, particularly for India and China. The new estimates of the PPPs imply a large increase in the estimate of India's head-count index for $1 per day and a sizeable decrease for China. These two changes are off-setting. We discuss some of these differences further in Section 3.

[4]For a review of alternative concepts of poverty found in the literature and policy discussions see Ravallion (1994a).

would conclude that the proportion who are poor around 1990 is about the same, namely 15 percent in each. However it is plainly the case that at any given real poverty line—constant in terms of the goods and services that it allows one to command—the proportion who are poor is higher in Indonesia.

Confining attention to developing countries, it might be argued that an adequate degree of comparability is assured by the fact that local poverty lines are (typically) anchored to a similar nutritional cut-off point; a food-energy intake around 2,100–2,300 calories per person per day is common. However, the methodologies used in practice to map the caloric cut-off point into the consumption or income space do not assure that the resulting poverty lines are comparable in terms of command over (say) basic consumption needs (Ravallion, 1994a; Ravallion and Bidani, 1994).[5] Even amongst developing countries, there is substantial variation in the real value of the poverty lines used, with a marked tendency for countries with higher average incomes to have higher poverty lines (RDV). Little of this appears to be attributable to differences in nutritional requirements for good health.

While analyses of poverty within any one country should naturally use a concept of "poverty" appropriate to that specific country, there is a compelling case for ignoring the poverty lines of individual countries when attempting to make "global" comparisons and aggregations. But then whose poverty line should be used in making comparisons? Poverty lines appropriate to the poorest countries, such as India, have been a popular choice in past work [Ahluwalia, Carter and Chenery (1979), Kakwani (1980a), World Bank (1980, 1990), RDV (1991)]. The slightly higher poverty line of "$US1 per day" at 1985 purchasing power parity used by RDV and World Bank (1990) is just as defensible. The more important issue is achieving comparability across countries. Here there is a compelling case for using the same level of real consumption to define the poverty line. But how can that be assured?

Official exchange rates could be deceptive, since goods which are not traded internationally appear to figure prominently in the consumption bundles of poor people. The International Comparisons Project (ICP) has helped here, by facilitating the construction of the purchasing power parity (PPP) exchange rates [Kravis *et al.* (1975), Summers and Heston (1988, 1991)].[6] There are two main concerns about existing PPPs. (i) Are the underlying ICP prices internationally comparable? The price quoted for "rice" (say) in one country may be for a different quality (and/or different packaging) than in another.[7] (ii) Are PPPs designed for comparing average incomes (from national accounts) appropriate for poverty comparisons? In the method used by Kravis *et al.*, it has been claimed that the PPPs

[5]Ravallion and Bidani (1994) compare the regional profile of poverty within one country (Indonesia) obtained by the two most common methods used to set poverty lines, both anchored to the same nutritional cut-off point; the two poverty profiles are virtually un-correlated (the rank correlation coefficient across 35 regions in 1990 is 0.15).

[6]The PPP rate for a country is given by the value of the mean outputs of that country evaluated at domestic prices relative to their value at the (output-weighted) mean international prices. The latter in turn depend on the PPP rates, and so a set of simultaneous equations are solved to obtain the PPP rates (Kravis *et al.*, 1982).

[7]Concerns have also been raised about whether the ICP price for one country is representative of the type of good normally consumed there. However, insisting on this could easily generate inconsistencies in the resulting poverty lines, in that lower quality goods will be used in poorer countries.

better reflect the price structures prevailing in rich countries.[8] These concerns are enhanced by the fact that international comparisons of absolute poverty are known to be sensitive to errors in the PPP rates; for example, RDV find that the aggregate estimates of poverty are particularly sensitive to errors in the PPP for China. Nonetheless, the Kravis *et al.* PPP rates appear to be a far better option than official exchange rates for international currency conversions when aiming to compare standards of living, and they have been used for this purpose by Ahluwalia, Carter and Chenery (1979), Kakwani (1980a), World Bank (1980, 1990), and RDV. We shall continue using the PPP rates in this study, notably the latest estimates for private consumption in Summers and Heston (1991).

2.2. *Poverty Measures*

There is now a large literature on poverty measures. Rather than discuss all of the measures that have been used or proposed, we shall follow Atkinson (1987) in focusing on a broad class of additively separable measures, encompassing many of those found in the literature.

As we have seen, there is uncertainty about a number of aspects of the poverty comparisons we shall be making below. There are likely to be errors in our living standards data, unknown differences in needs between households at similar consumption levels, uncertainty and arbitrariness about both the poverty line and precise poverty measure. Given these problems it is important to ask: how robust are our poverty comparisons? Would they alter if we made alternative assumptions? A recent strand of research in poverty analysis has shown how we can answer such questions, drawing on and developing results from the theory of stochastic dominance. We shall give an elementary exposition of the approach, as required for understanding the later results.[9]

Imagine the curve which is traced out as one plots the proportion of the population (p) (on the vertical axis) consuming less than any given level (z) (on the horizontal); this is simply the cumulative distribution function $p = F(z)$, which can be thought of as the "poverty incidence curve" (PIC)—each point on the curve gives the "head-count index" of poverty, i.e., the proportion of the population consuming less than the particular poverty line on the horizontal axis. If one calculates the area under this curve up to each point then one traces out the "poverty deficit curve," $D(z)$; each point on this curve gives the aggregate poverty gap (distance below z) per head of the population. If one again calculates the area under the poverty deficit curve at each point then one obtains a new curve, which can be termed the "poverty severity curve" $S(z)$, each point on which is half the squared poverty gap per head.

