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Debates on the

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How *Not* to Count the Poor*

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Introduction

How many poor people are there in the world? This simple question is surprisingly difficult to answer at present.

Building on earlier exercises going back to the late 1970s,[3] the World Bank (henceforth Bank) has, in the 1990 and 2000/1 World Development Reports (WDRs), as well as periodically thereafter, presented comprehensive estimates of the extent of poverty in the world and in particular regions and countries in different years. These estimates have been widely accepted and employed in a range of analyses and assessments. They have been used to describe the world, to determine resource allocation priorities, and to judge which policies and programs reduce poverty the most. Recently, they have played a central role in monitoring the first Millennium Development Goal, which calls for the halving of global poverty as defined by the Bank's estimates.

Among the questions that the Bank's global income poverty estimates have been used to answer is whether the world is "on the right track" in terms of poverty reduction strategy. The Bank's recent estimates have led many to conclude that the world is indeed on the right track. Former Bank President, James D. Wolfensohn, for example, stated in 2001:

Over the past few years, [these] better policies have contributed to more rapid growth in developing countries' per capita incomes than at any point since the mid-1970s. And faster growth has meant poverty reduction: the proportion of people worldwide living in absolute poverty has dropped steadily in recent decades, from 29 per cent in 1990 to a record low of 23 per cent in 1998. After increasing steadily over the past two centuries, since 1980 the total number of people living in poverty worldwide has fallen by an estimated 200 million—even as the world's population grew by 1.6 billion.[4]

Barely two years earlier, the Bank had painted a strikingly different picture: "the absolute number of those living on $1 per day or less continues to increase. The worldwide total rose from 1.2 billion in 1987 to 1.5 billion today."[5]

Global poverty estimates also influence assessments of the seriousness of the problem of world poverty, the scale of resources that should be devoted to reducing it, and the regions to which these resources should be directed. WDR 2000/1 argued, for example, that the largest number of the world's poor were in Africa rather than in South Asia, as earlier believed. The questions of how many poor people there are in the world, how poor they are, where they live, and how these facts are changing over time are clearly very important ones. The Bank's answers to these questions have been highly influential in part because, until quite recently, there were no other estimates.[6] Alternative estimates that have been produced recently adopt in central respects the same methodology as the Bank.

It is argued in this chapter that the Bank's estimates of the level, distribution, and trend of global poverty are marred by three serious problems. The first is that the Bank uses an arbitrary international poverty line that is not adequately anchored in any specification of the real requirements of human beings. The second problem is that it employs a concept of purchasing power "equivalence" that is neither well defined nor appropriate for poverty assessment. These difficulties are inherent in the Bank's "money-metric" approach and cannot be credibly overcome without dispensing with this approach altogether. The third problem is that the Bank extrapolates incorrectly from limited data and thereby creates an appearance of precision that masks the high probable error of its estimates. It is difficult to judge the nature and extent of the errors in global poverty estimates that arise from these three flaws. It will be argued, however, that there is some reason to believe that the Bank's approach may have led it to understate the extent of global income poverty and to infer without adequate justification that global income poverty has steeply declined in the recent period. We refer in what follows to the Bank's methodology of poverty assessment as it was applied to produce the estimates of poverty published in the 1990 and 2000/1 WDRs and in accompanying papers by Shaohua Chen and Martin Ravallion (as well as subsequent updates on the Bank's Povcalnet website[7]). However, the criticisms we present of this method apply also to the approach (as described, for instance, in Ravallion, Chen, and Sangraula, 2008) that the Bank is using to generate its most recent revised estimates of poverty.

It is possible to describe a practicable methodology for assessing global income poverty that would be more reliable. The current income poverty estimates should no longer be employed, and new ones corresponding to a defensible methodology should be generated.

A meaningless poverty line

A procedure frequently used in national poverty assessment exercises is to define a poverty line in terms of the cost of achieving certain ends. These ends are most

often elementary requirements (such as the ability to be adequately nourished). The commodities that are deemed necessary for an individual to achieve a set of elementary requirements can be allowed to vary across groups of persons (defined for instance by age, gender, and other relevant criteria) if that is thought appropriate. Procedures of this kind have the advantage that, once established, they offer a consistent basis for determining the level of the poverty line in different years and locations. They also result in a poverty line that has a meaningful and relevant interpretation in terms of access to resources that are sufficient for achieving basic human requirements. For this reason, many countries have used such procedures in their domestic poverty estimates.

In contrast to this human requirements centered approach, the Bank has adopted what can be referred to as a "money-metric" methodology that does not directly refer to such requirements but rather to a relatively arbitrary international poverty line (IPL) defined in abstract money units and to local currency amounts that it deems to be "equivalent." In 1990, the Bank constructed an IPL from a set of domestic poverty lines (some from governmental, others from non-governmental sources) for thirty-three countries during the mid-1980s. These domestic poverty lines were scaled upward or downward according to changes in the national consumer price index (CPI) to determine their "equivalent" in 1985 national currency units. These 1985 national currency amounts were then converted into a common unit of "real purchasing power" equivalence using the 1985 purchasing power parity (PPP) conversion factors for consumption (expressed in local currency units per "international dollar," on which see below) calculated by Summers and Heston (1988). An IPL of $31 per month was chosen. The reason provided is that the domestic poverty lines of eight of the poorer countries in the sample, converted into dollars in this way, were very close to this IPL, which was thus deemed to reflect a poverty line that was "most typical" for poor countries.[8] This "$1 (PPP 1985) a day" (actually $1.02 PPP 1985) poverty line was applied in WDR 1990. In the Bank's later poverty measurement work (starting with Chen et al. 1994), this IPL was revised downward, without explanation, to $30.42 per month or $1 per day PPP 1985 (Chen and Ravallion, 2001, pp. 285 n. 7).

This IPL was then converted into the national currency units of different countries using the Penn World Tables (Summers and Heston 1988) PPP conversion factors for 1985. The resulting national poverty lines were then adjusted in proportion to changes in the national CPI (as reported in the IMF's *International Financial Statistics*) and applied to estimates of per capita household consumption from household survey data to derive the number of poor persons in a particular country and year.

For the 2000 poverty estimation exercise and more recent ones, the Bank established a new IPL. For the same list of thirty-three countries it had used earlier, it identified the ten countries whose domestic poverty lines—converted into 1993 national currency units and then, via 1993 general-consumption PPPs, into 1993 international dollars—were the lowest. The Bank then chose the median of these (so converted) domestic poverty lines—$32.74 per month or $1.08 per day 1993—as its new IPL. No justification has been offered for this change in approach. One reason may be that when 1993 PPPs are used to convert the list of thirty-three poverty lines into international dollars a cluster of poverty lines that may be deemed "most typical" no longer appears.

Is the new IPL "higher" or "lower" than the old one? This question is impossible to answer, as PPP dollars from different years are not comparable (as will be discussed below). The Bank claims that "This [new $1.08 per day PPP 1993] line has a similar purchasing power to the $1-a-day line in 1985 PPP prices, in terms of the command over domestic goods" (WDR 2000/1, p. 17). However, as PPP units in different years are non-comparable, this statement has no meaning. Chen and Ravallion (2001) offer as justification for their claim the observation that the global poverty headcount is approximately the same for the most recent common year (1993) in which both methodologies were applied. In offering this fact as a justification for the ostensible "equivalence" of the new IPL with the old they make a serious error in reasoning. It is obvious that, when employing *any* method of poverty assessment, one can define an IPL that is just high enough to yield whatever rate of poverty incidence one wishes to match (because it had resulted from a method previously used). There will necessarily be some level of the IPL defined in terms of the new method at which the aggregate number of poor people will be equal to the number previously estimated by the old method. Such coinciding results are easily achievable between any pair of methods and therefore do not show two methods to have any particular consistency with each other, nor do they provide any reason to believe that either method is appropriate for assessing the purchasing power of the poor.

An alternative approach to judging the Bank's claim that the new IPL maintains "a similar purchasing power…in terms of the command over domestic goods" involves using each country's CPI to transform its 1985 national poverty line (equivalent to $1 per day PPP 1985) into 1993 national currency units and then comparing the result with this country's 1993 national poverty line (deemed equivalent to $1.08 per day PPP 1993). We present the result of this exercise in Table 3.1, which shows 1985 national poverty lines updated to 1993 through a country's CPI to be as much as 30 per cent lower (for Nigeria) and as much as 157 per cent higher (for Mauritania) than the 1993 poverty line for the same country. Since national CPIs are used to convert each country's national poverty line from the base-year amount into equivalent amounts for other years, the Bank's change in IPL has raised Nigeria's national poverty lines uniformly for all years, and dramatically lowered Mauritania's national poverty lines uniformly for all years. Changes of this kind can potentially affect estimates of the trend as well as the level of poverty in each country.

Such large revisions in national poverty lines, up and down, cannot be reconciled with the claim of Chen and Ravallion (2001) that the new IPL maintains the "same" real level of purchasing power as the old. These adjustments

Table 3.1a. 1985 World Bank Poverty Line, updated by CPI versus 1993 WB Poverty Line at PPP (in national currency units)

Country	CPI Updated Old Poverty Line (1*PPP85*CPI)	New Poverty Line (1.08*PPP93)	Ratio: Updated Old PL/New PL	Country	CPI Updated Old Poverty Line (1*PPP85*CPI)	New Poverty Line (1.08*PPP93)	Ratio: Updated Old PL/New PL
Algeria	15.08	11.94	1.26	Kuwait	0.31	0.25	1.24
Australia	2.13	1.43	1.49	Lesotho	1.67	1.20	1.39
Austria	18.22	14.84	1.23	Luxembourg	48.13	39.71	1.21
Bahrain	0.29	0.28	1.01	Madagascar	665.13	567.64	1.17
Bangladesh	10.90	13.59	0.80	Malawi	2.75	1.63	1.69
Barbados	2.03	1.19	1.70	Malaysia	1.56	1.69	0.92
Belgium	48.76	39.40	1.24	Malta	0.25	0.26	0.98
Botswana	1.54	1.49	1.04	Mauritania	93.28	36.24	2.57
Burkina Faso	160.95	110.66	1.45	Mauritius	12.98	7.41	1.75
Burundi	120.05	60.27	1.99	Morocco	5.31	3.30	1.61
Cameroon	341.47	152.42	2.24	Mozambique	631.85	864.85	0.73
Canada	1.56	1.37	1.14	Nepal	10.10	9.89	1.02
CAR	198.10	116.14	1.71	Netherlands	2.77	2.20	1.26
Chad	156.82	94.94	1.65	New Zealand	2.45	1.61	1.52
Chile	257.70	222.71	1.16	Niger	175.61	107.70	1.63
China	1.59	1.52	1.05	Nigeria	8.68	12.33	0.70
Colombia	317.76	214.39	1.48	Norway	11.25	9.84	1.14
Congo	376.58	219.11	1.72	Pakistan	8.12	8.85	0.92
Costa Rica	84.02	57.85	1.45	Panama	0.74	0.48	1.55
Denmark	11.66	9.88	1.18	Paraguay	1018.92	801.80	1.27
Dominican Rep.	7.37	4.47	1.65	Philippines	13.94	6.68	2.09
Ecuador	1107.22	890.63	1.24	Portugal	182.30	124.98	1.46
Egypt	2.38	1.25	1.91	Rwanda	106.04	58.69	1.81
El Salvador	9.52	4.78	1.99	Saudi Arabia	4.80	2.52	1.90
Ethiopia	1.14	1.39	0.82	Senegal	210.63	136.64	1.54
Fiji	0.95	0.90	1.06	Sierra Leone	281.97	250.47	1.13
Finland	8.52	6.93	1.23	Singapore	1.53	1.71	0.90
France	8.36	7.05	1.18	South Africa	2.13	1.79	1.19
Gabon	470.04	326.38	1.44	Spain	151.55	125.72	1.21
Gambia	6.24	2.62	2.38	Sri Lanka	12.47	13.75	0.91
Germany	2.83	2.17	1.30	Sudan	77.28	50.89	1.52
Ghana	292.17	191.51	1.53	Swaziland	1.66	1.29	1.28
Greece	257.75	194.31	1.33	Sweden	14.35	10.80	1.33
Guatemala	2.92	1.98	1.48	Switzerland	3.25	2.36	1.38
Haiti	5.60	2.60	2.15	Syria	9.95	11.48	0.87
Honduras	3.63	2.08	1.74	Tanzania	99.47	126.44	0.79
India	8.23	7.51	1.10	Thailand	10.96	14.40	0.76
Indonesia	651.49	680.38	0.96	Togo	189.00	95.93	1.97
Iran	257.73	275.01	0.94	Trini.-Tobago	3.66	3.50	1.05
Ireland	0.91	0.71	1.27	Tunisia	0.55	0.37	1.48
Italy	1983.72	1600.92	1.24	Turkey	8190.38	6351.30	1.29
Jamaica	14.39	12.64	1.14	UK	0.86	0.68	1.28
Japan	277.70	200.49	1.39	United States	1.34	1.08	1.24
Jordan	0.34	0.32	1.05	Venezuela	60.17	40.70	1.48
Kenya	23.70	12.60	1.88	Zambia	326.81	239.14	1.37
Korea, Rep.	736.56	743.48	0.99	Zimbabwe	3.24	2.45	1.32

Table 3.1b. Summary of data in Table 3.1a

Summary	
Number of Countries	92
Number of Countries With Ratio > 1	77
Number of Countries With Ratio < 1	15
Geometric Mean Ratio of Old PL to New PL (unweighted)	1.31
Percentage of Sample Population for Whom Ratio > 1 (1985 Population)	81.62%
Geometric Mean Ratio of Old PL to New PL (weighted by 1985 population)	1.12

Notes: For method, see text. Following the World Bank, we draw the PPP conversion factors for 1985 from Table 3 of Summers and Heston (1988). China's PPP for 1985 is drawn from the online Penn World Tables 5.7 as it is not available in Summers and Heston (1988). PPP conversion factors for 1993 are from the table "The World Bank 1993 Consumption PPP in 1993 Price," available from <http://siteresources.worldbank.org/INTPOVCALNET/Resources/PPP1993.xls> (accessed on July 4, 2009). We draw the country-specific CPI data from the 1998 WDI ("Consumer price index (1987 = 100)," series code: FP.CPI.TOTL). Data for a small number of countries were dropped due to wildly improbable differences between the 1993 poverty lines calculated according to the two methods. We confirmed through examination of Economist Intelligence Unit country reports that in each of these cases a hyperinflation or change of currency was experienced.

entail huge revisions in estimates of the poverty headcount for any given year, substantially increasing poverty estimates for some countries and dramatically lowering poverty estimates for others. In 1999, applying its method with the old ($1 per day PPP 1985) IPL, the Bank reported very similar poverty rates for Nigeria and Mauritania of 31.1 per cent and 31.4 per cent respectively. In 2000, applying its method with the new ($1.08 per day PPP 1993) IPL, the Bank reported poverty rates for Nigeria and Mauritania of 70.2 per cent and 3.8 per cent respectively. Depending on which PPP base year is used, Nigeria's poverty rate is either slightly lower or eighteen times higher than Mauritania's.

Chen and Ravallion (2001, p. 291) concede that the Bank's IPL revision has produced a substantial shift in the geographical distribution of poverty. This shift is illustrated in Table 3.2, which focuses on the three years (1987, 1990, 1993) for which the Bank has successively evaluated the same income and consumption data relative to two different IPLs. Table 3.2 shows that the IPL revision has greatly increased the reported incidence of poverty in Sub-Saharan Africa (raising the poverty headcount ratio reported for 1993, for instance, from 39.1 per cent to 49.7 per cent) and has greatly reduced the reported incidence of poverty in Latin America (lowering the poverty headcount ratio reported for 1993 from 23.5 per cent to 15.3 per cent). The Bank's revision of its IPL appears to have produced substantial changes in its poverty estimates, suggesting that the Bank's underlying methodology is unreliable.

The Bank's method is unreliable because its results are excessively dependent on the chosen PPP base year, which is entirely arbitrary. In order to see why, it is helpful to examine how the Bank compares the consumption expenditure of a person in one country and year with that of another person from another country and year. This comparison is made by the Bank in two steps. First, national CPIs are used to deflate or inflate the two national currency amounts into "equivalent" amounts of a common base year. Second, PPPs for this base year are then used to

Table 3.2. Changes in estimates of the prevalence and regional distribution of poverty due to methodological revision

	Headcount ratio for 1985 PPP PL (% of population living below $1.00 a day at 1985 PPP)			Headcount ratio for 1993 PPP PL (% of population living below $1.08 a day at 1993 PPP)			Percent change in headcount ratio from 1985 to 1993 PPP PLs		
	1987	1990	1993	1987	1990	1993	1987	1990	1993
East Asia	29.70	28.50	26.00	26.60	27.58	25.24	-10.44	-3.23	-2.92
Eastern Europe & Central Asia	0.60	–	3.60	0.24	1.56	3.95	-60.00	–	9.72
Latin America & Caribbean	22.0	23.00	23.50	15.33	16.80	15.31	-30.32	-26.96	-34.85
Middle East & North Africa	4.70	4.30	4.10	4.30	2.39	1.93	-8.51	-44.42	-52.93
South Asia	45.40	43.00	43.10	44.94	44.01	42.39	-1.01	2.35	-1.65
Sub-Saharan Africa	38.50	39.30	39.10	46.61	47.67	49.68	21.06	21.30	27.06
Total	30.70	–	29.40	28.31	28.95	28.15	-7.79	–	-4.25

Notes: The estimates relative to the $1 per day PPP 1985 IPL of the prevalence and distribution of global poverty in the years 1987, 1990, and 1993 are from Table 5 of Ravallion and Chen (1997; cf. WDR 1999/2000, p. 25). The corresponding estimates relative to the $1.08 per day PPP 1993 IPL are from Table 2 of Ravallion and Chen (2000; cf. WDR 2000/1, p. 23). The variations between these sets of estimates are also discussed in Chen and Ravallion (2001, pp. 290–3).

compare the resulting national currency amounts. The problem with this method is that the PPPs of different base years and the CPIs of different countries each weight prices of underlying commodities differently, as they reflect distinct global and national consumption patterns. As a result, international comparisons are highly dependent on the arbitrary choice of base year for the PPPs used to undertake the spatial component of these comparisons.

Poorly defined and inappropriate measures of purchasing power "equivalence"

At the heart of the money-metric approach to inter-country poverty comparison and aggregation is the translation of the IPL from the abstract money units (international dollars) in which it is defined into the local currencies actually used by persons in different countries. For this purpose, measures of purchasing power equivalence or *purchasing power parities* (PPPs) are used. These are defined in terms of a number of units of a country's currency that are deemed equivalent to a unit of the currency of a base country. PPPs for a given base year are typically interpreted as describing the number of units of a country's currency necessary to purchase the "same amount" of commodities as can be purchased for one unit of the base country's currency at the base country's prices.[9]

How can appropriate PPPs, suitable for deriving the amount of local currency that is "equivalent" in purchasing power to the IPL, be determined?[10] This question is difficult because price ratios between any two countries vary from commodity to commodity. The PPP importantly depends on the weights assigned, explicitly or implicitly, to the various commodities. Allowing such weights to be determined by actual consumption patterns does not avoid arbitrariness: consumption patterns vary from country to country due to diverse tastes, price vectors, and income distributions. And the fact that only a small fraction of a country's consumption expenditure is for medicines, for example, does not show that the price of medicines is of little importance for gauging the standard of living of its inhabitants.