Suppose we do not know the poverty line z, but we can be sure that it does not exceed z^{max}. Nor do we know the poverty measure, but we can identify some desirable properties for such a measure, including the aforementioned additivity

[8]The international prices used in the Kravis *et al.* PPPs are quantity weighted, so they tend to better reflect the price structure in rich countries than poor ones.

[9]On the use of dominance conditions in ranking distributions in terms of poverty see Atkinson (1987), and Foster and Shorrocks (1988). The following treatment draws on the exposition in Ravallion (1994a).

property.[10] Then it can be shown that poverty cannot have increased between two dates if the PIC for the latter data lies nowhere above that for the former data, up to z^{max} [Atkinson (1987)]. This is called first-order dominance. If the curves cross each other (and they may intersect more than once), then the ranking is ambiguous; some poverty lines and some poverty measures will rank the distributions differently to others. We need more information. One can restrict the range of poverty lines, or one can impose more structure on the poverty measure. If one restricts attention to additive measures which are strictly decreasing and at least weakly convex in incomes of the poor (this precludes the head-count index) then we can use a second-order dominance condition. This is still a wide set of measures, as it includes the poverty gap index and "distribution-sensitive measures" which increase when inequality increases amongst the poor. Then poverty cannot have risen if $D(z)$ is nowhere higher for the second data than the first at all points up to the maximum poverty line, and at least somewhere higher. When this test is inconclusive, one can further restrict the range of admissible poverty measures. If one is content to rely *solely* on (strictly convex) distribution-sensitive measures then a third-order dominance condition can be tested; poverty cannot have increased if $S(z)$ is nowehere higher at the second date. These tests are "nested" in that first-order dominance implies second-order dominance, which implies third-order dominance.

Dominance tests can also allow robust poverty comparisons in the presence of certain types of measurement error in the underlying distributions. Suppose, in particular, that the measurement errors in the PPPs generate random errors in the poverty lines in local currencies, and that those errors are identically distributed in each of the countries or regions being compared. Then it can be shown that first-order dominance over the range of observed consumptions implies an unambiguous poverty ordering in terms of the true poverty lines, whatever the underlying distribution of the measurement errors (Ravallion, 1994b). However, heterogeneity in the error distributions clouds this result; if (for example) poor countries have less accurate PPPs then rankings may not be robust, and the bias could go either way.

2.3. *Estimation from Survey Data*

We will take household consumption expenditure per person to be the preferred indicator of individual living standard.[11] The per capita normalization implicitly makes the quite special assumption that each person (whatever their age or gender, or how many other people live in the household) should have the same weight. There are a number of arguments that can be made for and against that assumption (Ravallion, 1994a). However, given the nature of data available to us for most of the countries, we have no choice.

[10]More precisely, attention is restricted to poverty measures which are additively separable between the individual poverty measures, or can be written as a monotonic transformation of an additve measure. Atkinson (1987) characterizes the set of admissible poverty measures and gives other examples from the literature.

[11]Ravallion (1994a) surveys the arguments for and against this choice.

Naturally the cut-off points (in monetary units or percentiles) in tabulations of distributional data for individual countries do not accord neatly with those implied by our currency conversions. Some form of interpolation is essential. Our methodology of constructing the poverty incidence curves is based on parameterized Lorenz curves. Two different specifications of the Lorenz curve are tried, *viz.* the general quadratic (GQ) Lorenz curve (Villasenor and Arnold, 1984, 1989) and the Beta Lorenz curve (Kakwani, 1980b).[12] The functional forms for these Lorenz curves are discussed in Datt and Ravallion (1992) which also derives the formulae for points on the PIC (and various poverty measures) for both specifications of the Lorenz curve.[13] The choice between the two specifications of the Lorenz curve is governed by two criteria. First, we check if the estimated parameters satisfy the conditions for a valid Lorenz curve.[14] If both specifications are found to be valid, the choice between then is made using a restricted goodness-of-fit criterion; we select the specification with the lower sum of squared errors up to that point in the PIC.[15] All of the Lorenz curves had excellent fits (the lowest R^2 was 0.995, though three-quarters were above 0.999).

While the estimation of the Lorenz parameters is relatively straightforward, we have had to make further assumptions in the construction of poverty measures, owing to the diverse nature of the distributional data available to us. Here we have followed the practice outlined in RDV. The assumptions have to do with three dimensions of data diversity: (i) the standard of living indicator used, (ii) the unit of counting and the ranking variable, and (iii) the date of the survey.

(i) *The standard of living indicator.* Not all household surveys use consumption expenditure as the living standard indicator. For 26 of the 63 surveys, the available distributional data pertain to income rather than consumption expenditure. For these countries we estimate mean consumption by multiplying the mean income from the survey by the ratio of private consumption to the GNP for the year of the survey. (The latter are obtained from the national accounts estimates compiled in World Bank, 1992b). While this adjusts the mean, one would also expect income to be more unequally distributed than consumption, though the impact on the estimated PIC is unclear.[16] We did one test, regressing the log of the proportion below \$1 per day (denoted F(1)) on the log of the mean (μ) and a dummy variable for whether the survey was of incomes or consumptions

[12]In our experience, we have found these two specifications of the Lorenz curve to track the distributional data extremely well; they easily out-perform many other functional forms discussed in the literature, particularly those in the two-parameter family.

[13]For any Lorenz curve $L(p)$, giving the share of total consumption by the poorest p proportion of the population, the PIC, $p=F(x)$, can be derived as the inverse function of $x=L'(p)\mu$ (Gastwirth, 1971).

[14]A theoretically valid Lorenz curve $L=L(p)$, where L is the share of the bottom p percent of the population in aggregate consumption, should meet the following four conditions: $L(0)=0$, $L(1)=1$, $L'(0^+)\geq 0$, and $L''(p)\geq 0$ for $0<p<1$. See Datt (1992) for the parametric restrictions implied by these conditions.

[15]A user-friendly computer program POVCAL (for use on any PC with the DOS operating system) is available from the authors to implement these methods; see Chen *et al.* (1992).

[16]A Lorenz-dominating difference in inequality between two distributions (in this case incomes and consumptions) could either increase or decrease the PIC at any given point; Lorenz curve dominance does not imply first-order dominance.

(DIE = 1 for income surveys). This gave the following result:[17]

$$\log F(1) = \underset{(11.64)}{10.11} - \underset{(8.27)}{1.72} \cdot \log \mu + \underset{(1.44)}{0.32} \cdot \text{DIE} \quad R^2 = 0.55, n = 63$$

The coefficient on DIE is positive as expected, but it is not significant at even the 10 percent level. Furthermore, it is not clear how much of this is due to the fact that the income surveys tend to be more common for Latin America where inequality is also higher; indeed, if we add a dummy variable for that region to the same regression then the coefficient on DIE drops to −0.13 (t-ratio of 0.56). We repeated the test using the proportion below $2 per day, with similar results. There is thus little sign of bias in the poverty measures due to the difference between income and consumption Lorenz curves, and so no adjustment was made (beyond that in the mean).[18]

(ii) *The unit for counting and the ranking variable.* National surveys also differ in using the household or the individual as their unit for counting, and in terms of the variable they use in ranking (per person or per household). In all but two of the 63 surveys we have used, the counting unit is persons (so that we have percentages of persons in each expenditure or income group) and the ranking variable (used in defining those groups) is income or expenditure per person. In the two odd cases, we have no choice but to use the household Lorenz curve (though adjusted for differences in household size in all except one case), but combined with an estimate of mean consumption per capita (obtained by dividing the mean household consumption reported in the survey by the average household size).

(iii) *The date of the survey and price adjustment.* The dates of the national surveys span the period 1981 to 1992. Even for the countries where we have surveys at more than one date, the survey dates need not coincide with the years 1985 and 1990, on which we decided to anchor our poverty estimates. In all estimates for these two dates, we have assumed the Lorenz curve at the nearest survey date to be our best estimate of the Lorenz curve for 1985 or 1990; if we have only one survey for that country then the Lorenz curve is used for both dates.[19] We thus make adjustments only to the mean consumption per capita for changes between the closest survey date and 1985, and similarly for 1990. The adjustment involves multiplying the mean per capita consumption as reported in the survey by the ratio of private consumption per capita in 1985 (or 1990) to that at the survey date, as obtained from the national accounts (World Bank, 1992b). All nominal values of mean per capita consumption are then expressed in 1985 PPP-adjusted U.S. dollars. This conversion is based on Summers and Heston (1991) PPPs for private consumption in 1985, and data on country-specific consumer price indices from the *International Financial Statistics* compiled by the

[17]This is an OLS estimate using all surveys. Absolute t-ratios in parentheses.

[18]RDV also tested for possible bias due to this difference in the surveys, by including a dummy variable for whether the survey is one of incomes or consumptions in a regression of the poverty measure against a range of social indicators and national accounts data; the dummy variable did not have a significant coefficient.

[19]The mean survey date for estimating the 1985 poverty incidence curve is (to the nearest integer) 1985, while it is 1989 for estimating the 1990 PIC.