Ultimately, the concept of an "equivalent" amount of currency is only substantively meaningful in relation to an *achievement* concept. One currency amount at a point in time and space can be deemed "equivalent" to another currency amount at another point in time and space if both quantities are just sufficient to achieve a common end.[11] Since amounts that are equivalent in relation to one end may not be equivalent in relation to another, the end must be carefully specified and justified so that it generates cost comparisons that are appropriate for the purpose at hand. Very different cost comparisons (and PPPs) may apply to comparisons of the cost to governments of achieving a given level of military capability, the costs to corporate executives of achieving an accustomed standard of living, or the costs to persons of avoiding extreme poverty.

One obvious way of specifying the end in relation to which a set of PPPs is defined is to fix a reference bundle of commodities. The least cost of purchasing this reference bundle in different countries in national currency units at the prevailing local prices establishes a set of PPPs.[12] A generalization of this approach specifies the end as some final achievement (for example, the attainment of a specified degree of subjective preference satisfaction—utility—or the possession of a specified set of human requirements however conceived) which is dependent on the ability to obtain commodities. In this case, the least cost (in national currency units at the prevailing local prices) of bringing about this final achievement in different countries establishes a set of PPPs. In order to conduct such an exercise, it is necessary to specify a transformation function which specifies the manner in which command over commodities is transformed into final achievements. This transformation function can be held to be common across countries or be informed by subjective preferences and relevant contextual features (such as environmental or cultural conditions). Since persons can vary in their ability to transform commodities into final attainments, more fine-grained index numbers (specific to persons within countries as well as to individual countries) can also in principle be constructed. It is unavoidable, however, to specify an invariant level of achievement (in some achievement space) to which the PPPs refer, if they are to be deemed to characterize "equivalent" levels of purchasing power.

It is obvious that there cannot be one set of PPPs that is appropriate for all purposes. Rogoff (1996) is one of many to note: "Ultimately, there is no 'right' PPP measure; the appropriate variation of PPP depends on the application." More fundamentally, the appropriate PPP is determined by the underlying achievement concept in relation to which equivalence is specified. If PPPs are to be meaningful and relevant to their purpose, distinct achievement concepts must be specified to ground cost of living adjustments for corporate executives, comparison of poverty lines across countries, and conversion factors used to determine the relative size of military expenditures. It is an empirical question whether the PPPs associated with distinct achievement concepts are sufficiently different in magnitude to make it necessary to adopt different PPPs for each purpose.

In practice, two methods of calculating PPPs have been most widely used. The World Bank currently uses the EKS (Elteto-Köves-Szulc) method in its calculations of poverty headcounts, while the Penn World Tables and earlier World Bank publications use the GK (Geary-Khamis) method (see for example Kurabayashi and Sakuma, 1990; and Ward, 1985). Both methods suffer from three problems.

The first problem with existing PPPs is that they do not in fact refer to any specified achievement concept. In practice, the dominant motivation for producing PPPs to date has been to undertake broad comparisons of the quantity of real national income and its components and of relative prices. These "broad gauge" PPPs have been used to compare living standards or to permit comparative

assessments of poverty and income distribution despite the possibility that they may be inappropriate for these purposes. Considerations of whether PPP calculation methods permit consistent inter-country orderings (obeying such properties as base country invariance and "fixity" of rank orderings[13]) have been of greater interest than considerations of whether they permit a meaningful and appropriate basis for comparison of individuals' living standards and of the cost of achieving specific ends such as the avoidance of deprivation.

The second problem is that the measure of average prices constructed in existing PPPs is quite inappropriate for poverty assessment. This is because existing methods for calculating PPPs involve aggregating information on the quantities of a wide variety of commodities demanded in different countries and the (explicit or implicit) prices at which these commodities are exchanged. As such, PPPs from existing methods reflect quantities and prices that have no relevance to absolute poverty assessment. PPPs from existing methods are influenced by *irrelevant* information in the following ways, among others:

(i) Commodity Irrelevance: They are influenced by information about the prices and quantities of commodities consumed disproportionately by the non-poor, both within the same country and in other countries. In principle, the price of *some* such commodities could be relevant to determining the cost of avoiding absolute poverty. In particular, this will be true of commodities that are essential to maintaining an adequate level of well-being and unaffordable for many poor people. However, most commodities consumed disproportionately by the non-poor do not have this feature.

(ii) Country Irrelevance: PPPs that are meant to reflect how much currency in one country is required to purchase the "same" amount of goods and services as can be bought with one unit of the currency of a base country are influenced by information about prices and quantities of commodities consumed in *third* countries. There are reasons why this sensitivity to third country information could sometimes be appropriate in the multilateral comparison of aggregate levels of real national income (see Reddy and Plener, 2006). However, this sensitivity is quite inappropriate in the case of absolute poverty assessment. Sensitivity to third country information will imply that a poverty line in a country (calculated by converting an IPL expressed in a base country's currency using a PPP conversion factor) will fluctuate simply because of changes in prices in a third country, even though nothing has changed either in the country in which poverty is being measured or in the base country. Whether a household in India lives in absolute poverty by the $1 PPP per day standard cannot reasonably depend on information about Japanese real estate prices, but under the current methodology of poverty assessment it may. How serious the impact of such "country irrelevance" is in practice is difficult to judge.

Both country and commodity irrelevance are instances of the violation of a principle of independence of irrelevant alternatives: *poverty estimates for a country should not change simply because other countries' consumption patterns or price levels have changed, nor because the consumption pattern or price level of goods that are not needed to avoid poverty have changed.* A method of measurement that fails to satisfy this requirement is flawed.

The problem of dependence on irrelevant alternatives can be avoided by starting from an appropriate achievement concept and constructing PPPs which accurately reflect the relative costs of attaining this achievement in different countries.

The third problem with existing PPPs is that PPPs of different base years are not comparable. They are designed to provide spatial rather than spatio-temporal comparisons. The changing structure of the global and national economies over time gives rise to substantial changes in PPPs. Because of the lack of a clear and invariant achievement concept to which the PPPs refer, it is difficult to adjudicate among inter-country comparisons that invoke PPPs from different base years. Moreover, such adjudication is necessary since estimated trends in poverty levels can differ according to the base year used. Table 3.1 shows that poverty lines in individual countries are greatly influenced by the base year. Since different countries' poverty lines are influenced differently, this problem cannot be remedied by adjusting the levels of the IPLs associated with different PPP base years. For example, raising the level of the Bank's new IPL to $1.343 per day PPP 1993 would achieve a perfect fit with the old IPL ($1 per day PPP 1985) for the US, would improve the fit with the old IPL for Mauritania, and would worsen the fit for Nigeria.[14] Nor can the problem be avoided by using the PPPs of one base year in perpetuity, because the choice of this base year would still be arbitrary. It would still be true that very different results would have been obtained if a different PPP base year had been chosen instead.

National poverty headcounts and hence also the geographical distribution of poverty are greatly influenced by the choice of base year. As our tables, and indeed the Bank's own tables (comparing Table 4 of WDR 1999/2000 with Table 4 of WDR 2000/1), show these variations are intolerably large. This is a problem that is inherent to the money-metric approach and the use of existing PPPs (see Pogge and Reddy, 2006, for a full exposition and some dramatic examples). It is unknown at this point to what extent these variations can be reduced by combining the money-metric approach with more appropriate PPPs that better reflect the basic requirements and/or empirical consumption patterns of those deemed very poor.

A dilemma therefore arises when attempting to use existing PPPs to estimate the value of any aggregate (including the extent of severe poverty) over time. One option is to commit to some PPP base year once and for all, and then to use the resulting PPPs for the comparison and conversion of household

consumption data generated in all subsequent years. This option has the advantage that it provides a stable basis of comparison. However, this option has an important drawback: the global consumption pattern will shift and is likely over time to diverge from the original pattern that once prevailed in the chosen PPP base year. It becomes increasingly difficult to justify the application of the previously fixed PPPs to the assessment of poverty in the most recent years; the PPPs used do not refer to the relative costs of purchasing goods and services in the most recent years.

The second option is the one the Bank has chosen. Here the previously chosen PPP base year is periodically replaced by a later one, thus avoiding the use of PPPs that reflect an outdated consumption pattern. However, this second option also has its drawbacks: each time a PPP base year is abandoned, all the previous estimates of the extent and trend of poverty calculated via these PPPs must be discarded too. This may undermine public understanding of and confidence in the exercise. The deeper drawback of the second option mirrors that of the first: while the substituted PPPs of the later base year are more appropriate for assessing present and recent poverty, they will be less appropriate for assessing poverty experiences long past. Thus, using 1993 PPPs rather than 1985 PPPs does not provide any obvious gain for assessing the 1980–2001 global poverty trend.

One might think that that this uncomfortable choice may be avoided by using PPPs from different base years in a single time–space comparison. This is not possible, however, because international dollars of different years cannot be meaningfully compared. Moreover, it can be shown that in the case of both EKS and GK PPPs, the use of different base years may lead to downward bias in estimates of changes in poverty headcounts over time (see Reddy and Pogge, 2005, pp. 15–23). In the case of EKS PPPs, the rising proportion of consumption (in both poor and rich countries) accounted for by commodities, such as services, that are relatively cheaper in poor than in rich countries, will lead to declining PPPs and therefore artificially declining poverty lines and poverty headcounts for poor countries over time. In the case of GK PPPs, it can be shown that any shift in consumption—in either rich or poor countries—from tradables to nontradables reduces the PPPs of poor countries and hence, again, their national poverty lines and poverty headcounts. Given that consumption expenditure tends to shift from tradables to nontradables over time, this implies that poverty headcounts based on GK PPPs in different years may show an illusory decline in poverty.

The problem of inter-temporal comparison would not arise if an explicit achievement concept were adopted, since in that case there would be no need to specify a base year to arrive at a set of index numbers. This procedure provides a consistent and robust basis for inter-temporal as well as inter-spatial comparisons.

False precision and mistaken inferences

In addition to errors resulting from the conceptual problems described above, the Bank's estimates of global poverty involve errors due to measurement problems associated with the data used. Some of these errors can be significantly diminished. Others cannot be, but can, at the least, be more explicitly identified. We describe below some of these issues.

Probable error

Despite obvious possibilities of error, the Bank's estimates of the total number of poor in specific countries, regions and the world are reported with six-digit "precision."[15] Kakwani (1993) noted, "No ... tests [of the statistical significance of estimates] have been devised for poverty measures because of their complex nature." But since then, it has become possible to construct estimates of standard errors associated with sampling through various procedures (both through assessing the theoretical properties of survey designs and poverty measures and through concrete procedures such as "bootstrapping"). This can be a difficult exercise when sampling designs are complex. In addition, sampling error is only one source of the errors likely to be present in global poverty estimates. However, these are not reasons to avoid providing at least a gross indication of the possible errors involved and their sources. Suggestions of false precision can be avoided even in the absence of well-developed statistical tests.

Above we showed that large fluctuations in the level of headcount poverty in particular countries and regions were caused simply by the choice of PPP conversion factors associated with one base year rather than another. Further uncertainty emerges as a result of the fact that PPPs for a very large number of countries are based on judgments or fitted values rather than on actual observations of prices and quantities of goods consumed in that country. For example, sixty-three countries participated in the International Comparison Program Phase V Benchmark Study in 1985.[16] Relative price levels for the remaining countries were determined through regression estimates, which predicted real per capita income (and thereby PPPs) on the basis of exchange rate incomes, secondary school enrollment ratios, and "post adjustments," which are derived from data about the costs of living of expatriates living in capital cities collected by the International Civil Service Commission and by private sector consultants (Ahmad, 1992). There are, of course, errors associated with a procedure of this kind.

The errors associated with the PPP estimates for countries containing potentially large numbers of poor persons may have especially important implications. India participated in the 1985 ICP benchmark survey but not in the 1993 ICP benchmark survey or subsequent ones. China participated in neither. Thus,

'PPs for these two vast and heterogeneous countries with significant shares of world poverty have been largely based on "educated" guesses. The consumption PPP reported by the World Bank for India in 1993 is based on the updating of its assumed international price level in 1985 by domestic inflation, with some adjustment made for changes in post adjustments and other data. The consumption PPP reported by the World Bank for China is based primarily on an estimate of China's PPP in 1986 produced by academic authors (Ruoen and Kai, 1995) through a bilateral comparison of prices in China and the United States. China's PPP was thus derived in an entirely different way than were PPPs assigned to other countries, and is now quite dated. Since the State Statistical Bureau did not report national average prices for many items, the authors undertook price surveys in a mere ten cities with no coverage of rural areas.

PPPs proposed for China vary by a factor of more than two, reflected in per capita GDP estimates for 1990 spanning the range from $1,300 (IMF), $1,600 (Ruoen), and $1,950 (World Bank) to $2,695 (Penn World Tables).[17] Ruoen and Kai (1995) report that, even when they confine themselves to their favored methodology, reasonable estimates for China's PPP per capita income in 1991 still vary from $1,227 to $1,663. Reddy and Minoiu (2006) present alternative poverty estimates for China associated with the World Bank's IPL and distinct specifications of China's PPP and other parameters. They show that estimates of the extent of poverty in China in 1990 and subsequently are greatly influenced by these choices. Reddy and Minoiu (2006) show that estimates of the extent and trend of East Asian and world poverty are in turn greatly influenced by the assumptions used in assessing poverty in China. This extraordinarily important issue is never once mentioned in the Bank's presentation of its global poverty estimates. More recently, new estimates of PPPs for China have raised altogether new controversies (see, for instance, Keidel, 2007).

Countries that participate in ICP price surveys also differ greatly in the quality of the price observations they collect. There is reason to believe that price and quantity observations in specific regions (for example sub-Saharan Africa) are of poor quality. Quantity observations are typically inferred by dividing estimates of total expenditure on specific commodities (taken from the national income and product accounts) with price data from surveys. Uncertainties about the quality of the national income and product accounts therefore also infect the ultimate results. Missing observations are often replaced through regression methods (using the so-called country-product-dummy method) with associated uncertainties.

Finally, the Bank's global poverty assessments use data on individual consumption from household surveys. It is well known, however, that there are very large discrepancies between consumption reported in household surveys and consumption reported in the national income accounts. Which of these sources is more accurate? There is considerable reason to believe that household surveys are a much more accurate source of private consumption data.

Nevertheless, as noted by Karshenas (2002), "the discrepancy in average consumption between the household survey and national accounts data, apart from definitional discrepancies between the two concepts, is due to possible errors in both sources of data."

The poor may face different prices than the non-poor

The benchmark surveys of the International Comparison Program collect data on prices paid by consumers for specified items at specified points of sale in countries throughout the world. These are typically formal sector enterprises in urban centers.

An important issue is that the poor may face different prices than the non-poor for the goods they consume, because of where they buy (for example in semi-peripheral and rural areas with potentially less-competitive retail market structures), because of the quantities in which they buy (typically smaller than for the non-poor, because of cash-in-hand, credit, and storage limitations), or because of who they are (social marginalization, which may permit adverse retail market discrimination against the poor, or monopolistic price discrimination which may segment the retail market according to consumer income). There is some evidence that the poor pay more for the goods they purchase. For example, Biru (1999) finds that lower income groups pay more for the same commodities in Zambia, and that the differences in the prices paid by the different income groups are greatest in the poorest regions. Similar results are reported by Rao (2000) for rural South India. The use of PPPs based on prices observed to be paid by the non-poor may then be misleading insofar as the poor tend to pay different prices for these same commodities than their non-poor compatriots do.

Automatic poverty "reduction"?

Chen and Ravallion (2004) note that their global poverty estimates are based on data from only ninety-seven countries. Of these, twelve have only a single survey in the 1981–2001 period and twenty more have only two surveys (pp. 163–6). In the absence of up-to-date survey based data on the distribution of consumption, the procedure adopted by the Bank is to "estimate measures for each reference year by applying the growth rate in real private consumption per person from the national accounts to the survey mean—assuming in other words that the Lorenz curve for that country does not change" (Chen and Ravallion, 2001, p. 289). With the distribution of income assumed to be constant, estimated poverty rises and falls with average consumption. The procedure yields merely apparent poverty reductions in countries in which both real private consumption per capita and the inequality in its distribution have increased. This double increase case seems to be quite common in the 1990s.

How much of the vaunted reduction in global poverty is due to the assumption that national Lorenz curves have not changed since the last survey? This is difficult to tell without additional information. But it is quite possible that the 7 per cent reduction in global $1 per day poverty that the Bank has calculated for the 1987–2001 period (Chen and Ravallion, 2004, p. 153) is entirely due to that empirical assumption built into its measurement approach. According to Table A.1 in Chen and Ravallion (2004, pp. 163–6), for many of the countries involved, especially in Africa, the latest survey date lies quite a few years back.

Erroneous estimates: some empirical evidence

In this section, we offer some empirical evidence that the use of an inappropriate PPP concept has led to error (and specifically understatement, *ceteris paribus*) in estimates of the level of global poverty. First, we consider the lower IPL used by the World Bank and show that it makes an enormous difference which PPP concept is used to generate this IPL. We show that the Bank's reliance on general consumption PPPs leads to lower poverty lines (and therefore lower poverty headcounts) than would result from employing an appropriately narrower PPP concept in most countries.

Second, we estimate the increased headcount that would arise in specific countries as a result of employing less inappropriate PPPs. Third, we show that the supposedly close fit between the IPL and official domestic poverty lines for the poorest countries—used by the Bank to motivate the choice of its IPL—breaks down when less inappropriate PPPs are used. We conclude that the use of general consumption PPPs distorts global poverty assessments. Replacing these with PPPs that are related as closely and explicitly as possible to the consumption needs of the poor would constitute an improvement of the money-metric approach. However, we shall argue below that this is an inadequate solution and that a more comprehensive reform of methodology is required.

Inappropriate PPPs and the understatement of local "equivalents" (with an endogenous IPL)

The World Bank generates its IPL on the basis of PPPs for general consumption. But for a limited but still substantial range of countries, PPPs for narrower categories relevant to poverty assessment (in particular "all food" and "bread and cereals" sub-aggregates) are available. These PPPs are calculated from price and quantity data for various items collected in specific "benchmark" years by the International Comparison Program (ICP) under its "basic headings" comprising internationally comparable product categories). The PPPs for "all foods" and for "bread and cereals"—henceforth "food-based" PPPs—derive

from applying the EKS aggregation procedure to the price and quantity data for commodities at the even more detailed "basic heading" level belonging to these sub-aggregate classifications.

Food expenditure plays a significant role in the overall cost of avoiding absolute poverty. "Bread and cereals" PPPs are likely to be especially relevant for poverty assessment, as bread and cereals are likely to play an important role in meeting basic food needs. Other sub-categories making up the ICP "foods" category as a whole in 1985 were "meat," "fish," "milk, cheese and eggs," "oils and fats," "fruits, vegetables and potatoes," and "other food." Although these other categories of foods are also likely to play a role in a balanced diet, they may figure minimally in the most absolutist conception of basic requirements. Using ICP data, Regmi et al. (2001) report that the income elasticities of demand for staple foods (including cereals) are lower than those for non-staple foods in all countries. They also note that this phenomenon is especially marked for the poorest countries. The poor cannot substitute away from staple foods to anything else. Expenditures on these foods play an important role in the actual consumption of the poor, and are also likely to play an important role in the cost of avoiding poverty.