IMF (1993).[20] No attempt is made to adjust for cost-of-living differences within countries; there are few cases where the data (on both distributions and prices) are adequate for that purpose.[21]

2.4. *Criteria for Inclusion in the Data Set*

We only cover low- and middle-income countries (as classified by World Bank, 1994). We have not included all available distributional data sets for the 1980s; several considerations with regard to quality and comparability have guided the selection. An important consideration has been whether the household survey had national-level coverage. Thus, a number of surveys, particularly in Africa (Angola, Burundi, Chad, Mauritania, Zaire) and Latin American (Argentina, Ecuador, El Salvador, Paraguay, Uruguay), were not included in this study because of their limited (sub-national) coverage. (In Latin America alone one could add six or more countries to the data set if one were willing to use surveys for urban areas only.) The only exception to this is the survey for Ethiopia 1981–82 which was a rural survey. However, given that rural population was 87 percent of the total populations even in 1990, and this being the only survey available for Ethiopia over the 1980s, we decided to include it in our data set.

Other considerations related to the quality of the data available. For example, survey data are available for Nigeria 1985–86, and this would have greatly increased our population coverage in Sub-Saharan Africa. However, that data had to be excluded because of the tabulation plan; the published tables (the only form in which these data were available to us) reported the size distribution of household income over only five income groups with the first group accounting for 52 percent of all households; nor do the tables provide mean household incomes within the five income groups, and furthermore, only cash income is used in ranking.[22] Given the nature of the data, estimation of the distribution function for Nigeria would have been subject to an unacceptably high margin of error in our view. There were also some cases in which a second survey was available, but was not used because of a significant change in survey methodology, or the tabulation plan; for example, a second survey was available for Pakistan, but comparable tabulations were not available.

[20]Summers and Heston (1991) provide the PPPs for 1988 for most countries, and for an earlier year between 1985 and 1987 for some other countries where estimates for 1988 could not be constructed. The complete Penn World Table (Mark 5), which is available on computer disks from the authors, provides the full time series of PPP estimates for all countries. The PPPs we use are taken from this source. We decided to use PPPs for 1985 since this turns out to be the most recent year for which PPPs are available for all countries.

[21]In some cases (including China, Indonesia, and most countries in South Asia), distributions are available which distinguish urban from rural areas. Some regional data are also readily available (including India and Indonesia). The more serious problem is making a consistent allowance for cost-of-living differences. Past estimates of poverty lines by region or sector are subject to the same criticism that we have made already about cross-country comparisons, namely that the methods used are unlikely to yield the same real poverty line across space (Ravallion, 1994a). One experiment for Indonesia suggested to us that these problems should not be taken lightly, and that a better approach may actually be to ignore spatial differences within countries (Ravallion and Bidani, 1994).

[22]This could entail a sizable bias to the Lorenz curve since rural areas (which also tend to be poorer) tend to use cash less.

Such screening choices are matters of both knowledge and judgement. Certainly some of those surveys we have included could reasonably be questioned. One which we were worried about including was the 1984–85 survey for Morocco; though this was similar in most respects to the 1990–91 survey (they were done by the same statistics office, and distributions of consumption per person are available for both) their sample sizes were quite different, and there were also some differences in the questionnaire and interviewing. This was the most marginal case in the set of 19 countries with surveys at more than one date.

The countries of Eastern/Central Europe and the ex-U.S.S.R. pose a number of further problems. While there is a good deal of distributional data now available, PPP rates are either unavailable or unreliable. We include data for Eastern Europe when the PPP rates are available from Summers and Heston (1991), though we present estimates with and without this region.

TABLE 1

NUMBER OF COUNTRIES INCLUDED AND POPULATION REPRESENTED BY SURVEY DATA

Region	Number of countries	Percent of population represented*	Number of countries with two data sets	Percent of population represented*
East Asia	5	91.75	4	88.21
Eastern Europe	3	58.64	2	50.15
Latin America	13	83.04	6	50.08
Middle East & North Africa	4	23.92	2	12.94
South Asia	5	96.23	3	84.79
Sub-Saharan Africa	14	36.62	2	5.4
Total	44	80.00	19	67.21

* Percent of the 1990 population of all low- and middle-income countries in that region represented by the surveys.

Table 1 summarizes the countries in the data set by region. We have compiled all the appropriate survey data sets for the 1980s that we could find, mostly from governmental statistical agencies and World Bank data files, subject to the quality criteria described above. Overall the 44 countries represent 80 percent of the population of low- and middle-income countries in 1990, while the 19 countries represent 67 percent. However, there is marked regional variation in the coverage, ranging from 24 percent in the Middle East and North Africa to 96 percent in South Asia.

The following countries are included (survey dates in parentheses). In East Asia: China (1985 and 1990), Indonesia (1984 and 1990), Malaysia (1984 and 1989), Philippines (1985 and 1988), and Thailand (1988). In South Asia: Bangladesh (1985–86 and 1988–89), India (1983 and 1989–90), Nepal (1984–85), Pakistan (1991), Sri Lanka (1985 and 1990). In Sub-Saharan Africa: Botswana (1985–86), Cote d'Ivoire (1985, 1988), Ethiopa (1981–82), Ghana (1987–88 and 1988–89), Guinea Bissau (1991), Kenya (1992), Lesotho (1986–87), Mauritania (1987–88), Rwanda (1983–85), Senegal (1991–92), Tanzania (1991), Uganda (1989–90), Zambia (1991), Zimbabwe (1990–91). In North Africa and the Middle East:

Algeria (1988), Jordan (1991), Morocco (1984–85 and 1990–91), Tunisia (1985 and 1990). In Central/Eastern Europe: Hungary (1989), Poland (1985, 1989), Yugoslavia (1985, 1989). In Latin America: Bolivia (1990), Brazil (1985, 1989), Chile (1989), Colombia (1988 and 1991), Costa Rica (1981, 1989), Dominican Republic (1989), Guatemala (1986–87 and 1989), Honduras (1989), Jamaica (1988, 1990), Mexico (1984), Panama (1989), Peru (1985–86), Venezuela (1987, 1989). We do not present the individual country estimates, though a summary of the distributional shares by country which can be found in World Bank (1994, Table 30).

3. The Results

Table 2 gives our estimates of five points on the aggregate PIC (the cumulative percentage of the population of the developing world as a whole consuming less than various amounts) including the "$1 per day" poverty line described in section 2.[23] Four sets of estimates are given. The first relies solely on the sub-set of 19 countries for which we have observations at two points in time, and are based on the survey year. The second is obtained by estimating the poverty measures for 1985 and 1990 by the method described in Section 2, though still relying solely on the 19 country sub-set. The third extends the method of the second to all 44 countries (including the 25 cases in which the same survey data are used to estimate the Lorenz curve at both 1985 and 1990). The fourth is the same as the third except that it excludes the three countries in Eastern Europe (as noted above).

The four sets of estimates agree closely, and all indicate first-order dominance, implying an unambiguous fall in poverty, no matter which poverty line or poverty measure is used (Section 2.2). However, the quantitative differences over time are very small; for example, to the nearest integer, the proportion living below $1 per day remained unchanged by all estimation methods. On the basis of the results in Table 2, we conclude that there was a negligible change in the aggregate PIC during the latter half of the 1980s. Thus, the numbers of poor have been growing at close to the rate of population growth, about 2 percent per year.

However, the aggregates hide some diversity between regions. Table 3 gives a breakdown of the results for the four regions Sub-Saharan Africa, South and East Asia, and Latin America; Figures 1 to 4 plot the PICs for the four main regions at both dates, each of which is compared to the aggregate PIC. Poverty fell in both East and South Asia, and there is (restricted) first-order dominance, so the conclusion is robust to the choice of poverty line or measure. Poverty increased in both Latin America and Sub-Saharan Africa, though in the latter case the conclusion is only robust for all poverty measures if one restricts the poverty line to $50 per month. The poverty deficit curves for this region show an increase in poverty for poverty lines up to a high level (above $60 per month).

[23]Ten points were estimated, spanning $17 to $60 per month, or roughly 15–70 percent of the total population. Strictly, when a minimum poverty line is used as well as a maximum one, dominance requires another condition in additional to the non-intersecting PICs, viz., the poverty gap of the dominated distribution is no higher than that of the dominating distribution at the minimum poverty line (Howes 1993). This sub-condition is satisfied for all temporal comparisons below, where we do obtain an unambiguous ranking in terms of the PICs.

TABLE 2

AGGREGATE POVERTY INCIDENCE CURVES FOR THE DEVELOPING WORLD

Estimation Method		Cumulative Percent of Population Under Each Consumption Level ($/person/month, 1985 PPP)					Mean Consumption ($/person/month, 1985 PPP)
		$21	$30.42	$40	$50	$60	
1. 19 countries, survey dates	year 1	18.48	33.99	47.31	58.35	66.66	61.76
	year 2	18.11	33.91	46.61	56.99	64.76	66.30
2. 19 countries	1985	18.32	33.92	47.32	58.41	66.74	61.44
	1990	17.71	33.71	46.70	57.29	65.18	65.38
3. 44 countries	1985	17.84	33.19	46.47	57.50	65.86	63.52
	1990	17.49	33.02	45.86	56.41	64.37	67.30
4. 41 countries (excluding E. Europe)	1985	18.25	33.88	47.33	58.40	66.69	62.88
	1990	17.79	33.52	46.43	56.95	64.84	66.97

TABLE 3

POVERTY INCIDENCE CURVES BY REGION

Region	Year	Cumulative Percent of Population Under Each Consumption Level ($/person/month, 1985 PPP)					Mean Consumption ($/person/month, 1985 PPP)
		$21	$30.42	$40	$50	$60	
East Asia	1985	4.89	15.72	29.94	43.69	54.63	70.93
	1990	4.86	14.71	26.81	39.05	49.27	80.26
Latin America	1985	13.23	23.07	31.97	40.05	47.03	117.49
	1990	17.21	27.77	37.01	45.22	52.13	109.66
Middle East & North Africa	1985	1.33	4.49	10.55	18.89	27.95	118.50
	1990	0.54	2.52	7.01	13.32	20.45	138.41
South Asia	1985	36.76	60.84	75.12	84.00	89.46	33.30
	1990	33.31	58.60	74.25	83.82	89.36	34.65
Sub-Saharan Africa	1985	31.65	51.40	64.98	74.09	80.15	48.63
	1990	33.44	52.89	65.55	74.11	80.00	48.92
Total	1985	18.25	33.88	47.33	58.40	66.69	62.88
	1990	17.79	33.52	46.43	56.95	64.84	66.97

Note: Survey data for 41 countries (Eastern Europe excluded); see Table 1 for distribution by region.