We now examine the effect of adopting food-based PPPs in the construction of an IPL and in its subsequent translation into national currency equivalents. We first followed the Bank's procedure of defining the IPL as the median of the ten lowest official domestic poverty lines (as ranked when the chosen PPP concept is used to convert from national currencies to international dollars), using all of the countries for which we have comprehensive data (i.e. both food-based PPPs and general consumption PPPs) from the same list of official domestic poverty lines (for thirty-three countries) used by the Bank. We call this method A. The IPL constructed by the method is endogenous in the sense that it varies according to the PPP concept used. We then converted the resulting IPL into national currencies, using the same PPP concept as was used in its construction. Table 3.3a lists the IPL and its national currency equivalents constructed in this fashion for each of three distinct PPP concepts ("all consumption," "all food", and "bread and cereals") for which data is available for 1993. In the final column we examine whether the resulting national poverty lines are higher when food-based PPPs are used than when general consumption PPPs are used for both construction and conversion of the IPL. As shown by the summary statistics in Table 3.3b, this is overwhelmingly the case in low income countries—and more so when "bread and cereals" PPPs, likely to be most closely related to the requirements of poverty avoidance, are used. For these poorest countries, the use of "bread and cereals" PPPs rather than general consumption PPPs for both the construction and conversion of the IPL raises "equivalent" national poverty lines by 36 per cent on average (by 26 per cent when weighted by population). Once again, these magnitudes are quite substantial, suggesting that the choice of an alternative PPP concept more reflective

Table 3.3a. 1993 food-based PLs versus general consumption based PL using "endogenous" food-based IPLs calculated by method A

Country	All food PL in national currency ($1.08* PPP food)	Bread and cereals PL in national currency ($1.10* PPP B&C)	All consumption PL in national currency ($1.22* PPP Consume)	Ratio: all food PL / all consumption PL	Ratio: bread and cereals PL / all consumption PL	Country	All food PL in national currency ($1.08* PPP food)	Bread and cereals PL in national currency ($1.10* PPP B&C)	All consumption PL in national currency ($1.22* PPP Consume)	Ratio: all food PL / all consumption PL	Ratio: bread and cereals PL / all consumption PL
Antigua & Barbuda	2.97	3.34	2.83	1.05	1.18	Malawi	1.81	2.21	1.84	0.98	1.20
Australia	1.25	1.74	1.62	0.77	1.07	Mali	139.47	218.23	151.00	0.92	1.45
Austria	17.10	17.95	16.76	1.02	1.07	Mauritius	6.79	6.04	8.37	0.81	0.72
Bahamas	1.26	1.43	1.40	0.90	1.03	Moldova	0.29	0.32	0.22	1.31	1.40
Bangladesh	23.69	25.88	15.36	1.54	1.69	Morocco	3.09	3.17	3.73	0.83	0.85
Belarus	26.08	28.99	17.43	1.50	1.66	Nepal	14.46	15.86	11.17	1.29	1.42
Belgium	42.13	43.71	44.51	0.95	0.98	Netherlands	2.28	2.17	2.48	0.92	0.87
Belize	1.27	1.24	1.42	0.90	0.88	New Zealand	1.66	1.86	1.82	0.91	1.02
Botswana	1.74	2.08	1.68	1.04	1.24	Nigeria	20.93	26.28	13.92	1.50	1.89
Bulgaria	11.73	13.71	9.17	1.28	1.49	Norway	13.05	13.98	11.11	1.17	1.26
Cameroon	149.54	186.78	172.18	0.87	1.08	Pakistan	11.51	11.31	10.00	1.15	1.13
Canada	1.49	1.59	1.55	0.96	1.02	Philippines	7.94	10.34	7.55	1.05	1.37
Congo, Rep.	284.43	287.10	247.51	1.15	1.16	Poland	9.10	9.33	10.07	0.90	0.93
Côte d'Ivoire	194.76	238.64	192.37	1.01	1.24	Portugal	176.39	159.03	141.18	1.25	1.13
Croatia	2.84	2.86	2.44	1.16	1.17	Romania	315.01	193.10	237.76	1.32	0.81
Czech Rep.	11.84	7.74	11.17	1.06	0.69	Russian Fed.	275.95	151.05	225.33	1.22	0.67
Denmark	12.03	13.15	11.16	1.08	1.18	Senegal	134.23	202.53	154.35	0.87	1.31
Dominica	2.64	3.24	2.35	1.12	1.38	Sierra Leone	398.58	598.12	282.94	1.41	2.11
Egypt	1.25	1.50	1.41	0.88	1.06	Singapore	1.29	1.53	1.93	0.67	0.79
Fiji	1.01	1.26	1.02	1.00	1.24	Slovak Rep.	10.66	7.35	12.22	0.87	0.60
Finland	9.49	11.90	7.83	1.21	1.52	Slovenia	97.31	102.94	90.15	1.08	1.14
France	8.11	8.32	7.97	1.02	1.04	Spain	141.77	175.37	142.02	1.00	1.23
Gabon	543.36	385.40	368.69	1.47	1.05	Sri Lanka	19.15	18.74	15.54	1.23	1.21
Germany	2.22	2.46	2.46	0.90	1.00	St. Kitts & Nevis	2.42	3.01	2.31	1.05	1.30
Greece	228.39	305.17	219.50	1.04	1.39	St. Lucia	2.50	3.46	2.24	1.11	1.55
Grenada	2.41	2.45	2.01	1.20	1.22	St. Vincent & the Grenadines	2.41	2.52	1.83	1.32	1.38
Guinea	436.01	534.42	410.29	1.06	1.30	Swaziland	1.23	1.61	1.46	0.84	1.10
Hong Kong	6.61	7.55	8.74	0.76	0.86	Sweden	12.54	13.82	12.20	1.03	1.13
Hungary	42.81	49.42	57.67	0.74	0.86	Switzerland	2.89	2.82	2.67	1.08	1.06
Iceland	123.85	124.10	103.20	1.20	1.20	Thailand	17.25	14.13	16.27	1.06	0.87
Indonesia	715.77	691.24	768.58	0.93	0.90	Trinidad & Tobago	3.52	4.26	3.95	0.89	1.08
Iran	326.78	395.18	310.66	1.05	1.27	Tunisia	0.34	0.29	0.42	0.81	0.68
Ireland	0.81	0.79	0.80	1.01	0.99	Turkey	8806.73	7932.93	7174.62	1.23	1.11
Italy	1897.65	1998.46	1808.45	1.05	1.11	Ukraine	0.01	0.01	0.01	1.45	0.72
Jamaica	16.96	15.77	14.28	1.19	1.10	UK	0.66	0.61	0.76	0.86	0.80
Japan	295.19	337.21	226.48	1.30	1.49	US	1.08	1.10	1.22	0.89	0.90
Kenya	12.97	19.24	14.23	0.91	1.35	Vietnam	2413.95	2464.23	1930.36	1.25	1.28
Korea, Rep.	1149.98	1600.21	839.85	1.37	1.91	Zambia	341.31	551.61	270.14	1.26	2.04
Luxembourg	41.97	41.54	44.86	0.94	0.93	Zimbabwe	2.25	2.95	2.76	0.82	1.07

Table 3.3b. Summary and analysis of Table 3.3a

	Full sample (all available countries)	No high income countries	No high or middle income countries	Low income countries only
Number of countries	78	54	41	15
Number of countries with ratio > 1 for food PL	47	36	26	9
Number of countries with ratio > 1 for bread & cereals PL	57	41	30	14
Number of countries with ratio < 1 for food PL	31	18	15	6
Number of countries with ratio < 1 for bread & cereals PL	21	13	11	1
Arithmetic mean ratio: food PL / all consumption PL (unweighted)	1.07	1.10	1.10	1.14
Geometric mean ratio: food PL / all consumption PL (unweighted)	1.05	1.09	1.09	1.12
Arithmetic mean ratio: bread & cereals PL / all consumption PL (unweighted)	1.16	1.20	1.19	1.41
Geometric mean ratio: bread & cereals PL / all consumption PL (unweighted)	1.12	1.16	1.14	1.36
Percentage of sample population for whom ratio of food PL / all consumption PL > 1 (1993 population)	59.07%	72.14%	71.20%	61.30%
Percentage of sample population for whom ratio of bread & cereals PL / all consumption PL > 1 (1993 population)	59.45%	61.41%	59.66%	75.62%
Arithmetic mean ratio: food PL / all consumption PL (weighted by 1993 population)	1.10	1.17	1.16	1.18
Geometric mean ratio: food PL / all consumption PL (weighted by 1993 population)	1.08	1.15	1.14	1.16
Arithmetic mean ratio: bread & cereals PL / all consumption PL (weighted by 1993 population)	1.13	1.18	1.15	1.31
Geometric mean ratio: bread & cereals PL / all consumption PL (weighted by 1993 population)	1.09	1.12	1.09	1.26

Notes: For method, see text. Country income level classifications are taken from the World Bank's *World Development Report*, 1994.

of the consumption requirements of avoiding poverty would greatly increase the estimated extent of severe income poverty worldwide.

A possible objection to this procedure is that by choosing the IPL as the median of the bottom ten poverty lines of that set of countries for which all three PPPs were available, we have introduced a systematic selection bias. In particular, our endogenous poverty line for all consumption of $1.22 per day differs from the $1.08 of the Bank due to the loss of eleven countries in the sample for which data on food-based PPPs was not available. To deal with this concern to the extent possible, we construct a second set of endogenous IPLs interpreting the Bank's methodology as involving choosing the median of the bottom 30.3 per cent of countries' domestic poverty lines when the chosen PPP concept is employed to convert these into international dollars. Here we use the median of the bottom seven out of twenty-two usable domestic poverty lines to mirror the Bank's use of the bottom ten out of thirty-three usable domestic poverty lines.[18] This second method (which we call method B) is also endogenous, as the IPL depends on the PPP concept employed. When general consumption PPPs are used, this method results in an IPL of $1.10 in 1993 international dollars (very close to the Bank's $1.08).

The IPLs constructed both through method A and method B along with the values of the official domestic poverty lines for which all three PPPs are available (converted into international dollars using the respective PPP concepts) are exhibited in Table 3.5. In Table 3.4 we report the national poverty lines "equivalent" to the endogenous IPL arising from the alternative PPP concepts (calculated through method B). Once again, it is evident that the use of food-based PPP concepts leads to higher national poverty lines than when general consumption PPPs are used both to calculate the IPL and its national currency equivalents. For the low income countries, the use of bread and cereals PPPs leads to national poverty lines that are on average 42 per cent higher (31 per cent when weighted by population). Once again, these magnitudes are quite substantial, suggesting that the choice of an alternative PPP concept less inappropriate for poverty assessment would increase the estimated extent of severe income poverty worldwide.

The distortion arising from the use of general-consumption PPPs instead of all food or bread and cereals PPPs is greater for the poorer countries, even when the IPL varies endogenously. This is shown in the summary statistics grouped by income class in Tables 3.3b and 3.4b and by the regressions in Tables 3.6a and 3.6b. The regressions show that whatever measure of disadvantage is used (per capita GDP measured at exchange rates or at PPP, infant mortality rate or under 5 mortality rate) the extent to which poverty lines based on food-based PPPs are higher than poverty lines based on general consumption PPPs increases as disadvantage increases. The results involving the PPP measure most closely related to the requirements of poverty avoidance (bread and cereals PPPs) show coefficients of the highest magnitude and at a very high level of

Table 3.4a. 1993 food-based PLs versus general consumption based PL using "endogenous" food-based IPLs calculated by method B

Country	All food PL in national currency ($0.92*PPP food)	Bread & cereals PL in national currency ($1.03* PPP B&C)	All consumption PL in national currency ($1.10*PPP Consume)	Ratio: all food PL / all consumption PL	Ratio: bread & cereals PL / all consumption PL
Antigua & Barbuda	2.53	3.13	2.56	0.99	1.22
Australia	1.07	1.63	1.46	0.73	1.12
Austria	14.57	16.81	15.12	0.96	1.11
Bahamas	1.08	1.34	1.26	0.85	1.07
Bangladesh	20.18	24.24	13.85	1.46	1.75
Belarus	22.22	27.15	15.72	1.41	1.73
Belgium	35.89	40.93	40.13	0.89	1.02
Belize	1.08	1.16	1.28	0.85	0.91
Botswana	1.48	1.95	1.51	0.98	1.29
Bulgaria	9.99	12.84	8.27	1.21	1.55
Cameroon	127.39	174.90	155.24	0.82	1.13
Canada	1.27	1.48	1.40	0.91	1.06
Congo, Rep.	242.29	268.83	223.16	1.09	1.20
Côte d'Ivoire	165.91	223.45	173.45	0.96	1.29
Croatia	2.42	2.68	2.20	1.10	1.21
Czech Rep.	10.09	7.24	10.07	1.00	0.72
Denmark	10.25	12.31	10.07	1.02	1.22
Dominica	2.25	3.04	2.12	1.06	1.43
Egypt	1.06	1.40	1.27	0.84	1.11
Fiji	0.86	1.18	0.92	0.94	1.29
Malawi	1.54	2.07	1.66	0.93	1.25
Mali	118.81	204.34	136.15	0.87	1.50
Mauritius	5.78	5.66	7.55	0.77	0.75
Moldova	0.25	0.30	0.20	1.24	1.46
Morocco	2.63	2.97	3.36	0.78	0.88
Nepal	12.32	14.85	10.07	1.22	1.48
Netherlands	1.94	2.03	2.24	0.87	0.91
New Zealand	1.41	1.74	1.64	0.86	1.06
Nigeria	17.83	24.60	12.55	1.42	1.96
Norway	11.12	13.09	10.02	1.11	1.31
Pakistan	9.81	10.59	9.02	1.09	1.17
Philippines	6.77	9.68	6.80	0.99	1.42
Poland	7.75	8.73	9.08	0.85	0.96
Portugal	150.26	148.91	127.29	1.18	1.17
Romania	268.34	180.81	214.38	1.25	0.84
Russian Fed.	235.06	141.44	203.17	1.16	0.70
Senegal	114.35	189.65	139.17	0.82	1.36
Sierra Leone	339.53	560.06	255.11	1.33	2.20
Singapore	1.10	1.43	1.74	0.63	0.82
Slovak Rep.	9.08	6.88	11.02	0.82	0.62

Country	All food PL in national currency ($0.92*PPP food)	Bread & cereals PL in national currency ($1.03* PPP B&C)	All consumption PL in national currency ($1.10*PPP Consume)	Ratio: all food PL / all consumption PL	Ratio: bread & cereals PL / all consumption PL
Finland	8.08	11.14	7.06	1.15	1.58
France	6.91	7.79	7.18	0.96	1.08
Gabon	462.86	360.88	332.42	1.39	1.09
Germany	1.89	2.31	2.21	0.85	1.04
Greece	194.56	285.75	197.91	0.98	1.44
Grenada	2.05	2.30	1.82	1.13	1.26
Guinea	371.42	500.41	369.93	1.00	1.35
Hong Kong	5.63	7.07	7.88	0.71	0.90
Hungary	36.47	46.27	52.00	0.70	0.89
Iceland	105.50	116.20	93.05	1.13	1.25
Indonesia	609.73	647.25	692.98	0.88	0.93
Iran	278.36	370.04	280.10	0.99	1.32
Ireland	0.69	0.74	0.72	0.96	1.03
Italy	1616.51	1871.28	1630.57	0.99	1.15
Jamaica	14.45	14.77	12.87	1.12	1.15
Japan	251.46	315.75	204.20	1.23	1.55
Kenya	11.05	18.02	12.83	0.86	1.40
Korea, Rep.	979.62	1498.38	757.24	1.29	1.98
Luxembourg	35.76	38.90	40.45	0.88	0.96
Slovenia	82.89	96.39	81.28	1.02	1.19
Spain	120.77	164.21	128.05	0.94	1.28
Sri Lanka	16.31	17.55	14.01	1.16	1.25
St. Kitts & Nevis	2.06	2.82	2.08	0.99	1.35
St. Lucia	2.13	3.24	2.02	1.05	1.61
St. Vincent & the Grenadines	2.05	2.36	1.65	1.24	1.43
Swaziland	1.04	1.51	1.32	0.79	1.14
Sweden	10.68	12.94	11.00	0.97	1.18
Switzerland	2.46	2.64	2.41	1.02	1.10
Thailand	14.69	13.23	14.67	1.00	0.90
Trinidad & Tobago	3.00	3.99	3.56	0.84	1.12
Tunisia	0.29	0.27	0.38	0.76	0.70
Turkey	7502.03	7428.11	6468.92	1.16	1.15
Ukraine	0.01	0.01	0.01	1.37	0.75
UK	0.56	0.57	0.69	0.82	0.83
US	0.92	1.03	1.10	0.84	0.94
Vietnam	2056.33	2307.42	1740.49	1.18	1.33
Zambia	290.74	516.50	243.57	1.19	2.12
Zimbabwe	1.92	2.76	2.49	0.77	1.11

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Table 3.4b. Summary and analysis of Table 3.4a

	Full sample (all available countries)	No high income countries	No high or middle income countries	Low income countries only
Number of countries	78	54	41	15
Number of countries with ratio > 1 for food PL	35	29	23	9
Number of countries with ratio > 1 for bread & cereals PL	59	41	30	14
Number of countries with ratio < 1 for food PL	43	25	18	6
Number of countries with ratio < 1 for bread & cereals PL	19	13	11	1
Arithmetic mean ratio: food PL / all consumption PL (unweighted)	1.01	1.04	1.04	1.08
Geometric mean ratio: food PL / all consumption PL (unweighted)	0.99	1.03	1.03	1.06
Arithmetic mean ratio: bread & cereals PL / all consumption PL (unweighted)	1.21	1.25	1.24	1.46
Geometric mean ratio: bread & cereals PL / all consumption PL (unweighted)	1.17	1.20	1.19	1.42
Percentage of sample population for whom ratio of food PL / all consumption PL > 1 (1993 population)	46.54%	61.96%	61.19%	61.30%
Percentage of sample population for whom ratio of B&C PL / all consumption PL > 1 (1993 population)	60.05%	61.41%	59.66%	75.62%
Arithmetic mean ratio: food PL / all consumption PL (weighted by 1993 population)	1.04	1.10	1.10	1.12
Geometric mean ratio: food PL / all consumption PL (weighted by 1993 population)	1.02	1.08	1.08	1.09
Arithmetic mean ratio: bread & cereals PL / all consumption PL (weighted by 1993 population)	1.18	1.22	1.19	1.36
Geometric mean ratio: bread & cereals PL / all consumption PL (weighted by 1993 population)	1.13	1.16	1.14	1.31

Notes: For method, see text. Country income level classifications from the World Bank's *World Development Report, 1994.*

Table 3.5. Calculation of "endogenous" food-based IPLs for 1993 (following the World Bank procedure)

	Using PPPs for all consumption		Using PPPs for all food		Using PPPs for breads & cereals	
	Countries ordered lowest to highest by converted PL	Domestic PL converted to $/day using 1993 PPPs for all consumption	Countries ordered lowest to highest by converted PL	Domestic PL converted to $/day using 1993 PPPs for all consumption	Countries ordered lowest to highest by converted PL	Domestic PL converted to $/day using 1993 PPPs for all consumption
1	Zambia	0.88	Zambia	0.62	Zambia	0.39
2	Indonesia	1.05	Bangladesh	0.68	Bangladesh	0.64
3	Thailand	1.10	Nepal	0.76	Nepal	0.70
4	Nepal	1.10	Thailand	0.92	Kenya	1.03
5	Bangladesh	1.19	Indonesia	1.00	Indonesia	1.06
6	Tunisia	1.26	Pakistan	1.15	Thailand	1.14
7	Pakistan	1.50	Sri Lanka	1.19	Pakistan	1.20
8	Kenya	1.55	Tunisia	1.38	Sri Lanka	1.24
9	Sri Lanka	1.65	Kenya	1.50	Egypt	1.45
10	Egypt	1.71	Turkey	1.51	Philippines	1.56
11	Morocco	1.78	Egypt	1.71	Tunisia	1.67
12	Turkey	2.10	Morocco	1.90	Turkey	1.71
13	Philippines	2.37	Philippines	1.99	Morocco	1.88
14	Jamaica	2.85	Jamaica	2.13	Jamaica	2.33
15	Poland	4.49	Japan	4.30	Japan	3.83
16	Japan	6.33	Poland	4.40	Poland	4.37
17	UK	7.34	Belgium	7.48	Belgium	7.34
18	Belgium	7.99	UK	7.52	UK	8.24
19	US	10.79	Canada	10.72	Canada	10.23
20	Germany	11.50	US	10.79	Germany	10.34
21	Canada	11.61	Germany	11.27	US	10.79
22	Australia	13.92	Australia	15.92	Australia	11.68

Method A: Median of bottom ten countries in sample

IPL using PPPs for all consumption	1.22
IPL using PPPs for all food	1.08
IPL using PPPs for bread & cereals	1.10

Method B: Median of bottom 30.3% of countries in sample

IPL using PPPs for all consumption	1.10
IPL using PPPs for all food	0.92
IPL using PPPs for bread & cereals	1.03

statistical significance. By using general consumption PPPs, the Bank grossly underestimates the costs in national currency of purchasing a quantity of food equivalent to that which can be purchased in the United States. If the Bank maintains its money-metric methodology of global poverty assessment but substitutes less inappropriate PPPs this can be expected to raise national poverty lines and associated poverty headcounts. We shall ultimately argue, however, that there is a still better alternative.