Despite these differences in progress in reducing poverty, the poverty ranking of regions is generally stable; poverty is highest in South Asia, followed by Sub-Saharan Africa, Latin America and the Caribbean, East Asia, and Middle East/North Africa, in that order. The one exception to this ranking is for 1990, when there is a reversal between Sub-Saharan Africa and South Asia at the lower poverty line, though the difference is small.

These regional estimates differ in a number of respects from those reported in RDV. Comparing the estimated percentages consuming less than $1 per day in 1985 by region in the two studies one finds: East Asia (RDV:21 percent; this study: 16 percent), Latin America (19; 23), Middle East and North Africa (31; 4), South Asia (51; 61), Sub-Saharan Africa (47; 51). There are a number of

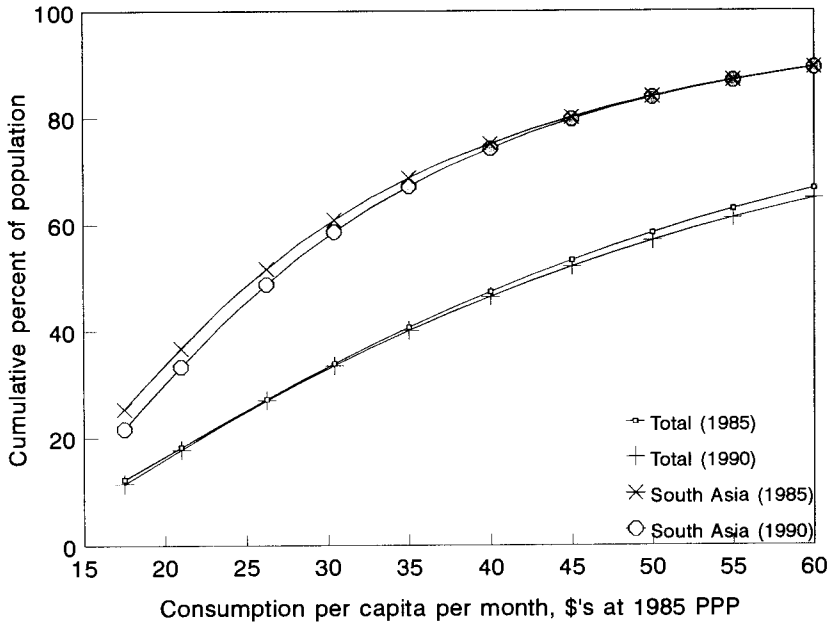

Figure 1. Poverty Incidence Curves for South Asia 1985–90

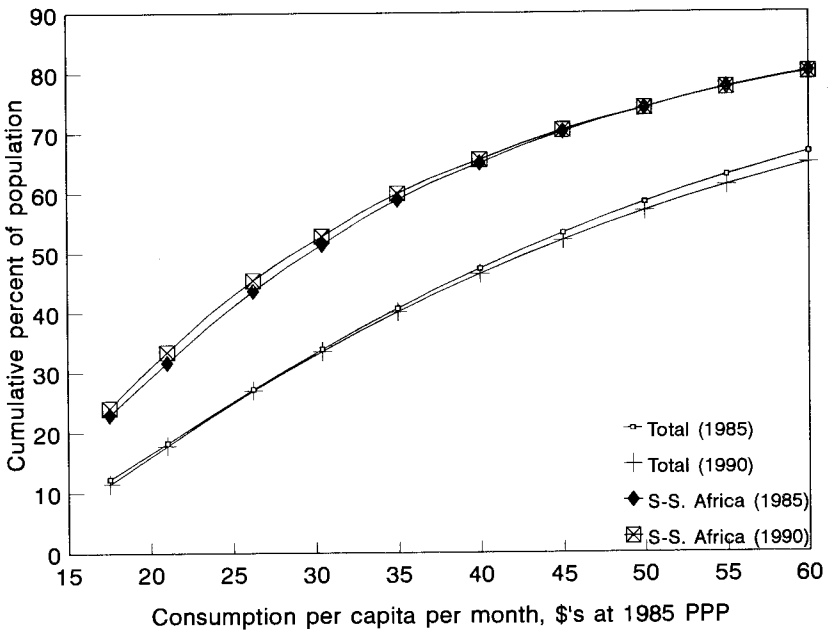

Figure 2. Poverty Incidence Curves for Sub-Saharan Africa 1985–90

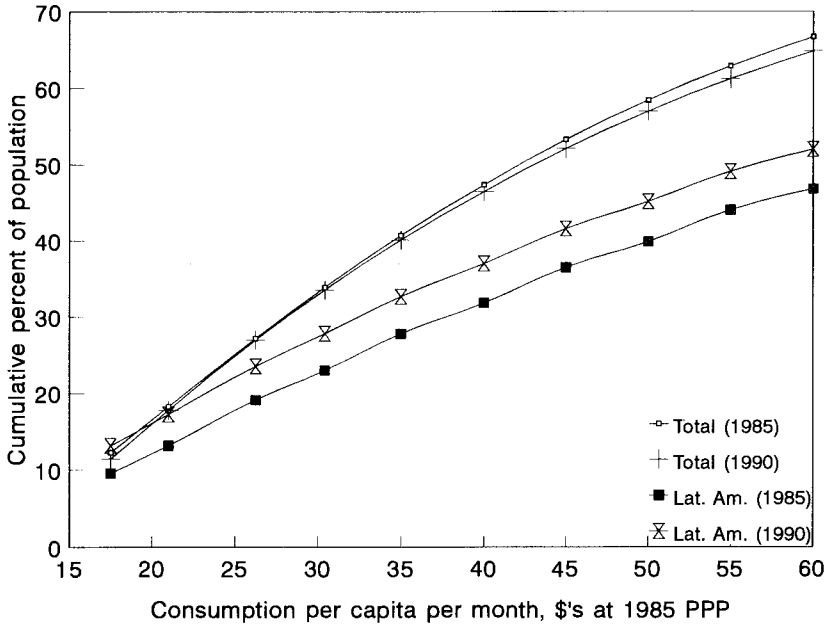

Figure 3. Poverty Incidence Curves for Latin America 1985-90

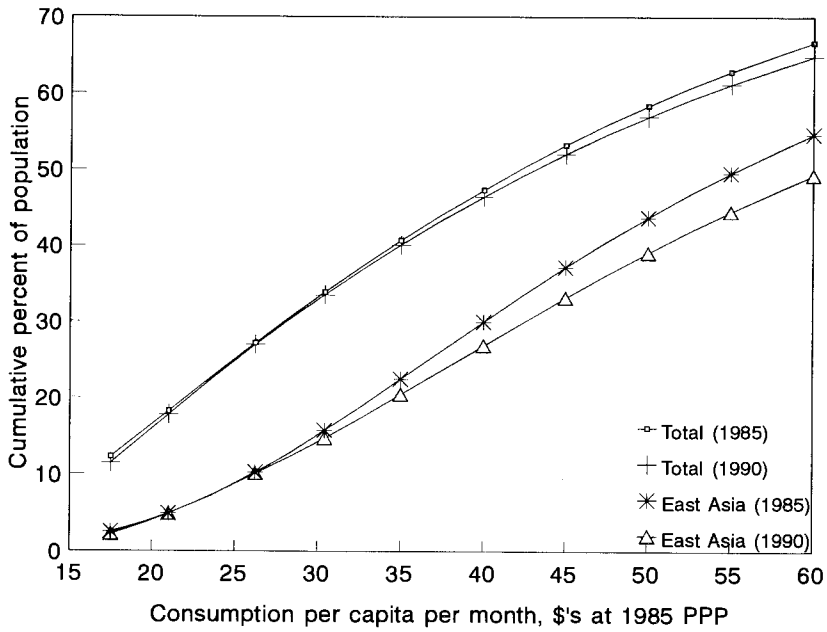

Figure 4. Poverty Incidence Curves for East Asia 1985-90

reasons for these differences: The primary data set used here is larger and more recent; we have 44 countries with survey-based estimates (instead of 22 in RDV) and an up-date has been possible for every one of the common sub-set of 22 countries. Also RDV used an extrapolation model for the remaining 64 countries covered; in the present paper we have confined attention to the countries covered; in the present paper we have confined attention to