Table 3.6a. 1993 ratio of food, and bread and cereals PLs to consumption PL using "endogenous" food-based IPLs calculated by method A

	Dependent variable: ratio of 1993 food PL to 1993 all consumption PL				Dependent variable: ratio of 1993 bread & cereals PL to 1993 all consumption PL			
Log per capita GDP In constant 1995 US dollars at exchange rates	-0.032** (0.014) [-2.33]				-0.064*** (0.021) [-3.11]			
Log GDP in US dollars at PPP		-0.044** (0.020) [-2.15]				-0.116*** (0.029) [-3.95]		
Log infant mortality rate			0.026 (0.022) [1.20]				0.088*** (0.033) [2.70]	
Log under 5 mortality rate				0.025 (0.020) [1.24]				0.085** (0.029) [2.93]
Number of observations	78	78	73	73	78	78	73	73
R-squared	0.07	0.06	0.02	0.02	0.11	0.17	0.09	0.11

Table 3.6b. 1993 ratio of food, and bread and cereals PLs to consumption PL using "endogenous" food-based IPLs calculated by method B

	Dependent variable: ratio of 1993 food PL to 1993 all consumption PL				Dependent variable: ratio of 1993 bread & cereals PL to 1993 all consumption PL			
Log per capita GDP in constant 1995 US dollars at exchange rates	-0.031** (0.013) [-2.36]				-0.067*** (0.021) [-3.10]			
Log GDP in US dollars at PPP		-0.042** (0.019) [-2.18]				-0.120*** (0.030) [-3.93]		
Log infant mortality rate			0.025 (0.021) [1.22]				0.091*** (0.034) [2.69]	
Log under 5 mortality rate				0.024 (0.019) [1.26]				0.088*** (0.030) [2.91]
Number of observations	78	78	73	73	78	78	73	73
R-squared	0.07	0.06	0.02	0.02	0.11	0.17	0.09	0.11

Notes: We obtain our data on per capita GDP at market exchange rates in constant 1995 US dollars and our data on per capita GDP converted at PPP from the Bank's 2000 World Development Indicators. Our data on infant mortality rates and under 5 mortality rates were provided by UNICEF.

The effect of PPP-influenced variation in national poverty lines on poverty headcounts

What is the effect of employing inappropriate PPPs on the apparent incidence of poverty? We answer this question for the set of poor countries for which we have both broad gauge general consumption PPPs and food-based PPPs as well as household survey based data about the size and distribution of income. For these countries, we estimate the headcount poverty associated with different PPP concepts using the POVCAL software program designed and distributed by the Bank. We report all cases for which the necessary data was available and for which the program generated theoretically consistent results.

We find that using food-based PPPs rather than general consumption PPPs both to construct and to convert an IPL into local currency units raises poverty headcount ratios substantially. For the set of countries for which we have a complete set of data, on average, as shown in Tables 3.7a and 3.7b, a 1 per cent increase in the poverty line due to the use of all-food PPPs rather than general consumption PPPs is associated with a 0.96 per cent increase (method A) and a 0.95 per cent increase (method B) in the poverty headcount ratio. Similarly, on average, as shown in the tables, a 1 per cent increase in the poverty line due to the use of bread and cereals PPPs rather than general consumption PPPs is associated with a 0.96 per cent increase (method A) and a 1.02 per cent increase (method B) in the poverty headcount ratio. Roughly, then, a 1 per cent increase in the poverty line is associated with a 1 per cent increase in the poverty headcount ratio. The effect of using all food rather than general consumption PPPs is to raise the average headcount ratio from 39.85 to 44.66 per cent (method A) and from 33.88 to 35.59 per cent (method B). The effect of using bread and cereals PPPs rather than general consumption PPPs is much more dramatic. It raises the average headcount ratio from 39.85 to 60.31 per cent (method A) and from 33.88 to 56.81 per cent (method B).

How "representative" are the World Bank's International Poverty Lines?

A justification offered by the authors of the Bank's poverty measurement methodology for the IPLs they employ is that the domestic poverty lines of several poor countries are close to its lower ($1 per day) IPL when the former are converted into international dollars using general consumption PPPs. Chen and Ravallion (2001) and Ravallion (1998) report regressions attempting to establish this and state, "The poverty rate on this basis must thus be deemed a conservative estimate, whereby aggregate poverty in the developing world is defined by perceptions of poverty found in the poorest countries" (Chen and Ravallion, 2001, p. 288). We show in Figure 3.1, which represents the relation between domestic poverty lines as converted to international dollars using various PPP concepts and consumption per capita, that this statement is not

Table 3.7a. Comparisons of PLs and estimated poverty headcounts, 1993: selected countries' PLs and headcounts using method A
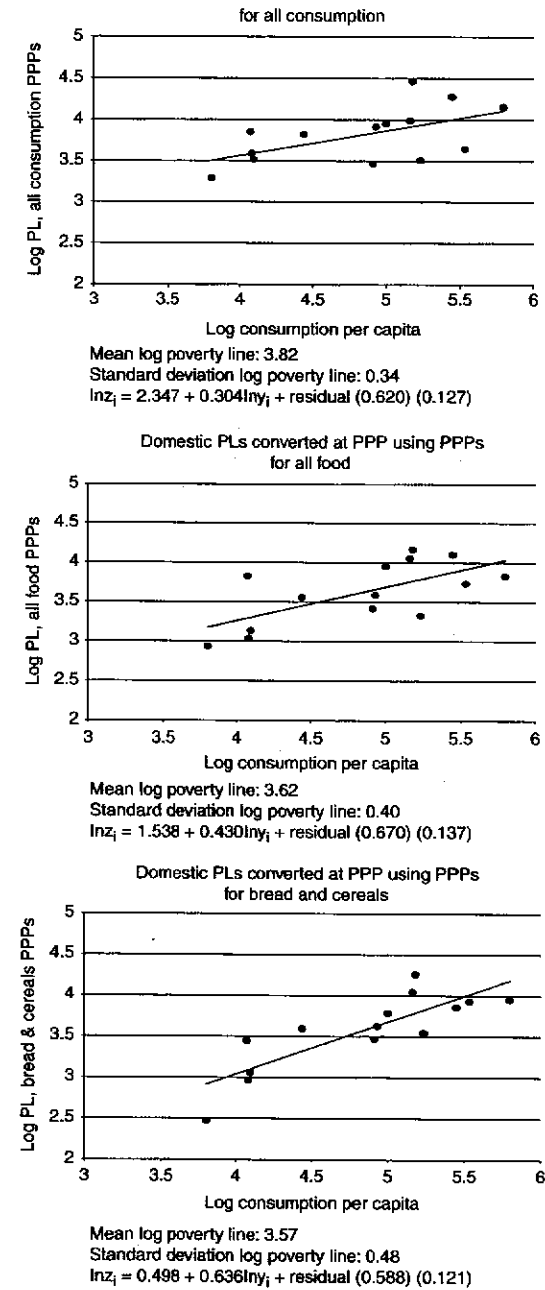
Country	Year	Estimate of headcount ratio for consumption PL (PL = CPI*1.22*PPP Consumption)	Estimate of headcount ratio for all food PL (PL = CPI*1.08*PPP All Food)	Estimate of headcount ratio for bread & cereals PL (PL = CPI*1.10*PPP B&C)	Ratio of headcount for all food PL to headcount for consumption PL	Ratio of headcount for breads & cereals PL to headcount for consumption PL	Ratio of (HC for food PL / HC for consumption PL) to (Food PL / consumption PL)	Ratio of (HC for B&C PL / HC for consumption PL) to (B&C PL / consumption PL)
Bangladesh	1995-6	30.68	63.66	69.56	2.08	2.27	1.35	1.35
Côte d'Ivoire	1995	15.24	15.78	25.66	1.04	1.68	1.02	1.36
Kenya	1994	49.71	44.58	66.12	0.90	1.33	0.98	0.98
Mali	1994	63.39	59.85	77.65	0.94	1.22	1.02	0.85
Nepal	1995-6	33.25	51.29	57.69	1.54	1.73	1.19	1.22
Nigeria	1996-7	79.51	90.36	93.89	1.14	1.18	0.76	0.63
Senegal	1995	16.33	10.94	30.00	0.67	1.84	0.77	1.40
Sierra Leone	1989	60.09	68.53	79.23	1.14	1.32	0.81	0.62
Zambia	1996	66.38	75.99	89.47	1.14	1.35	0.91	0.66
Geometric mean		39.85	44.66	60.31	1.12	1.51	0.96	0.96

Table 3.7b. Comparisons of PLs and estimated poverty headcounts, 1993: selected countries' PLs and headcounts using method B

Country	Year	Estimate of headcount ratio for consumption PL (PL = CPI*1.22*PPP Consumption)	Estimate of headcount ratio for all food PL (PL = CPI*1.08*PPP All Food)	Estimate of headcount ratio for bread & cereals PL (PL = CPI*1.10*PPP B&C)	Ratio of headcount for all food PL to headcount for consumption PL	Ratio of headcount for breads & cereals PL to headcount for consumption PL	Ratio of (HC for food PL / HC for consumption PL) to (Food PL / consumption PL)	Ratio of (HC for B&C PL / HC for consumption PL) to (B&C PL / consumption PL)
Bangladesh	1995–6	23.44	51.72	65.23	2.21	2.78	1.51	1.59
Côte d'Ivoire	1995	11.12	9.55	22.25	0.86	2.00	0.90	1.55
Kenya	1994	44.01	36.09	62.67	0.82	1.42	0.95	1.01
Mali	1994	58.76	52.42	75.4	0.89	1.28	1.02	0.85
Nepal	1995–6	26.47	39.96	53.18	1.51	2.01	1.23	1.36
Nigeria	1996–7	75.8	86.91	93.02	1.15	1.23	0.81	0.63
Senegal	1995	12.21	6.3	26.6	0.52	2.18	0.63	1.60
Sierra Leone	1989	57.73	64.47	77.5	1.12	1.34	0.84	0.61
Zambia	1996	61.71	69.56	88.11	1.13	1.43	0.94	0.67
Geometric mean		33.88	35.59	56.81	1.05	1.68	0.95	1.02

Notes: We construct headcount estimates using the World Bank's Povcal Program (see <http://www.worldbank.org/html/prdph/lsms/tools/povcal/> [accessed on June 15, 2009]). Shaohua Chen of the World Bank has provided data on total national final household consumption expenditure in national currency units. We use population data from the World Bank's 2000 *World Development Indicators*.

for all consumption

Mean log poverty line: 3.82
Standard deviation log poverty line: 0.34
$\ln z_i = 2.347 + 0.304\ln y_i + \text{residual} \ (0.620) \ (0.127)$

Domestic PLs converted at PPP using PPPs for all food

Mean log poverty line: 3.62
Standard deviation log poverty line: 0.40
$\ln z_i = 1.538 + 0.430\ln y_i + \text{residual} \ (0.670) \ (0.137)$

Domestic PLs converted at PPP using PPPs for bread and cereals

Mean log poverty line: 3.57
Standard deviation log poverty line: 0.48
$\ln z_i = 0.498 + 0.636\ln y_i + \text{residual} \ (0.588) \ (0.121)$

Figure 3.1 Domestic poverty lines converted into dollars using PPPs for food versus PPPs for general consumption, poorest fourteen countries.

necessarily robust to the choice of PPP concept. In that figure, we replicate their core result that there is a (visually) relatively "flat" cluster of poor countries whose official domestic poverty lines are close to one another if they are converted into international dollars using general consumption PPPs. (Our result is not numerically identical to the Chen and Ravallion 2001 result since we use data on consumption per capita from national income accounts rather than the household survey data they use, due to our lack of access to the latter for all countries.) It should be clarified that the purportedly "flat" relationship is not especially flat, since the poverty lines in question vary for the poorest fourteen countries between around 26 to around 87 international dollars (1993) per month.

When these same official domestic poverty lines are converted into international dollars using food-based PPPs, the relationship between consumption and the domestic poverty line is similar, with the highest poverty line for the poorest fourteen countries being around 67 international dollars and the lowest poverty line being around 18 international dollars (1993) per month. When bread and cereals PPPs rather than general consumption PPPs are used, a still steeper relationship between consumption and the domestic poverty line becomes evident, with the poverty lines for the poorest fourteen countries varying between around 12 and around 67 international dollars (1993) per month. The elasticity of domestic poverty lines with respect to per capita income *doubles* for the poorest countries composing the cluster when bread and cereals PPPs rather than all consumption PPPs are used.

It is not obvious that the IPL chosen by the Bank is innocuous because it matches closely the official domestic poverty lines of a wide range of poor countries. The validity of this claim appears to depend on the use of the very PPP concept that is being challenged, and indeed it is not obvious that it is true even when general consumption PPPs are employed: the domestic poverty lines employed by the Bank in its "inductive" procedure for constructing an IPL are fixed by officials of governmental and intergovernmental agencies (in many cases by authors of the Bank's own country documents). Influenced by political and other considerations, such domestic poverty lines may be a poor reflection of "perceptions of poverty found in the poorest countries" (Chen and Ravallion, 2001, p. 288). It has also already been noted that both the lower and the upper IPL are substantially lower than the cost of meeting basic human requirements in the base country (the United States) in relation to whose currency the IPL is defined, which should not be the case if PPPs used are appropriate and the IPL employed corresponds to the cost of attaining basic human requirements.

Comparison of domestic poverty lines in poor countries and the $1 and $2 per day IPLs is possible, by inferring the relative values of these poverty lines from the national headcount estimates associated with these different lines for the same survey years and countries. We have undertaken a detailed study of this kind, using headcount estimates from online databases and World

Development Reports in the 1990s. The conclusion that can be drawn is that for the majority of country years, the $1 per day PPP 1993 line is notably lower, and the $2 per day PPP 1993 line higher than the domestic poverty line. This conclusion suggests that, even to the extent that domestic poverty lines are accepted as indicating "perceptions of poverty" in poor countries, neither IPL really captures these perceptions, although the upper and lower IPL together may offer a better picture of poverty than does either independently.

It is interesting to note that for a large number of "spells" in which poverty estimates are available for the same country and two distinct years, the trends of poverty identified according to the Bank's higher or lower IPL are different in direction than those identified according to national poverty lines. This discrepancy is deeply concerning, and points to the poor state of poverty monitoring worldwide.

For countries in Latin America, the influential poverty estimation methodology of the Economic Commission for Latin America (ECLA), developed by Oscar Altimir in 1979, provides another comparator to the poverty estimates of the Bank. The ECLA methodology makes an attempt to set poverty lines that account for nutritional and non-nutritional requirements. Although there are some reasons to doubt the adequacy of this methodology (in particular its implicit assumption that all households have the structure of a nationally representative household) it seems likely that its poverty estimates are more appropriate for Latin America than those produced by the Bank. It is interesting to note that ECLA estimates of the poverty headcount ratio for its lower poverty line are substantially higher than those of the Bank for its lower ($1.08 per day PPP 1993) IPL.[19] ECLA estimates of the poverty headcount ratio for its higher poverty line are also substantially higher than those of the Bank for its higher ($2.15 per day PPP 1993) IPL. These discrepancies suggest the need for caution in accepting the claim that the IPL captures "perceptions of poverty" in poor countries.

Can the money-metric approach be saved?

In response to the criticisms of the Bank's approach offered by us in early versions of this paper as well as by other authors, a number of proposals have emerged as to how to save the "money-metric" approach to poverty assessment from the difficulties it faces. We discuss three of these proposals here.

The first proposal, initiated by the World Bank in the aftermath of initial circulations of the criticisms in this paper, is the so-called PPPP (or poverty-related PPP) project of the World Bank (in its capacity as host of the International Comparison Program). The proposal is to maintain the Bank's present approach but to introduce new "poverty-related" PPPs focused more directly on the commodities likely to be required to avoid poverty.

In our view, although this proposal constitutes an improvement over the current approach, it is inadequate for a number of reasons. First, it does not address the difficulty of the meaninglessness of the present IPLs, but merely seeks to reduce problems associated with their translation into local currency units. Second, it is impossible to define poverty-related PPPs without having a clear conception of the commodities required to avoid poverty, which in turn requires an achievement-based poverty concept. However, if such a concept exists, then PPPs are not needed at all. Rather, as discussed further in the next section, poverty lines corresponding to this concept can be directly constructed in each country. Existing proposals for the construction of poverty-related PPPs propose that quantity and price data be collected for specific commodities, reflecting the pattern of consumption of lower quantiles of the income distribution in different countries. This proposal is highly unsatisfactory, since the same quantiles of the income distribution have very different real incomes in different countries. In addition, the empirical pattern of their actual consumption, reflecting adaptive preferences and endogenous adjustments to duress, offers an inadequate guide to the costs of poverty avoidance. Third, although PPPPs can diminish the problem of commodity irrelevance in the calculation of PPPs, they do nothing to address the problem of country irrelevance.

The second proposal, presented by Deaton (2000, 2003) recommends the following five step formula:

1. start from the $ PPP 1993 poverty lines in Chen and Ravallion (2001); 2. ask UNDP and World Bank country offices to check these lines; 3. modify the lines to correct serious errors revealed at the country level; 4. update the lines over time using domestic price indexes, without further reference to PPP exchange rates; 5. if step 4 is carried out on an annual basis, as is warranted by the importance of the counts, then major improvements to PPP exchange rates could be incorporated infrequently, no more than once a decade.

It is not clear what Deaton means by checking for "serious errors." Presumably, he has in mind that the poverty lines employed should not reflect a money-metric approach at all but rather reflect an achievement-based conception of some kind. If so, would it not be better to begin with such a conception? As it stands, it is unclear what Deaton's proposed approach achieves other than to arrive at a set of more acceptable poverty lines (one for each country) reflecting potentially very different levels of real income (since there is no requirement to coordinate the process of "checking" the poverty lines in relation to a common achievement-based conception) and misleadingly bearing the common label of "$1 per day" or "$2 per day." This proposal solves the underlying problems of the money-metric approach only by substituting a set of national poverty lines, which possess no common interpretation but bear a common flag, apparently for public relations purposes.

The third approach, recently presented by Kakwani and Son (2006), recommends, as best we understand it, the following six step procedure. First, a reference group deemed appropriate in one or more reference countries deemed appropriate (for example, the bottom quintile of the consumption distribution in Bangladesh) should be identified. For the average food consumption pattern of that reference group the average cost of calories (i.e. the number of calories in the average food consumption basket of the reference group divided by the cost of that basket) in international dollars should be identified. The PPPs used should preferably be ones based on relative international prices of commodities figuring significantly in the consumption pattern of those deemed poor. Call the resulting international dollar amount the international dollar reference cost of calories. Second, translate this international dollar reference cost of calories into local currency amounts in each country by employing PPPs. The resulting "equivalent" local currency value in each country may be called the local currency reference cost of calories. This amount may also be translated into the local currency value of a given survey year through the use of an appropriate and available CPI. Third, a per capita calorie norm should be identified. This calorie norm can if thought appropriate be permitted to vary with type of household (as defined by age and gender composition) and country.

Fourth, the per capita cost to each household of achieving this calorie norm, given the average cost of calories identified earlier in each country (i.e. this cost of calories times the per capita calorie norm) should be identified. This amount may be referred to as the food poverty line for each household.

Fifth, the cost of achieving the non-food requirement for each household in each country should be identified. This should be done as follows. Identify the households in each country whose value of per capita food consumption is the same as the food poverty line for the household. These are households whose local currency average cost of calories is the same as the local currency reference cost of calories. Interpret these households in all countries as consisting of individuals possessing the same level of subjective preference satisfaction. Identify the average per capita local currency value of the total consumption of these households in each country. Subtract the food poverty line from this average per capita local currency value. Identify the resulting remainder as the non-food poverty line for households of each type in each country, making further ad hoc adjustments as thought appropriate in order to capture non-food requirements in each country.

Sixth, identify a household as poor if its per capita consumption falls beneath the total poverty line defined by summing the food poverty line calculated in step four and the non-food poverty line calculated in step five.

There are at least three central problems with this approach. The first problem is that the choice of a reference group and an associated reference consumption basket involves circularity: it cannot be determined what the appropriate choice of reference group is without first resolving the problem that we are attempting to solve—the identification of the poor and the requirements of poverty avoidance. The second problem is that the approach relies on the

existence of appropriate PPPs which may be used to determine the international dollar reference cost of calories and its local currency "equivalent." As such, it is subject to all of the problems of country and commodity irrelevance identified above. There is circularity here too: it cannot be known what the appropriate PPPs to employ are without having first identified an invariance concept (in relation to which "equivalent" purchasing power is to be understood) and no such concept is identified here. The third problem is that the interpretation attached to households possessing the same average cost of calories—that they possess a common level of subjective preference satisfaction—can neither be readily justified, nor serve as the basis for constructing a non-food poverty line. It cannot be readily justified because it relies on strong assumptions regarding the uniformity of the preferences of individuals and of the manner in which they transform commodities into final subjective preference satisfaction regardless of the diverse contexts in which they live. It also assumes that subjective preference satisfaction is what we are ultimately concerned with, and that such satisfaction can be inferred and treated as interpersonally comparable. The level of expenditure undertaken by households possessing the same average cost of calories may in fact be insufficient to achieve either the nutritional or the non-nutritional requirements of members of such households.

Conclusion and an alternative

Income poverty is, as we have noted, only one aspect of poverty, and other poverty estimates, based on under-nutrition, infant mortality, access to health services, and other indicators can continue to inform us even in the absence of usable figures concerning global income poverty. International development targets should appropriately continue to focus on these measures of deprivation in the world, which are not to the same extent subject to the concerns we have outlined above, while a new procedure for the global assessment of income poverty is developed and implemented.

A new procedure is urgently needed. There are strong reasons to doubt the validity and meaningfulness of the estimates of the level, distribution and trend of global income poverty provided by the Bank in recent years. These reasons for doubt revolve around the lack of a well-defined IPL that permits meaningful and reliable inter-temporal and inter-spatial comparisons, the use of an inappropriate measure of purchasing power equivalence, the reporting of falsely precise results, and inadequately justified inferences.

All of these flaws are likely to systematically distort estimates of the level and trend of global income poverty. There is some reason to think that the distortion is in the direction of understating the extent of income poverty. Whether this is so cannot be known with confidence in the absence of better founded estimates. Statements that global income poverty is decreasing have no

evidential justification in light of the uncertainties associated with present and past estimates of its extent. The problems are avoidable, although their avoidance would require a fundamental change in the methodology of global poverty assessment. The "$1-per-day" poverty estimates regularly calculated and published by the World Bank cannot adequately serve the purposes they are intended to serve. In particular, the monitoring of world poverty, necessary to assess whether the Millennium Development Goals are being achieved, cannot reliably be undertaken at present.

Our rejection of the Bank's procedure does not support the skeptical conclusion that the attempt to provide a standard of income poverty comparable across time and space is doomed to fail. There exists a much better procedure which can be easily implemented. This alternative procedure would construct poverty lines in each country that possess a *common* achievement interpretation. Each poverty line would refer to the local cost of achieving a specific set of ends. These ends should be specified at the global level and can include elementary human requirements such as the ability to be adequately nourished. Each poverty line should reflect the cost of purchasing commodities containing relevant characteristics (for example, calorie content) that enable individuals to achieve the desired ends (such as specified elementary human requirements, however conceived).[20] Poverty lines defined in this way would have a common meaning across space and time, offering a consistent framework for identifying the poor. As a result, they would permit meaningful and consistent inter-country comparison and aggregation. The proposed procedure focuses not on whether the incomes of poor people are sufficient in relation to an abstract IPL but rather on whether they are sufficient to achieve a set of elementary requirements. In effect, it does away with the need for an IPL, by focusing instead on a common poverty concept to be applied in all countries. As such, the proposed procedure altogether eliminates the need for PPPs (which are central to the existing money-metric approach) and avoids the many problems associated with these.

To be sure, income poverty statistics based on the procedure we suggest cannot be objective and precise in the way of measurements of physical distance. There are differences of opinion about the relative significance of various elementary human requirements, about the relevance of interpersonal variations in such requirements, about the quantity and quality of commodities needed to achieve these basic requirements, and about the appropriate degree of deference to local circumstances. Such disagreements can often be narrowed through reasonable collective reflection and debate to a sufficient degree to create a framework for action. If that is not possible, multiple conceptions (concerning, for instance, the relevant elementary requirements and how they are to be empirically interpreted) can be retained. In the context of assessing severe poverty (rather than living standards more generally) such differences will in any case be relatively narrow.

Although approximations will necessarily be involved in an alternative exercise of global poverty measurement (as in any empirical estimation exercise), it

will at least be possible to interpret the resulting errors in estimation in a transparent, consistent, and meaningful way. Until and unless the task of counting the global poor is better conducted, we will simply not know very much about the extent of income poverty and its evolution over time. Such ignorance also makes it challenging to determine whether and to what extent the current world order is benefiting or harming the global poor.

The heart of an alternative (and more credible) approach to measuring global poverty is to carry out on a world scale an equivalent of the poverty measurement exercises conducted regularly by national governments, in which poverty lines that possess an explicit achievement interpretation are developed. In many large federal countries in which there are significant internal variations in tastes and in prices, workable means for accommodating internal differences within a consistent aggregate poverty assessment exercise have been implemented. Today a similar approach is needed at the global level. It should begin with a transparent and consultative process of identifying at the global level a core conception of poverty defined in terms of an achievement interpretation. This achievement interpretation can focus on a set of elementary requirements (e.g. the ability to be adequately nourished) and the characteristics of commodities (e.g. nutritional content) necessary to achieve them. This core conception should be used to define poverty lines. These poverty lines can then be applied to available survey data so as to identify the poor. Such a procedure, and such a procedure alone, can produce consistent estimates of poverty that are comparable across space and time.[21] A national poverty commission, supported by international funds, should be empowered in each country to construct and update poverty lines over time, drawing on national and international expertise, undertaking periodic and meaningful public consultations, and presenting its reasoning and conclusions to public scrutiny. Such a commission should strive to maintain an invariant relation between the poverty lines established and the fixed achievement interpretation required to be given to these poverty lines worldwide.

Reddy, Visaria, and Asali (2008) show that inter-country comparisons of poverty based on the construction of poverty lines related to a common achievement concept is possible, even employing existing surveys that were not designed to support such comparison. They adopt a nutritional norm and construct poverty estimates for three countries in three continents (Nicaragua, Tanzania, and Vietnam). They show that both ordinal and cardinal comparisons of poverty can be influenced by whether the money-metric approach or a requirement-based approach of this admittedly limited type is used.

Improvement and coordination in survey protocols, so as to create an improved basis for such analysis, are also required. A new international effort to create common protocols for survey design and analysis, and for poverty line construction, is necessary. Such an effort is complementary to, and can substantially strengthen, national poverty assessment exercises. The UN's historic achievement in promoting a common statistical protocol in the form of the System of National Accounts—an achievement which could not have been dreamed of before the Second World War—testifies to the important role of international coordination in such a process. It is necessary today to launch the equivalent of this effort in the area of poverty estimation.

We are surprised that the Bank has been publishing regular income poverty statistics for twenty years now—which are reported with six-digit precision and widely used in academic research, policy analyses, and popular media all over the world—without even a hint of public recognition of the deep flaws in their construction. It is hard not to see this fact as indicative of the low priority that has hitherto been attached to the global problem of persistent severe poverty.

Notes

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1. The New School for Social Research, Department of Economics.
2. Yale University, MacMillan Center and Department of Philosophy.
3. See Ahluwalia, Carter, and Chenery (1979).
4. Remarks to the G-20 Finance Ministers and Central Governors, Ottawa, November 17, 2001. Wolfensohn relied on how the number of persons living below $1 per day was said to have evolved in World Bank (2001, p. 8). Not long after his speech, the World Bank revised this estimate, affirming that the number of those living below $1 per day had declined by "almost 400 million" between 1981 and 2001 (Chen and Ravallion, 2004, p. 141).
5. See WDR 1999/2000, p. 25. This is the very period for which the Bank later showed the steepest decline in the global poverty headcount (World Bank, 2001, p. 8).
6. In two recent papers, Sala-i-Martin (2002, 2006) has produced a set of estimates of global income poverty. His methodology, however, involves applying the World Bank's $1 (and $2) a day poverty lines to a world income distribution profile generated using country GDP data converted at PPPs, and is therefore subject to all of the objections we make to the World Bank's estimates of global poverty, as well as to others that we do not state here. The alternative estimates provided in Bhalla (2002) and in Deaton and Dupriez (2009) are subject to similar concerns.
7. <http://iresearch.worldbank.org/PovcalNet/jsp/index.jsp> accessed on June 15, 2009.
8. "A ... representative, absolute poverty line for low income countries is $31, which (to the nearest dollar) is shared by six of the countries in our sample, namely Indonesia, Bangladesh, Nepal, Kenya, Tanzania, and Morocco, and two other countries are close to this figure (Philippines and Pakistan)" (Ravallion, Datt, and van de Walle, 1991).
9. The following statement is illustrative: "PPPs measure the relative purchasing power of different currencies over equivalent goods and services. They are international

price indexes that allow comparisons of the real value of consumption expenditures between countries in the same way that consumer price indexes allow comparisons of real values over time within countries...The resulting PPP indexes measure the purchasing power of national currencies in 'international dollars' that have the same purchasing power over GDP as the US dollar has in the United States" (Notes to Table 4.10, World Bank World Development Indicators 1998).

10. Two short, thoughtful research notes by Michael Lipton (1996) and Shahin Yaqub (1996) contain a few of the insights we have developed further here regarding the importance of PPPs in global poverty assessment. The issue is also noted although not fully explored by Deaton (2000).

11. For a fuller discussion of the conceptual relation between index numbers expressing money "equivalence" and concepts of achievement invariance, see Reddy and Plener, 2006.

12. An example is the *Economist's* "Big Mac" PPP index, which assesses the purchasing power of all national currencies in relation to a single commodity by valuing each currency in inverse proportion to the retail price of a Big Mac.

13. This refers to the property that rank orderings of countries are maintained when the procedure for PPP estimation is applied only to a proper subset of the countries.

14. The underlying problem is that the vector of PPPs for 1993 is not a scalar multiple of the vector of PPPs for 1985.

15. Chen and Ravallion (2001, pp. 290). There is more modest five-digit precision in WDR 2000/1, p. 23, and Chen and Ravallion (2004).

16. We have not been able to find any public enumeration of the countries that participated in the 1993 benchmark survey.

17. These different estimates and their differences are discussed in Heston (undated).

18. The Bank used the median of the converted poverty lines of the following countries to construct its $1.08 1993 PPP poverty line: Bangladesh, China, India, Indonesia, Nepal, Pakistan, Tanzania, Thailand, Tunisia, and Zambia. We lack data on PPP conversions for food and bread and cereals for 1993 for China, India, and Tanzania.

19. See, for example, Appendix E in Reddy and Minolu (2006).

20. We do not believe that it is necessary finally to resolve here the issue of whether these needs should be conceptualized in terms of elementary capabilities or in some other manner. An adequately operational approach to global poverty assessment need not require final agreement on this issue.

21. See Reddy and Plener (2006).

Bibliography

Ahluwalia, M.S., Carter, N.G., and Chenery, H.B. (1979) 'Growth and Poverty in Developing Countries'. *Journal of Development Economics*, 6, pp. 299–341.

Ahmad, S. (1992) 'Regression Estimates of Per Capita GDP Based on Purchasing Power Parities'. World Bank Policy Research Working Paper 956, Washington DC.

—— (1994) 'Improving Inter-spatial and Inter-temporal Comparability of National Accounts'. *Journal of Development Economics*, 44, pp. 53–75.

Anand, S. and Kanbur, R. (1991) 'International Poverty Projections'. World Bank Policy, Research, and External Affairs Working Paper No. 617, Washington DC.

Bhagwati, J. (1983) 'Why Are Services Cheaper in the Poor Countries?' *Economic Journal*, 94, pp. 279–86.

Bhalla, Surjit S. (2002) *Imagine There is No Country.* Washington, DC: Institute for International Economics.

Biru, Y. (1999) 'The Purchasing Power of the Poor: A Case Study of Zambia'. In F. G. Pyatt and M. Ward (eds.) *Identifying the Poor*, Amsterdam: IOS Press.

Boskin, M. J. et al. (1998) 'Consumer Prices, the Consumer Price Index, and the Cost of Living'. *Journal of Economic Perspectives*, 12, pp. 3–26.

Chen, S. and Ravallion, M. (2001) 'How Did the World's Poorest Fare in the 1990s?' *Review of Income and Wealth*, 47(3), pp. 283–300.

—— —— (2004) 'How Have the World's Poorest Fared since the Early 1980s?' *World Bank Research Observer*, 19, pp. 141–69. <http://wbro.oupjournals.org/cgi/content/abstract/19/2/141> accessed on May 6, 2008.

—— —— and Datt, G. (1994) 'Is Poverty Increasing In the Developing World?' *Review of Income and Wealth*, 40(4), pp. 359–76.

Deaton, A. (2000) 'Counting the World's Poor: Problem and Possible Solutions'. Mimeo, Princeton University.

—— (2003) 'How to Monitor Poverty for the Millennium Development Goals'. Mimeo, Research Program in Development Studies, Princeton University.

—— and Dupriez, O. (2009) 'Global Poverty and Global Price Indexes', Working paper, Princeton University. http://www.princeton.edu/indeaton/downloads/Global_Poverty_and_Global_Price_Indexes.pdf>, accessed September 30, 2009.

Diewert, E. (1990) 'Axiomatic and Economic Approaches to International Comparisons'. In A. Heston and R. Lipsey (eds.) *International and Interarea Comparisons of Prices, Income and Output,* NBER, Chicago: University of Chicago Press.

Geary, R. C. (1958) 'A Note on the Comparison of Exchange Rates and Purchasing Power Between Countries'. *Journal of the Royal Statistical Society,* 121, pp. 97–9.

Heston, A. (undated) 'Treatment of China in PWT 6'. Mimeo.

—— (2000) 'PPP Comparisons in the ESCAP Region: What Have We Learned?' Mimeo.

—— and Lipsey, R. E. (1999) *International and Interarea Comparisons of Income, Output, and Prices.* Chicago: University of Chicago Press.

—— and Summers, R. (1995) 'Price Parities of Components of Gross Domestic Product in 35 Developing Countries: 1985'. Center for International Comparisons at the University of Pennsylvania (CICUP).

—— —— (1997) 'PPPs and Price Parities in Benchmark Studies and the Penn World Table: Uses'. CICUP.

—— —— Aten, B., and Nuxoll, D. A. (1995) 'New Kinds of Comparisons of the Prices of Tradables and Nontradables'. CICUP.

Hildebrand, F. B. (1992) *Methods of Applied Mathematics.* New York: Dover.

Jorgenson, D. and Slesnick, D. (1999) 'Indexing Government Programs for Changes in the Cost of Living'. *Journal of Business and Economic Statistics,* 17(2).

Kakwani, N. (1993) 'Statistical Inference in the Measurement of Poverty'. *Review of Economics and Statistics,* 75(4).

—— and Son, H. H. (2006) 'New Global Poverty Counts'. United Nations Development Programme, International Poverty Center (Brasilia, Brazil), Working Paper No. 29. <http://www.ipc-undp.org/pub/IPCWorkingPaper29.pdf>, accessed July 28, 2009.

Karshenas, M. (2002) 'Measurement and Nature of Absolute Poverty in Least Developed Countries'. Mimeo, School of Oriental and African Studies, University of London.

Keidel A. (2007) 'The Limits of a Smaller, Poorer China'. *Financial Times*, November 13.

Khamis, S. H. (1970) 'Properties and Conditions for the Existence of a New Type of Index Numbers'. *Sankhya*, 32(B).

—— (1972) 'A New System of Index Numbers for National and International Purposes'. *Journal of the Royal Statistical Society*, 135, pp. 96–121.

Kravis, I. B. (1986) 'The Three Faces of the International Comparison Program'. *World Bank Research Observer*, 1(1), pp. 3–26.

Kurabayashi, Y. and Sakuma, I. (1990) *Studies in International Comparisons of Real Product and Prices*. Tokyo: Kinokuniya Company Ltd.

Lipton, M. (1996) 'Emerging Asia, the Penn Tables, and Poverty Measurement'. Poverty Research Unit Newsletter No. 4, School of African and Asian Studies, University of Sussex.

—— (2001) 'The 2015 Poverty Targets: What Do 1990–98 Trends Tell Us?' Mimeo.

Milanovic, B. (2002) 'True World Income Distribution, 1988 and 1993: First Calculation Based on Household Surveys Alone'. *The Economic Journal*, 112, pp. 51–92.

Pogge, T. and Reddy, S. (2006) 'Unknown: Extent, Distribution and Trend of Global Income Poverty'. *Economic and Political Weekly*, 41(22), pp. 2241–7. <http://www.socialanalysis.org> accessed on May 6, 2008.

Rao, V. (2000) 'Price Heterogeneity and Real Inequality: A Case-Study of Prices and Poverty in Rural South India'. *Review of Income and Wealth*, 46(2).

Ravallion, M. (1998) 'Poverty Lines in Theory and Practice'. World Bank Living Standards Measurement Survey Working Paper No. 133, Washington DC.