the countries for which we have distributional data (we comment later on the possibility of a bias due to this fact). And finally the PPP exchange rates have been up-dated (RDV used the Summers and Heston, 1988, PPPs for 1985, while we have used their up-dates in Summers and Heston, 1991, for that year). For example, the PPP revisions have increased the estimated poverty rate for South Asia (due mainly to the higher PPP exchange rate for India given in Summers and Heston, 1991).

However, the largest discrepancy by far with RDV's results is for the Middle East and North Africa. RDV had relied heavily on their extrapolation model for this region; indeed, they had only one distributional data set for that region (namely Morocco). We have been able to add three new data sets. For each of these, we find that the RDV extrapolation model had overestimated poverty incidence. The reason appears to be that the social indicators of the countries in this region tend to be poor *relative to* their incomes; thus the RDV extrapolation model overestimated poverty. In fact RDV's 95 percent confidence interval for this region was very wide; while their point estimate was 31 percent living below $1 per day, their 95 percent confidence interval was 13 percent to 51 percent. Nonetheless, our revised estimate for the region is outside even this wide interval, reflecting the poor performance of RDV's extrapolation model in that region.

On balance, however, these differences wash out. The estimated percentage of the population of the developing world living on less than $1 per day has changed little; RDV estimated 33.0 percent below this figure in 1985 while we estimate 33.2 percent.