—— Datt, G., and van de Walle, D. (1991) 'Quantifying Absolute Poverty in the Developing World'. *Review of Income and Wealth*, 37, pp. 345–61.

—— et al. (1991) 'Quantifying the Magnitude and Severity of Absolute Poverty in the Developing World in the Mid-1980s'. World Bank Policy Research Working Paper No. 587, Washington DC.

—— and Chen, S. (1997) 'What Can New Survey Data Tell Us About Recent Changes in Distribution and Poverty?' *The World Bank Economic Review*, 11(2), pp. 357–82.

—— —— and Sangraula, P. (2008) 'Dollar a Day Revisited'. World Bank Policy Research Working Paper No. 4620, Washington DC.

Reddy, S. and Plener, B. (2006) 'The Choice of Index Number: Part I'. Institute for Social and Economic Research and Policy, Columbia University. <http://www.iserp.columbia.edu/research-initiatives/working-paper-series/choice-index-number-part-i-valuation-and-evaluation> accessed on July 28, 2009.

—— and Minoiu, C. (2006), 'Has World Poverty *Really* Fallen?' *Review of Income and Wealth*, 53(3), pp. 484–502.

—— —— (2008) 'Chinese Poverty: Assessing the Impact of Alternative Assumptions'. *Review of Income and Wealth*, 54(4), pp. 572–96.

—— and Pogge, T. (2005) 'How *Not* to Count the Poor,' Version 6.2. <http://www.socialanalysis.org> accessed, July 28, 2009.

—— Visaria, S., and Asali, M. (2008) 'Inter-country Comparisons of Poverty Based on a Capability Approach'. In K. Basu and R. Kanbur (eds.) *Arguments for A Better World: Essays in Honor of Amartya Sen*, Oxford: Oxford University Press.

Regmi, A., et al. (eds.) (2001) 'Cross-Country Analysis of Food Consumption Patterns'. In *Changing Structure of Global Food Consumption and Trade*. Washington DC: Economic Research Service/USDA.

Rogoff, K. (1996) 'The Purchasing Power Parity Puzzle'. *Journal of Economic Literature*, 34, pp. 647–68.

Ruoen, R. and Kai, C. (1994) 'An Expenditure-Based Bilateral Comparison of Gross Domestic Product between China and the United States'. *Review of Income and Wealth*, 40, pp. 377–94.

—— —— (1995) 'China's GDP in U.S. Dollars Based on Purchasing Power Parity'. World Bank Policy Research Working Paper 1415, Washington DC.

Ryten, J. (1998) 'The Evaluation of the International Comparison Program (ICP)'. *International Monetary Fund*. <http://siteresources.worldbank.org/ICPINT/Resources/UNSC30_ICP1_1999.pdf> accessed on July 28, 2009.

Sala-i-Martín, Xavier (2002a) 'The Disturbing "Rise" of Global Income Inequality'. NBER Working Paper No. w8904. <http://www.nber.org/papers/w8904>.

—— (2006) 'The World Distribution of Income: Falling Poverty and … Convergence, Period'. *Quarterly Journal of Economics*, 121, pp. 351–97.

Schiller, B. (2001) *The Economics of Poverty and Discrimination*. Upper Saddle River, NJ: Pearson.

Sen, A. (1984) 'Poor, Relatively Speaking.' In *Resources, Values and Development*, Cambridge, Mass.: Harvard University Press.

Summers, R. and Heston, A. (1988) 'A New Set of International Comparisons of Real Product and Price Levels Estimates for 130 Countries, 1950–1985'. *Review of Income and Wealth*, 34, pp. 1–25.

—— —— (1991) 'The Penn World Table (Mark 5): An Expanded Set of International Comparisons, 1950–1988'. *Quarterly Journal of Economics*, pp. 327–68.

—— —— (1995) 'Standard of Living: SL an Alternative Measure of Nations'. *Current Material Well-Being*, CICUP, 95(5).

United Nations (1992) 'Handbook of the International Comparison Programme'. New York. <http://www.unstats.un.org/unsd/methods/icp/ipco.htm> accessed on July 28, 2009.

United Nations, Department of Economic and Social Information and Policy Analysis (1994) 'World Comparison of Real Gross Domestic Product and Purchasing Power, 1985'. New York. <http://pwt.econ.upenn.edu/papers/World_Comparison_phaseV.pdf> accessed on July 28, 2009.

Vachris, M. A. and Thomas, J. (1999) 'International Price Comparisons Based on Purchasing Power Parity'. *Monthly Labor Review*, 122, pp. 3–12.

Ward, M. (1985) *Purchasing Power Parities and Real Expenditures in the OECD*. Paris: OECD.

World Bank (1990) *World Development Report 1990*. Washington DC: World Bank Press.

—— (1993) *Purchasing Power of Currencies: Comparing National Incomes Using ICP Data*. Washington DC: World Bank.

—— (2000) *World Development Report 1999/2000*. New York: Oxford University Press. <http://www.worldbank.org/wdr/2000/fullreport.html> accessed on May 6, 2008.

—— (2001) *World Development Report 2000/2001*. New York: Oxford University Press. <http://www.worldbank.org/poverty/wdrpoverty/report/index.htm> accessed on May 6, 2008.

—— (2002) *Globalization, Growth, and Poverty*. New York: Oxford University Press. <http://econ.worldbank.org/prr/globalization/text-2857/>.

Yaqub, S. (1996) 'Internationally Comparable Estimates of Poverty'. Poverty Research Unit Newsletter No. 4, School of African and Asian Studies, University of Sussex.

3a

A Reply to Reddy and Pogge

Martin Ravallion[1]

A lay reader of the Reddy and Pogge chapter in this volume might be forgiven for suspecting that the World Bank's data producers and researchers are real scoundrels. Reddy and Pogge (2002, 2008[2]) assert that there are *"deep flaws"* in the Bank's methods of measuring global poverty, and that the Bank has probably understated the extent of poverty in the world and overstated global poverty reduction.[3] Furthermore, they contend that it is no accident that these flaws have gone unchecked for nearly twenty years; this reflects (they claim) the *"low priority that has hitherto been attached to the global problem of persistent severe poverty."* Given that eliminating global poverty is the Bank's self-declared goal, surely only scoundrels could have imparted deep flaws into the institution's measures of progress in attaining that goal? (Yet others claim that we have systematically overstated the extent of poverty in the world to keep ourselves employed fighting poverty.[4] It seems that measuring global poverty is a treacherous business for us scoundrels!)

However, as this chapter argues, the Reddy and Pogge (RP) critique collapses under even moderate scrutiny. They do not provide anything approaching a sound basis for believing that there are "deep flaws" in the Bank's estimates of the extent of global poverty.

The World Bank's poverty measures

Some years ago a consensus emerged in the international development community on the idea of an international poverty line of around $1 a day. This became the basis of the first of the UN's Millennium Development Goals (MDG1), which calls for a halving of the 1990 "$1-a-day" poverty rate by 2015.[5] Reddy and Pogge (2008, p. 2) declare that "$1 a day" is a *"meaningless poverty line,"* which presumably implies that MDG1 is a meaningless goal in their view. RP call for a new approach to measuring global poverty. However,

before following their advice, one should take a closer look at how exactly the "$1-a-day" line arose. This should convince anyone that the line has more meaning than RP are willing to acknowledge.

Conceptually, one can think of any poverty line as the monetary cost of a reference level of "welfare" deemed necessary to not be considered poor. As in any true cost of living index (or money-metric utility function), the reference is a matter of choice. When measuring poverty, prior information on the nutritional requirements for good health and normal activity levels is often used to guide that choice.[6] However, it must be acknowledged that there is ample scope for different people to form different judgments on the key parameters in setting a poverty line, including the composition of the food bundle and the allowance made for non-food needs.

The (unsurprising) reality is that people at different levels of living tend to hold different views about what the reference level of economic welfare should be for defining "poverty." The critical level of spending that a poor person would deem to be adequate in order to escape poverty is undoubtedly lower than the level that a rich person would deem adequate. (This has long been recognized in the literature on poverty measurement.)

The same point holds between countries, as well as within a given country. In a background paper produced for the 1990 *World Development Report* (WDR, World Bank, 1990), Ravallion et al. (1991) studied how national poverty lines varied with the mean consumption of a country, when both were converted to a common currency at purchasing power parity (PPP, meaning that the currency conversion rate is intended to assure a common purchasing power over commodities). Among poor countries, they have found that poverty lines tend to be low, and there is also only a modest income gradient across countries in their poverty lines—absolute consumption needs naturally dominate in a poor country. Nutritional requirements for good health and normal activity levels tend to be fairly similar between people in poor countries and rich countries. However, as living standards rise people tend to buy more expensive calories (more meat and higher quality, or more highly processed, food grains) and tend to have more varied diets. And prevailing notions change concerning what non-food needs should be met if one is to not be deemed "poor." Poverty is a socially specific concept. Thus, above a critical level of mean consumption, the national poverty line tends to rise sharply with mean consumption (Ravallion et al., 1991).

This issue has recently been revisited by Ravallion et al. (2008), who have compiled an entirely new database of national poverty lines across seventy-five developing countries. (In Chapter 13 of this volume, Chen and Ravallion summarize the results from this new compilation of national poverty lines.) Their results indicate that the pattern found in the original Ravallion et al. (1991) is quite robust: national poverty lines rise with mean consumption,

though with a low elasticity at low consumption. Both the food and non-food components of the national poverty lines rise with mean consumption. As one would expect, the "income" elasticity tends to be higher for the non-food component of the national poverty line, there is still a significantly positive elasticity for the food component (Ravallion et al., 2008).

In this light, the key question is: *By whose definition of "poverty" should we judge its extent in the world as a whole?* One might use the poverty lines that prevail in each country. But then one would not be treating people with the same level of welfare, as measured by real consumption, the same way. By treating absolutely poor people similarly to relatively poor people one would risk diverting the focus away from what is surely the highest priority: to raise the living standards of the poorest in the world. The resulting measures would lose meaning as measures of absolute poverty. Relative poverty lines can still be defended if one believes that relative deprivation matters to a person's welfare.[7] For comparison purposes, the Bank has also produced poverty measures that take this approach (Chen and Ravallion, 2001, 2004). However, in the bulk of its efforts at global poverty monitoring, the Bank has taken the position that to measure absolute poverty on a consistent basis across countries one should use a poverty line with the same real value.

The "$1-a-day" line aims to judge poverty in the world as a whole by the standards of what poverty means in poor countries. The latest available estimates indicate that about 1 billion people live below this line, representing about one-fifth of the population of the developing world (Chen and Ravallion, 2007). This is an explicitly conservative definition; one could hardly argue that the people in the world who are poor by the standards typical of poor countries are not in fact poor. The point is that one cannot reasonably argue that there is less poverty in the world as a whole than is indicated by this calculation. Chen and Ravallion (2001) also argue that the "$1-a-day" line is a defensible lower bound to relative poverty lines.

We do not claim that the "$1-a-day" line is the only line that one would want to use for international comparisons. Indeed, in Chen et al. (1994) we provided estimates spanning a fairly wide range. We regularly publish estimates for a line set at twice the level found in the poorest countries. The "$2-a-day" poverty count is published alongside the "$1-a-day" count in the Bank's *World Development Indicators* for all years in which the numbers have been published. (Pritchett, 2006, has proposed an "upper bound" poverty line of around $10 a day; about 95 per cent of the developing world's population live below this line.)

As one would expect, there are measurement errors and idiosyncratic differences between countries in how poverty lines are constructed, which can be interpreted as noise in the mapping from the underlying welfare space into the income space. So it would not make sense to pick the lowest poverty line in the world; in fact that is well below $1 a day. Some averaging is called for, as is

normally the case in economic measurement. The 1990 WDR $1 a day line had been picked by eyeballing the scatter of points in the relationship between national poverty lines and national mean consumption. Since then we have taken an average of the lines for the poorest countries, and provided tests of sensitivity to alternative methods of forming that average.

Having set an international poverty line, we then convert it back to local currency using the same PPPs. The best available consumer price indices (CPIs) are then used to convert the international line in local currency to prices prevailing at the time of the surveys. Next, these poverty lines are applied to distributions of consumption per person (or income if consumption is not available) constructed from nationally representative household surveys—we currently use well over 500 surveys for over 100 countries. Adjustments to the data are often required for consistency, such as assuring that population weights are used to obtain an unbiased estimate of the individual distribution of household consumption per person. Calculations are done from the primary data (either micro data or appropriate tabulations). The latest estimates are found in Chen and Ravallion (2007).[8]

As an aside, the vast bulk of the Bank's analytic and operational work on poverty does not use the "$1-a-day" line, and with good reason. When one works on poverty in a given country, or region, one naturally tries to use a definition of poverty considered appropriate to that setting. Most of the time, the Bank's poverty analysts do not need to know what the local poverty line is worth in international currency at purchasing power parity. In its annual tabulation of the "$1-a-day" poverty numbers, the Bank's *World Development Indicators* (for example, see World Bank, 2007) gives estimates based on national poverty lines side by side with the international lines, and has done so since these data were first published. Behind every one of these country numbers is a body of work as part of the Bank's country *Poverty Assessments* and (more recently for low income countries) the country's own *Poverty Reduction Strategy Paper*.

Purchasing power parity and poverty measurement

PPPs are derived from the country-level price surveys that have been done since 1968 by the International Comparison Program (ICP). Estimating global poverty is only one of many applications of these PPPs in economic research. (For example, they have also been widely used in the vast literature on measuring and explaining differences in real incomes across countries.)

Prior to 2000, the Penn World Tables (PWT) were our main source of the PPP rates derived from the ICP; see, for example, Summers and Heston (1991). In 2000 we switched to the 1993 PPPs estimated by the Bank's Development Data Group. New PPPs have recently become available for 2005, again based on

ICP price surveys (World Bank, 2008). There were numerous data improvements over time and various methodological differences between these sets of PPPs.[9]

RP clearly do not like any of these PPPs. Their main concern seems to be that PPPs (from either PWT or the Bank) do not correspond to the cost of a *"well-defined basket of commodities"* which leads them to claim that "... existing PPPs are generally inappropriate for identifying the real incomes of poor households and hence the incidence of absolute poverty" (Reddy and Pogge, 2002, p. 10). They go on to argue in their 2002 paper that "... the only way to avoid this problem is to *start* from a particular reference basket of commodities and to construct PPPs that accurately reflect the relative costs of purchasing *this* basket in different countries." So they appear to be proposing to price a single bundle of goods in each country relative to a reference country.[10] The idea of basing PPPs on a fixed bundle of goods is problematic for well-known reasons. People consume very different things in different countries, reflecting in part the differences they face in relative prices. I would be surprised if any kind of consensus could be reached on what should be included in the single global bundle of goods, comparable to the consensus that has been established around the "$1-a-day" concept.

In fact, the deficiencies of the idea of using a single bundle of goods led to the types of price indices currently in use for constructing PPPs. Ideally the underlying price index would only reflect differences in the cost of a reference level of welfare, fixed across all countries. This means that the reference bundle of goods cannot be the same across countries, given that relative prices vary and hence that consumers can substitute among goods to achieve the same level of welfare—moving along their indifference curves. The PPPs underlying the Bank's global poverty measures are based on the Fisher index, which gives a true cost of living index (reflecting differences in relative prices consistently with consumer preferences) under certain assumptions.[11]

While it would certainly not be progress to follow RP's recommendations, it can be agreed that it would be better to have PPPs designed for poverty measurement, weighted to the consumption bundle of people near the poverty line, using an appropriate iterative estimation method.[12] This was argued by Ravallion et al. (1991) in the first paper estimating the "$1-a-day" global poverty measures, although there was little or no progress toward that goal until the latest round of the ICP. An effort is underway at the Bank to estimate "PPPs for the poor," by re-weighting the 2005 ICP prices to accord more closely with consumption patterns of poor people. Preliminary results reported in Deaton and Dupriez (2007) do not suggest that the re-weighting needed to derive a PPP for the poor will make an appreciable change to the aggregate consumption PPP. However, further work will be needed before we can be confident about the implications for global poverty measurement.

Does the Bank underestimate the extent of global poverty?

The fact that we judge the extent of consumption poverty in the world by the standards typical of low income countries clearly does not mean that we are underestimating the extent of world poverty. Obviously if you use a higher standard you will get a higher poverty count. The "$1-a-day" line does not claim to be anything other than a poverty line typical of poor countries. To say that we are underestimating poverty by this method is like saying that one underestimates length using a ruler calibrated in inches rather than centimeters. If one knows how the ruler is calibrated there should be no confusion.

RP question whether the national poverty lines are reliable as a basis for setting an international poverty line. There appear to be two concerns. First, they claim that the national poverty line may be *"influenced by political and other considerations"*. They appear to be implying that this would lead us to underestimate the extent of global poverty, although this is evidently little more than a casual conjecture on their part, and they give no reason to expect a bias. Our new data set of seventy-five national poverty lines was formed from the World Bank's *Poverty Assessments* and the governments' own *Poverty Reduction Strategy Papers*. In every case, these poverty lines are constructed by professional teams, often comprising staff of the governmental statistics office and economists and/or statisticians working for the Bank. There are (as already noted) idiosyncratic differences in how poverty lines are constructed, which is why we take an average of the poverty lines found among low income countries. Errors certainly cannot be ruled out, but there is no obvious reason to expect systematic bias one way or the other.

Second, RP (2008) claim another fault in our method, stemming from the fact that different low-income countries have different (national) poverty lines. They present results for a truncated sample of the domestic poverty lines for "the poorest fourteen countries," which appears to be the fourteen countries with lowest mean consumption at PPP in the original sample of thirty-three countries used by Ravallion et al. (1991). RP show that there is a variance in poverty lines found among these countries. However, this has never been an issue.[13] Again, some averaging is called for, as we have always argued. RP do not present anything that would lead one to question that the mean poverty line (conditional on consumption) rises with consumption. Note that if RP had not chosen to truncate the Ravallion et al. (1991) sample—and no reason is given for this odd truncation—their readers would no doubt have seen the same strong positive relationship between the poverty line and mean consumption reported in Ravallion et al. (2001), and in Ravallion et al. (2008), for the new sample of seventy-five national poverty lines.

While the aims of the Bank's global poverty measurement effort have not changed over time, there have been many improvements in the underlying

data. There has been a huge increase in the country coverage of the Bank's global poverty aggregates; from one national survey for each of twenty-two countries in World Bank (1990) and Ravallion et al. (1991) to well over 500 surveys for 100 countries now. Indeed, the Bank has put substantial effort into expanding the database on household living standards.

The PPPs have changed too, with new and better price data. The 1993 PPPs were an improvement over those for 1985 in terms of country coverage, although there were concerns about data quality. However, the two sets of PPPs are not comparable, so there is no straightforward way to convert the old $1-a-day line at 1985 PPP to a new line with base 1993. Instead, the only defensible approach is to go back to the original poverty lines for the WDR 1990, and recalculate those lines with the new set of PPPs, and re-estimate the relationship between national poverty lines and mean consumption which led to the original $1-a-day lines used in the WDR 1990. The same basic approach has been proposed by Ravallion et al. (2008), based on the updated data set of national poverty lines referred to above, using the PPPs derived from the 2005 ICP price surveys. (Chapter 13 in this volume provides a summary.)

Why not just update the international poverty line for inflation in the US? This would be a valid method if the purchasing power parity principle held (whereby the PPP for a given country evolves over time according to differences in that country's rate of inflation and that for the US) *and* one deemed 1993 PPPs to be beyond question; indeed, under these conditions one would not have needed to do the 2005 ICP. However, neither condition holds. Ravallion et al. (2008) show that the joint implications of the purchasing power parity principle and comparability of the 1993 and 2005 ICP data can be convincingly rejected statistically.

Thus the naive approach of simply adjusting the old line upwards for inflation in the US ignores some key features of how PPPs have evolved over time, including problems of data comparability over time. For example, China's and Indonesia's poverty lines at 1985 PPP are almost identical to their poverty line at 1993 PPP; India's poverty line at 1993 PPP is only 17 per cent higher than its poverty line at 1985 PPP. Yet adjusting the 1985 $1-a-day line for US inflation would entail an upward increase of roughly 50 per cent. In other words, if we had simply adjusted the $1-a-day line for inflation in the US between 1985 and 1993 we would have obtained a poverty line that is well above the median of the ten lowest poverty lines at 1993 PPP, and so we could no longer claim to be using a poverty line that is typical of poor countries. That would certainly entail a re-calibration of the ruler. The same point applies to the switch from the 1993 to 2005 PPPs, as shown in Ravallion et al. (2008).

In the light of these observations, one should not accept the claim by RP, echoed by Wade (2004), that we have devalued the poverty line over time, and hence overestimated the extent of the world's progress against poverty.

We have long recognized these problems in switching PPP base years and data sources. The latest version of RP's critique is more cognizant of the problems than their earlier paper. However, they still do not properly acknowledge that our practice has always been to revise *all* of our estimates back in time (currently back to 1980) when new PPPs become available. The PPP currency conversion is only done at the base data; then the comparisons over time for a given country depend on the best available CPI for that country. The country-level CPIs are not always ideal, but they are the best data we have for making such comparisons over time.

The key point is that, in assessing progress against poverty in the world, we do not need to make comparisons across different (non-comparable) sets of PPPs. So the entire discussion of this issue in RP (2002, 2008) is irrelevant.

As an aside, it was noted in Chen and Ravallion (2001) that the $1.08 line using the 1993 PPP gave a very similar global poverty count to the old $1-a-day line at 1985 PPP for the common reference year in the series, namely 1993. RP assert that it was a *"serious error of reasoning"* on our part to have made this check for whether the poverty counts matched for the same year. This is surely overstated. It is natural to look at how new data and methods affect one's final estimate of (ostensibly) the same thing, and to draw some comfort from their similarity. RP are right that they could have come out at very different poverty counts; that is obvious enough since (as explained above), we did not choose the new poverty line to make the aggregate poverty count similar for any year.

"Methodological revisions," "erroneous estimates," and "false precision"?

As in virtually all aspects of socio-economic data, there is still scope for improving the data underlying the global poverty measures, namely the survey-based distributional data and the price data (both CPIs and PPPs). However, data are improving in the developing world, thanks to the efforts of international agencies such as the Bank, as well as the governmental statistical offices in developing countries. There is no doubt that both data sources have improved enormously in terms of coverage and quality in the time since our estimates of those poverty measures began, around 1990.

As data improve, it is not too surprising that our knowledge gets revised as well. In the light of better data, we have always revised our global poverty estimates accordingly, including back in time (as have other data sources, such as the national accounts).

These revisions to our past estimates provide fuel for many of RP's criticisms, though I expect most people would agree that to *not* revise knowledge in the light of new data would be far worse. In particular, RP criticize the Bank for

"*methodological poverty revisions*" (RP, 2002, p. 7). They give a number of examples (Tables 2 and 3 of RP, 2002), drawing on the Bank's published estimates at different dates.

It can hardly be surprising that the numbers change as a result of new data, even for the same country and year. This can arise from changes in the underlying estimate of the PPP exchange rate, revisions to the CPIs at country level and changes in the processing of the underlying survey data (a more consistent consumption or income aggregate may have been formed, for example). For example, quite a few of the "*pure methodological revisions*" they cite (in RP, 2002, Table 2) between the poverty counts using 1985 PPP and 1993 PPP are for the Former Soviet Union (FSU). For 1985 there was only one PPP rate for the FSU, while with the new 1993 price data from the International Comparisons Project it was possible to estimate separate PPP rates for all countries within the FSU. So naturally we revised the estimates for all countries within the FSU. RP chastise us for making such changes. A knowledgeable external consumer of these numbers would surely be far more inclined to criticize us if we had not made these revisions. The fact that RP can see all these changes speaks for itself about our openness in making the necessary revisions in the light of new data.

RP also confuse "*methodological revisions*" with real effects when they also compare our estimates for the same country at different dates (see Table 3 of RP, 2002). They acknowledge the possibility that these changes are real, but assert that this "*seems unlikely*" (p. 7) though they provide no justification for this judgment. Against their interpretation, the substantial increase in the measured poverty rate in Indonesia (for example) between 1996 and 1999, which RP identify as a "methodological revision," is more plausibly attributable to the severe macroeconomic crisis Indonesia faced in 1998, compounded by a poor agricultural year (Ravallion and Lokshin, 2007). While it may "seem unlikely" to RP that such a crisis could have substantially increased poverty, it is very clear from the evidence that it did do so. There are other examples of the same confusion of real effects with revisions in the light of better data.

RP (2002) assert that our methods systematically overstate the rate of poverty reduction for yet another reason, namely the method we use to line surveys up in time. In the latest available estimates at the time of writing, Chen and Ravallion (2008) used almost 700 surveys spanning 115 countries. But these surveys do not (of course) line up neatly in time across different countries, so an interpolation method is needed to obtain an aggregate estimate for any given reference year in the aggregate time series of regional or global estimates. Again, our methods are well documented. The reference years chosen lie comfortably within the range of the data. If there is only one survey for a country, then we estimate measures for each reference year by applying the growth rate in real private consumption per person from the national accounts to the survey mean—assuming that the distribution does not change. However, for almost 100 countries we had two or more surveys. When the reference date is between two surveys, we interpolate from each survey to the reference date and take a weighted mean (Chen and Ravallion, 2001, 2004).

Let us now take a closer look at why RP think we have overestimated the rate of poverty reduction. Though it is not entirely clear from their papers, one reason is that they appear to think that inequality is increasing within countries, thus leading us to overestimate the rate of poverty reduction by the above method. Yet, as we have established in other work and re-established in the latest update to our global poverty numbers, inequality within developing countries is falling about as often as it is increasing (Ravallion and Chen, 1997; Ravallion, 2007). And this is true during spells of growth too; indeed, the sample data for growing economies are almost exactly split between inequality-increasing cases and inequality-decreasing cases. Furthermore, even if RP were right that inequality tends to increase as poor countries grow, note that for all except the countries with only one survey, they would again be wrong since we interpolate in both directions and then take the average. This much could have been readily verified from the documentation they cite (notably Chen and Ravallion, 2001, 2004).

However, it is again important to note that in our published regional and global aggregates we have re-calculated all numbers back in time in the light of improved survey data, revised price indices and new PPPs. RP ignore the fact that in all updates of the Bank's global and regional aggregates, all the numbers have been revised back in time on a consistent basis. So at whatever line one chooses—$1 or $2 per day—the aggregate comparisons are consistent over time.

Another argument they make is that the PPP for food is "... *a more appropriate PPP concept*" for poverty measurement; they also assert that this gives a higher poverty count. However, RP provide no argument, and it is far from obvious, that putting zero weight on non-food goods would give you a better PPP than that based on all consumption, even recognizing that the latter PPP is anchored to the mean consumption bundles. I am not surprised that using a PPP that ignores about half of consumption gives different poverty counts for a fixed poverty line (though they do not present any evidence to suggest that it would give different trends). But this is hardly a convincing basis for saying that the estimates based on consumption PPPs are "*erroneous*" as they claim. RP's calculations are also deceptive given that they ignore the fact that switching to a food PPP would also change the poverty line; Ravallion et al. (2008) show that using the food PPPs implies an appreciably lower poverty line.

RP also accuse us of what they call "*false precision*" in the poverty estimates reported in the various technical papers by Chen and Ravallion, documenting their methods for the Bank's global poverty estimates. "False precision" refers to the fact that the estimates of the global poverty measures (in millions of people and percentages of the population) are given to two decimal places in Chen and Ravallion (2001, 2007; and to one decimal place

in Chen and Ravallion, 2004). RP believe that greater rounding off of the estimates would have better revealed their true precision. We choose to give as much accuracy as we could reasonably fit into our published tables, leaving it to the data users to do further rounding off. Maybe RP would be happier to round off the poverty counts to the nearest billion people before publishing them; then the count would have been unchanged (at 1 billion) between 1981 and 2004, even though the number of poor fell by 500.80 million (Chen and Ravallion, 2007). Readers can judge for themselves the merit of RP's claims of "false precision."

How would Reddy and Pogge measure global poverty?

In their conclusions, Reddy and Pogge claim that there is a better way of counting the world's poor. They are rather vague about what this would entail, but refer to a paper by Reddy et al. (2006). This paper measures poverty in three countries (Nicaragua, Tanzania, and Vietnam) using a method that will be recognized by specialists on poverty measurement as a version of what is termed the "cost of basic needs" (CBN) method (Ravallion, 1994, 2008a).[14] By this method one calculates the cost of a bundle of goods deemed to be nutritionally adequate and conforming to local tastes—to give the food poverty line—and one adds to this an allowance for non-food spending consistent with the spending patterns of those near the food poverty line. The Reddy et al. (2006) version of this method is that used by the government of Vietnam (following recommendations from the World Bank). They then repeat the method for the other two countries, using the same caloric cut-off point for all three countries (2,100 calories per person per day) but different (country-specific) food bundles and different allowances for non-food spending (anchored to the spending behavior in each country for the quintile at which 2,100 calories is reached on average).

What is being proposed here is essentially the method most developing countries use to set their own, national, poverty lines; indeed, virtually all of the seventy-five countries in our new compilation of national poverty lines have used some version of the same CBN method (Ravallion et al., 2009). There are of course differences; caloric cut-off points vary somewhat, as do valuation methods and the allowances made for non-food needs. However, to a first order approximation, one expects that the poverty lines generated by Reddy et al. (2006) are more like national poverty lines. In that light, the fact that (as Reddy et al. show) the resulting poverty measures differ from those obtained using an international ($1-or $2-a-day) line is hardly surprising. As noted already, the purchasing power over commodities of the national poverty lines is demonstrably *not* constant, as best that can be measured. So two people with the same absolute standard of living in terms of their command over commodities will be

treated differently, depending on where they live. Typically the person living in the poorer country will be less likely to be deemed poor.

RP may object that the Reddy et al. (2006) measures can still be considered "absolute" because they have used the same caloric cut-off point for all three countries. However, this response would ignore an important lesson from the literature on nutrition and poverty (and from common sense), namely that a given food energy intake can be attained in multiple ways, requiring very different levels of income. As already noted, there is a strong income effect on both the food and non-food components of national poverty lines (though stronger for non-food component); for example, one obvious reason why poorer countries tend to have lower poverty lines is that they consume cheaper calories.

So RP have not solved the problem of setting an international poverty line with constant purchasing power over commodities, but rather they have side-stepped that problem. Arguably, RP have not taken the discussion of how best to set an international poverty line any further than its starting point in the 1990 WDR (World Bank, 1990).

Conclusion

Reddy and Pogge begin their chapter in this volume as follows: *"How many poor people are there in the world? This simple question is surprisingly difficult to answer at present"*. I would argue instead that there is nothing simple about the question, and nothing surprising about how difficult it is to answer it. Reddy and Pogge have oversimplified the problem of measuring poverty in the world, have greatly exaggerated the supposed faults in the Bank's methods, and their proposed alternative method does not take us very far in the goal of setting an international poverty line.

Postscript in response to Thomas Pogge's rejoinder

I thought I was just a scoundrel in their eyes, but it seems I am "Nixonesque" to boot. (Although, given that Pogge is "not questioning the integrity of the Bank's researchers," I am left wondering in what sense he sees me as Nixon-esque.) Much of what I say above can be repeated in response to Pogge's rejoinder. I will avoid doing so. But there are a couple of points that do require clarification, so readers are not misled by Pogge's rejoinder.

One such issue is Pogge's assertion that the national poverty lines for developing countries (that we use in identifying an international poverty line) are unreliable in that they do not reflect "a level of income or consumption sufficient to meet basic human needs." The national poverty lines we use are

all founded on reasonably well-specified "basic needs," and in this respect they are no more "questionable" than (say) the official poverty line of the US. Indeed, they are typically set essentially the same way that Reddy and Pogge advocate that an international line should be set!

Of course, as I pointed out in my reply to Reddy and Pogge, what constitutes a "basic human need" is socially specific—it depends on the standards of living in a specific setting. And national poverty lines in poor countries are clearly not "survival points" below which nobody can live (for if they were there would not be so many people living below them!). Rather they reflect the prevailing notions of what "poverty" means in those societies. I have no objection when Pogge pleads for a higher line, reflecting what he thinks constitutes "basic human needs." The "$1-a-day" line has not claimed to be anything more than a defensible lower bound, by which poverty in the world as a whole is judged by what are seen to be basic human needs in the poorest countries in the world.

Pogge goes on to repeat some textbook-ish points about the properties of PPPs. The original "$1-a-day" paper in 1990 fully acknowledged that standard PPPs (designed for comparing national accounts across countries) were not strictly appropriate for measuring poverty. It took twelve years to get to a new round of the ICP that could do a better job in this respect. The analysis is still underway, but the preliminary results suggest that the "PPPs for the poor" are quite similar to the standard PPPs, and that the global poverty estimates are reasonably robust to this change. I have no disagreement in principle with Pogge on the importance of weighting PPPs and CPIs appropriately to the task of measuring poverty.

However, near the end of his rejoinder, Pogge comes to what he sees as "the most compelling evidence one can have that the method (used by the Bank) is no good," namely that one gets different poverty counts if one changes the base year for the PPPs. Yes, new rounds of the ICP have generated new PPPs that imply changes to our poverty estimates. New ICP rounds bring new and better data on the cost of living in developing countries. Consider the latest ICP round for 2005—almost certainly the biggest global statistical exercise in history, involving numerous international agencies and the government statistics offices of almost 150 countries. This is clearly far superior to past rounds in terms of country participation, survey data collection and processing methods, and the quality and comparability of the price data collected. Nobody who bothers to look into the history of the ICP—from 1970 (crude price surveys for ten countries) to 2005 (state of the art price surveys for 150 countries)—could contend otherwise. It cannot be too surprising that the 2005 ICP has changed our estimates of real volumes for all international economic comparisons, including poverty measures. (My chapter with Shaohua Chen in this volume shows the impacts for China.) There has also been considerable progress in improving the coverage and quality of the household survey data required for measuring poverty. This too has entailed some significant changes to our poverty measures.

The key point here is that the data have improved and that this has led to new *and* better estimates. That hardly means that "the method is no good."

Notes

1. These are the views of the author, and need not reflect those of the World Bank or any affiliated organization. The author is grateful to Shaohua Chen for her comments on this chapter.
2. See <http://www.socialanalysis.org> (accessed on June 16, 2009).
3. In this reply to Reddy and Pogge I will refer to both their chapter in this volume and their (unpublished but widely seen) paper of 2002, under the same title, which goes into more detail on some points.
4. See Bhalla (2002). This raises different issues—see (for example) Bourguignon et al. (2008).
5. See <http://www.un.org/millenniumgoals/>.
6. For an overview of the main approaches to setting poverty lines, see Ravallion (2008a).
7. For further discussion of the theory and evidence on this point, see Ravallion (2008b).
8. We have also created a website, *PovcalNet*, which allows users to replicate our calculations and try alternative assumptions; see <http://econ.worldbank.org/povcalnet>.
9. The PWT used the Geary-Khamis (GK) method, while the Bank used the EKS method, which is the multilateral extension of the bilateral Fisher index. On the differences between the GK and EKS methods and implications for global poverty measures, see Ackland et al. (2006).
10. I say "appear" here because they seem to back away from this position in their 2008 paper, possibly in recognition of the problems readers of their 2002 paper pointed out to them.
11. Notably that the utility function is quadratic. For a recent discussion, see Ackland et al. (2006).
12. Given that one needs to set a poverty line to determine the relevant consumption bundle, but only then can one determine the poverty line; an iterative method for this problem is proposed by Ravallion (1998), in the context of setting national poverty lines.
13. They also show that the variance is higher, and the relationship with mean consumption is steeper, if one uses food PPPs. Given that the underlying national poverty lines were based on both food and non-food needs, it would seem more appropriate to use the full consumption PPP.
14. Reddy et al. (2006) call their method a "capability-based approach." However, the relationship to Sen's (1985) "capability approach" is unclear. The fact of being able to afford a diet that yields (say) 2,100 calories per day does not assure that the functions that come with being adequately nourished will actually be met, even on average, let alone for each individual. A true "capability approach" would presumably look rather different to what Reddy et al. (2006) propose. For further discussion see Ravallion (2008a).

References

Ackland, R., Dowrick, S., and Freyens, B. (2006) 'Measuring Global Poverty: Why PPP Methods Matter'. Mimeo, Research School of Social Sciences, Australian National University.

Bhalla, S. (2002) *Imagine There's No Country: Poverty, Inequality and Growth in the Era of Globalization*. Washington DC: Institute for International Economics.

Bourguignon, F., Ferreira, F., Milanovic, B., and Ravallion, M. (2008) 'Global Inequality'. In K. Reinert and R. Rajan (eds.) *Princeton Encyclopedia of the World Economy*, Princeton, NJ: Princeton University Press (forthcoming).

Chen, S., Datt, G., and Ravallion, M. (1994) 'Is Poverty Increasing in the Developing World?' *Review of Income and Wealth*, 40(4), pp. 359–76.

—— and Ravallion, M. (2001) 'How Did the World's Poor fare in the 1990s?' *Review of Income and Wealth*, 47(3), pp. 283–300.

—— —— (2004) 'How Have the World's Poorest Fared Since the Early 1980s?' *World Bank Research Observer*, 19/2, pp. 141–70.

—— —— (2007) 'Absolute Poverty Measures for the Developing World, 1981–2004'. *Proceedings of the National Academy of Sciences of the United States of America*, 104/43, pp. 16757–62.

—— —— (2008) 'The Developing World is Poorer than we Thought, but no less Successful in the Fight against Poverty'. Policy Research Working Paper 4703, Washington DC: World Bank.

Deaton, A. and Dupriez, O. (2007) 'Poverty PPPs for Latin America and Asia'. Mimeo, Development Data Group, World Bank.

Pritchett, L. (2006) 'Who is *Not* Poor? Dreaming of a World Truly Free of Poverty'. *World Bank Research Observer*, 21(1), pp. 1–23.

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

—— (1998) *Poverty Lines in Theory and Practice*. Living Standards Measurement Study Paper 133. Washington DC: World Bank.

—— (2007) 'Inequality *is* Bad for the Poor'. In J. Micklewright and S. Jenkins (eds.) *Inequality and Poverty Re-Examined*, Oxford: Oxford University Press.

—— (2008a) 'Poverty Lines'. In Larry Blume and Steven Durlauf (eds.) *The New Palgrave Dictionary of Economics* (2nd edn), London: Palgrave Macmillan.

—— (2008b) 'On the Welfarist Rationale for Relative Poverty Lines'. In Kaushik Basu and Ravi Kanbur (eds.) *Arguments for a Better World: Essays in Honor of Amartya Sen*. Volume II: *Society, Institutions and Development*, Oxford: Oxford University Press.

—— and Chen, S. (1997) 'What Can New Survey Data Tell Us about Recent Changes in Distribution and Poverty?' *World Bank Economic Review*, 11(2), pp. 357–82.