One possible source of bias in our estimates is that the sample of countries included in our data set may not be representative of the region as a whole. As we have noted there are marked differences in coverage across regions (Table 1). The most worrying region from this point of view is clearly Sub-Saharan Africa, given the high poverty and (relatively) large population. Our coverage of the Middle East and North Africa is also of concern. To test for bias in coverage we calculated the average rate of growth in real private consumption per person from the national accounts over the period 1985–90 for all countries in the region (for which these data are available) and stratified the results according to whether or not the country is included in our data set of income/consumption distributions. Table 4 gives the results. We find that the countries excluded from our data set had a lower average rate of growth than those included; this holds for both regions. Though we do not (of course) know what happened to the Lorenz curve in the excluded countries, this does suggest that there may be a bias, namely that our data set will tend to over-estimate poverty reduction in these regions.

To try to get some idea of the magnitudes involved, we performed the following experiment. For lack of any obviously better assumptions, let us suppose that (i) the countries in our data set are representative of their region at the base date, and (ii) growth in the countries excluded was distribution neutral over the period

TABLE 4

RATE OF GROWTH IN PRIVATE CONSUMPTION PER CAPITA 1985–90

	Included In Our Data Set		Excluded From Our Data Set	
	Number of Countries	Growth in Real Consumption, Per Person 1985–90 (%, 5yr.)	Number of Countries	Growth in Real Consumption Per Person 1985–90 (%, 5yr.)
Middle East and North Africa	4	7.57	6	−11.55
Sub-Saharan Africa	14	0.46	22	−7.09
Combined	18	2.30	28	−8.71

Note: Growth rates are population weighted.

(i.e., the Lorenz curve remained unchanged). We can then use the rate of growth in real mean consumption from the national accounts to estimate the poverty measures for 1990 in the countries not in our data set, and use these estimates to "correct" our 1990 aggregates for the region as a whole. Of course this experiment assumes away the issue of whether there was more or less poverty in the excluded countries at the base date; instead it focuses on how much impact the unrepresentativeness of the included countries might have on our assessments of progress over time, but that is our main concern.

Table 5 gives the revised estimates for 1990 in these two regions. We now find an unambiguous increase in poverty in the Middle East and North Africa, reflecting the negative growth in average living standards of the countries not in our sample. We also find a sharper increase in poverty in Sub-Saharan Africa. For the developing world as a whole—to render the revised 1990 results comparable to those for 1985—the table also shows the aggregate 1985 poverty incidence estimates re-weighted using total (1985) populations of Sub-Saharan Africa and Middle East and North Africa. We no longer find first-order dominance; poverty incidence in the developing world now shows an increase for poverty lines of $1 per day and below, but a decrease above this figure. The poverty deficit and severity curves also intersect within the range of poverty lines, though if one

TABLE 5

ALTERNATIVE ESTIMATES ALLOWING FOR LOWER GROWTH IN COUNTRIES WITHOUT SURVEY

		Cumulative Percent of Population Under Each Consumption Level ($/person/month, 1985 PPP)					Mean Consumption ($/person/month, 1985 PPP)
Region	Year	$21	$30.42	$40	$50	$60	
Middle East & North Africa	1985	1.33	4.49	10.55	18.89	27.95	118.50
	1990	1.27	5.49	12.72	21.37	30.05	112.85
Sub-Saharan Africa	1985	31.65	51.40	64.98	74.09	80.15	48.63
	1990	36.29	55.35	67.63	75.95	81.53	46.38
Total*	1985	18.46	33.80	46.88	57.65	65.80	64.57
	1990	18.65	34.07	46.65	56.91	64.66	67.10

Note: *To assure comparability both these rows use the total populations of the regions as weights, rather than those of the countries included in the distributional data set (as in Table 3).

further restricts that range to a maximum of $50 per month then an unambiguous ranking is indicated for all distribution-sensitive poverty measures. However, the quantitative differences in the aggregate PICs are still small over the range of poverty lines.

4. Conclusions

We would not want to present these results as definitive; indeed we think that there is considerable scope for improvement. The ongoing efforts of governments and agencies to enhance the quality and quantity of household-level surveys and price data for international comparisons will allow continued future improvements in this type of poverty monitoring. However, the estimates we have made do appear to be about the best one can do with the existing data. They suggest that poverty has fallen slightly; this conclusion holds over a wide range of poverty lines and poverty measures, though a slight increase in poverty is indicated over a more restricted range of poverty lines when we make an allowance for possible bias in our sample of countries. However, in either case the changes involved are small, and the incidence of absolute poverty in the developing world as a whole has remained static during the latter half of the 1980s, with one-in-three persons consuming less than $1 per day, and about two-in-three consuming less than $2 per day. With the cumulative distribution of consumption changing only negligibly, the numbers of poor—by a wide range of definitions of what "poor" means—have been growing at the same rate as the aggregate population of the developing world, about 2 percent per year. There is, however, some marked variation between regions, with generally rising poverty incidence in both Latin America and Africa, and generally falling incidence in Asia.

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