—— —— and Sangraula, P. (2008) 'Dollar a Day Revisited'. *World Bank Economic Review*, 23(2), pp. 1–22.

—— Datt, G., and van de Walle, D. (1991) 'Quantifying Absolute Poverty in the Developing World'. *Review of Income and Wealth*, 37, pp. 345–61.

—— and Lokshin, M. (2006) 'On the Consistency of Poverty Lines'. In Alain de Janvry and Ravi Kanbur (eds.) *Poverty, Inequality and Development: Essays in Honor of Erik Thorbecke*, Springer.

—— —— (2007) 'Lasting Impacts of Indonesia's Financial Crisis'. *Economic Development and Cultural Change*, 56(1), pp. 27–56.

Reddy, S. G. and Pogge, T. W. (2002) 'How *Not* to Count the Poor'. (Version 3.0) Mimeo, Barnard College, New York.

—— Visaria, S., and Asali, M. (2006) 'Inter-Country Comparisons of Income Poverty Based on a Capability Approach'. Department of Economics, Barnard College <http://ssrn.com/abstract=915406>.

Sen, A. (1985) *Commodities and Capabilities*. Amsterdam: North-Holland.

Summers, R. and Heston, A. (1991) 'The Penn World Tables (Mark 5): An Extended Set of International Comparisons, 1950–1988'. *Quarterly Journal of Economics*, 106, pp. 327–68.

Wade, R. (2004) 'Is Globalization Reducing Poverty and Inequality?' *World Development*, 32(4), pp. 567–89.

World Bank (1990) *World Development Report: Poverty*. Oxford University Press for the World Bank.

—— (2000) *World Development Report: Attacking Poverty*. Oxford University Press for the World Bank.

—— (2007) *World Development Indicators*. Washington DC: World Bank.

—— (2008) *2005 International Comparison Program: Tables of Final Results*. Washington DC: World Bank.

3b

How Many Poor People Should There Be? A Rejoinder to Ravallion

*Thomas Pogge**

How many poor people should there be? To this apparently simple question, the world's governments have given two unanimous answers. One is enshrined in the 1948 *Universal Declaration of Human Rights*:

Everyone has the right to a standard of living adequate for the health and well-being of himself and of his family, including food, clothing, housing and medical care (Article 25).

Everyone is entitled to a social and international order in which the rights and freedoms set forth in this Declaration can be fully realized (Article 28).

There is to be no poverty at all, then—at least no severe poverty that would jeopardize the ability of human beings to meet their basic needs.

The other answer, also adopted unanimously, is rather different. It sets an acceptable extreme poverty level for 2015, which is presented as a halving of such poverty by that date. The interpretation of this goal keeps changing. At the 1996 World Food Summit in Rome, 186 governments agreed on "reducing the *number* of undernourished people to half their *present* level no later than 2015."[1] Greatly boosting the political importance of the extreme poverty statistics the World Bank had been supplying since 1990, the first Millennium Development Goal (MDG) then promised "to halve, by the year 2015, the *proportion of the world's people* whose income is less than one dollar a day and the proportion of people who suffer from hunger."[2] The UN and its MDG administrators have since decided that this proportion is to be calculated as a percentage not of world population, but of the faster-growing population of the less developed countries, and that the benchmark year for this and all MDGs should be not the year of their adoption (2000), but 1990.[3] The fate of billions is gravely affected

by these as well as by additional decisions about how the evolution of extreme poverty is assessed by the UN and the World Bank. It is in this context that Sanjay Reddy and I have joined the poverty measurement debate.

Let me provide one more piece of background. With some 18 million (30 per cent of) human deaths each year attributed to poverty-related causes (WHO, 2008), the scale of the world poverty problem is staggering in human terms. But in economic terms, the problem is paltry. The Bank now acknowledges that 1.4 billion human beings are living in extreme poverty: below its new international poverty line (IPL) of $1.25 per day (at 2005 purchasing power parities or PPPs) and 30 per cent below this level on average (Chen and Ravallion, 2008, pp. 32, 36). Yet this entire shortfall is said to amount to only 0.33 per cent of global GDP (ibid., p. 23). Using a less extreme definition of poverty, some 2.6 billion people are reportedly living below $2.00 per day (at 2005 PPPs) and nearly 40 per cent below this line on average (ibid., pp. 33, 36). Even their entire shortfall still amounts to only 1.3 per cent of global GDP (ibid., p. 23).[4] This shows that, for the sake of comparatively trivial gains, the world's governments—and we all—are keeping billions trapped in life-threatening poverty by imposing on them the heavy burdens facilitated by the global institutional architecture, such as debt obligations incurred by their illegitimate rulers, public spending restrictions to ensure national debt repayment, monopoly prices for medicines, and protectionist barriers to trade (Pogge, 2008).

Coming to Ravallion's reply, let me emphasize strongly that our concern has always been with the soundness of the Bank's measurement methodology. We are not questioning the integrity of the Bank's researchers. Our main contact at the Bank has been Ravallion's colleague, Shaohua Chen. Without her prompt, full, patient, and cheerful collaboration, we could not have analyzed and reconstructed the Bank's calculations to anything like the extent we have done. Ravallion is entitled to his Nixonesque protestation, of course. But it is not responsive to anything we have written. Nor does his being no "real scoundrel" (p. 86) help show that his method is sound.

Responding to us, Ravallion writes:

The fact that we judge the extent of consumption poverty in the world by the standards typical of low-income countries clearly does not mean that we are underestimating the extent of world poverty. Obviously if you use a higher standard you will get a higher poverty count. The "$1 a day" line does not claim to be anything other than a poverty line typical of poor countries. To say that we are underestimating poverty by this method is like saying that one underestimates length using a ruler calibrated in inches rather than centimeters. If one knows how the ruler is calibrated there should be no confusion. (p. 91)

This statement repeats many of the mistakes and confusions we have been criticizing. Let me go through them.

A silly objection we do not make

Ravallion is right that one is not underestimating the length of a table when, measuring in inches, one assigns it the number 50—even if, measured in centimeters, its length is 127. He is right to suggest that it would be silly to object to one method and the results it delivers, that another method would deliver different results. But we are not raising this silly objection. Our objection is that the Bank is using a method that is seriously flawed in the following ways.

Arbitrarily set too low, the Bank's IPL sugarcoats the poverty trend

The Bank has defended the *level* of its latest IPL as "anchored to the [domestic poverty] lines found in the poorest countries" (Chen and Ravallion, 2008, p. 9). The "anchoring" is a bit loose. In its first exercise, the Bank chose $1.02 (1985 PPP) as the IPL on the grounds that the domestic poverty lines of *eight* countries were *close to* this amount. Later, it chose $1.075 (1993 PPP) as the IPL because it is *the median* of *the ten lowest* domestic poverty lines. And for its most recent exercise the Bank is choosing $1.25 (2005 PPP) as the IPL because it is *the mean* of the domestic poverty lines *of the fifteen poorest countries*—thirteen of which are small states in Africa (ibid., p. 10).

To make matters worse, the domestic poverty lines relied upon are not exactly "found" by the Bank, but in many cases set by or in collaboration with the Bank itself (ibid., p. 9). There was no examination of whether these lines reflect a level of income or consumption sufficient to meet basic human requirements.

Ravallion responds that it does not matter how high or low the IPL is fixed. Once it is understood how this line is calibrated, there should be no confusion: poverty is whatever the Bank's method measures.[5]

Indeed, there is no confusion. But it does matter how high or low the IPL is set. This matters to the reported headcount trend, which looks ever prettier the lower the IPL is set.[6] It also matters insofar as millions go hungry above the Bank's IPL and are consequently ignored in the MDG1 exercise and by the affluent.

Is the Bank's IPL set at a reasonable level? We have already seen that the goal of eradicating poverty would still be quite feasible if the IPL were set at $2 a day rather than at $1.25 (2005 PPP): relative to the $2 a day standard, there would be 2.6 billion poor people—40 per cent of humanity—collectively living on 2 per cent and collectively lacking 1.3 per cent of global GDP. Assessed at market exchange rates, the eradication of poverty so defined would require a shift of well under 1 per cent of global GDP.

But isn't $2.00 a day rather too sumptuous as a poverty line, and doesn't the Bank's $1.25 (2005 PPP) standard better capture what it means to escape poverty? One can approach this question by converting the Bank's IPL into the currency of one's own country and year, using the conversion methods the Bank uses while claiming that they preserve equivalence of purchasing power. Following this approach, we find that, in the US in 2009, income or consumption of $1.37 per day would get a person counted as non-poor.[7] People living in the US strictly on what can be bought with this amount—$500 per year—would clearly be unable to meet their basic needs.[8] Insofar as the Bank's conversions indeed preserve purchasing power equivalence, we can conclude that its IPL is equally inadequate when converted into local currency unit (LCU) amounts for other country/year settings. Insofar as the Bank fails to register as poor many people who cannot meet their most basic needs, its criterion of poverty is at odds with how its readers understand this word. More importantly, by systematically ignoring very large numbers of people in life-threatening poverty, the Bank is providing misleading information to policy-makers about the distribution and trend (see note 6) of severe poverty, and grossly misleading information to all of us about the magnitude and seriousness of our responsibility to structure the world economy so that severe poverty is reliably avoided.

The Bank's method relies on questionable PPPs

How does the Bank derive its IPLs from domestic poverty lines which, after all, are denominated in many different currencies? And how, more generally, does it compare individual incomes and consumption expenditures denominated in diverse currencies?

Such *cardinal* comparisons—presupposed in averaging—are not as straightforward as Ravallion's analogy to lengths makes them seem. The income of a poor Indian may be higher than that of a poor Mexican in terms of the amount of rice each can buy and yet lower in terms of the amount of meat or gasoline. The comparison of incomes—or expenditures or domestic poverty lines—denominated in different currencies must somehow aggregate over such price data to arrive at an overall judgment of the form: the Indian's rupee income is worth *n* times as much as the Mexican's peso income.

The Bank's comparisons have been relying on general consumption PPPs of some specific base year for converting domestic poverty lines from this base year into US dollars of the same year. The Bank's successive IPLs were defined in different PPP base years: 1985, 1993, and 2005. Once it has defined an IPL in US dollars of a specific base year, the Bank then uses the same PPPs to convert this IPL into all local currencies of the same year. The resulting LCU amounts are then converted further via national consumer price indices (CPIs) to extend the IPL to other years.

Reddy and I have long been pointing out that the quality of the PPPs so heavily relied upon by the Bank's method is highly questionable, especially for the most important countries, China and India. Startled by the Asian Development Bank's recent re-evaluation of PPPs, the World Bank now accepts this

point, claiming that it had previously assigned about twice as much purchasing power to the Chinese and Indian currencies as they are really worth (Chen and Ravallion, 2008, p. 8). The Bank offers this overestimate in explanation of the dramatic 50 per cent hike in its reported 2005 global extreme poverty figure. It gives the number of extremely poor as 931.3 million relative to its $1.075 (1993 PPP) IPL and as 1,399.6 million relative to its new $1.25 (2005 PPP) IPL (ibid., Table 5). Below, I will argue that the Bank's dramatic revision reflects not merely bad inputs, and unnecessary ones at that, but a bad method as well.

Let me reiterate that the PPPs employed even in the Bank's latest poverty measurement exercise are highly questionable. Noting that the latest "price survey for China was confined to 11 cities [and] some surrounding areas," the Bank chose to "use existing differentials in urban-rural poverty lines...to correct the national PPP for the purpose of measuring poverty" (ibid., p. 11). Such a "correction" of China's PPP based on existing poverty lines is evidently highly conjectural and moreover ignores that prices in China vary more by province than by rural versus urban (Heston, 2008, p. 68). The employment of a single averaged PPP for all of India is similarly distorting, although greater efforts were undertaken in India than in China to collect rural prices.[9]

PPPs and CPIs are greatly affected by poverty-irrelevant commodities

Even if all prices were perfectly uniform in each country and general consumption PPPs were then calculated for all currencies to everyone's satisfaction, reliance on such PPPs in the context of the Bank's poverty measurement exercise would still be highly problematic. We make two objections in particular. One objection is *commodity irrelevance*. Generally, the more spending some commodity attracts, the more its price will influence calculated PPPs. This is problematic because many commodities are irrelevant to poverty avoidance. Used for purposes of poverty assessment, PPPs are influenced far too much by the prices of luxury goods and services, which the poor cannot afford and do not really need, and influenced far too little by the necessities that are most needed by the poor and on which they concentrate their spending.[10] The fact that an income suffices to meet basic human needs is no assurance, then, that a PPP equivalent income in another country is similarly sufficient. In poor countries, prices of necessities are often higher, and prices of services lower, than what the PPP to the US dollar would suggest.

A numerical example may illuminate the point. Imagine a simple world with three commodities: *necessities*, *discretionaries*, and *services* (always in this order). Suppose the prices of these three commodities are LCU 5, 6, and 1 in some poor country and $3, $4, and $9 in the US. What is the PPP? The answer depends on the spending pattern in both countries. Suppose this pattern, in per cent, is 30, 50, and 20 in the poor country and 10, 50, and 40 in the US. This yields a PPP (calculated by the Bank's method) of 1.55—each LCU is deemed equivalent to

$1.55. But in reference only to necessities, priced at LCU 5 and $3, each LCU is worth only 60 cents. The Bank's reliance on general consumption PPPs ensures that, wherever the actual price of necessities is higher than what such PPPs suggest, many who are very poor, relative to what they really need to buy, do not show up in the Bank's extreme poverty statistics.

There are indications that the Bank will try to address this problem by elaborating PPPs for the poor (PPPPs) based on the actual consumption pattern of the poor. This is an extremely complex undertaking because of the interdependence of three identifications. To ascertain what the poor are actually consuming, the Bank must be able to identify who the poor are. To do this, the Bank must identify the level of the IPL and the PPPPs for converting this line into all currencies. To identify the level of the IPL, which the Bank does by averaging the domestic poverty lines of the poorest countries, the Bank needs PPPPs to make those domestic lines comparable. Each of the required identifications—of PPPPs, of the poor, and of the IPL—thus presupposes the other two. This circularity problem will apparently be attacked through a complex iteration procedure.[11]

This revision may be a step forward insofar as it cuts down the influence of price data about commodities that are irrelevant to the avoidance of poverty. Still, the revision is not fully satisfactory because the observed spending pattern of the poor sometimes fails to disclose what they need most. Unmet needs, ignorance, and advertising often lead poor people to spend some of their income on alcohol, tobacco, or quackery. Yet, unlike higher food prices, a higher price of cigarettes does not make them poorer in an intuitive sense: it does not reduce their ability to meet their basic needs. Conversely, millions of poor people worldwide do not spend any money on buying patented medicines they urgently need. This fact does not show that the price of such medicines is for them irrelevant. In fact, this price is killing many of them. The observed spending pattern of the poor—itself heavily influenced by existing prices and other extraneous factors (tobacco advertising)—is not then a good indicator of what they require to meet their basic needs.

PPPs are greatly affected by poverty-irrelevant data from other countries

Both PPPs and PPPPs are subject to another objection we have made: *country irrelevance*. Considering two countries in isolation, the PPP rate is calculated on the basis of the prices and consumed quantities of all commodities. For example, the more that is spent on services in the US, the more of an influence the prices of services in India and the US will have on the PPP of the Indian rupee to the US dollar. Given that services are (relative to other commodities) especially cheap in India versus the US, high service consumption in the US raises the assessed purchasing power of the Indian rupee and hence the assessed spending power of the Indian poor. Clearly, what Americans are spending their money on

is wholly irrelevant to whether persons in India are poor or not. But the Bank's method makes the US spending pattern relevant to identifying the poor in India.

The problem is compounded once third countries enter the picture. Bilateral PPPs calculated without regard to other countries would not satisfy transitivity.[12] But it is, for various reasons, highly desirable that PPPs be transitive[13]—so that, for countries A, B, C:

$$PPP(A, B) \times PPP(B, C) = PPP(A, C)$$

To achieve such transitivity, the calculation of PPPs involves a final step that adjusts all preliminary bilateral PPPs to one another in a way that guarantees transitivity. This adjustment has the consequence that the PPP assigned to any local currency is affected by the prices and spending patterns not only of its home country and the US (base country), but also of every other country. In the Bank's method, then, the classification of any person as poor or non-poor is influenced not merely by the money she has and the prices she faces, but also by the prices and spending patterns of all countries included in the PPP exercise.

A move toward PPPPs would mitigate this problem. If the poor spend little on services, then the price of services in other countries will have little influence on the calculation of their currencies' PPPPs. But such calculations will still be excessively affected by the prices of commodities that are important only elsewhere. For example, if potatoes figure prominently in the spending of the poor in some countries, then India's PPPP will be significantly influenced by what potatoes cost in India and elsewhere. And the classification of Indians as poor or non-poor can then be significantly affected by potato prices even if potatoes are not, and cannot plausibly become, part of the diet of the Indian poor.

CPIs do not track the prices of necessities

Once the Bank has, through the use of PPPs, converted its chosen IPL into corresponding base-year amounts in all other currencies, it uses national CPIs to convert the results into LCUs for other years.

We object to this step as well. Tracking price changes in nationally consumed commodities, a country's CPI is influenced most by the commodities on which most is spent. Reliance on CPIs thus courts, once more, the risk of losing track of the prices of basic necessities. Falling prices of necessities may raise the real standard of living of poor people, even while their incomes are flat and the CPI is rising. Conversely, falling prices of electronics or services may cause the CPI to fall, even while biofuel demand is raising food prices. When this happens, poor people on constant incomes become even poorer in real life, but richer in the Bank's statistics. This is not a mere theoretical possibility. While

the Bank is delivering a steady stream of good news from the poverty front, the Food and Agricultural Organization reports steady increases in the number of chronically malnourished people—a number that now exceeds 1 billion for the first time in human history.[14]

This problem could be mitigated by constructing—in analogy to PPPPs—CPIs for the poor (CPIP). Such CPIPs would cut down the influence of the prices of non-necessities. But they would also, implausibly, cut down the influence of the prices of necessities that, because of their high price, are barely consumed by the poor. As far as I know, no revision toward CPIPs is currently being contemplated.

The Bank's method delivers massively inconsistent results

Perhaps the most compelling evidence one can have that a method is no good is that its applications deliver mutually inconsistent results. We have presented such evidence (both analytic and empirical), showing that the Bank's method is not robust with respect to the PPP base year chosen. Unfortunately, this objection was not understood. We were certainly not saying that new data should be ignored—a proposition Ravallion rightly refutes at length.

What then were we saying? The Bank's method requires comparing currency amounts from different countries and years. The Bank makes these comparisons in two steps. It converts each LCU amount into its base year equivalent, using the national CPI. It then converts the result into its base year US dollar equivalent, using base year PPPs. In this way, any income, consumption expenditure, and domestic poverty line—regardless of year, country, or amount—can be mapped onto a common cardinal scale calibrated in US dollars of some chosen base year.

Our objection is that this method is highly sensitive to the choice of PPP base years. A comparison of two monthly incomes—say 280 Canadian dollars (CAD) in 1980 with 831 Australian dollars (AUD) in 1999—yields different results depending on the year whose PPP is used in the conversion. Here is one way the Bank has used to compare such amounts:

$$CAD280(1980) = CAD544(1993) = 426(1993)$$

$$AUD831(1999) = AUD743(1993) = 558(1993)$$

But if the same two local currency amounts are compared via 1985 PPPs, then they turn out to be exactly equivalent. (We know this because the Bank used 1985 as its PPP base year until 1999.) The choice of 1993 rather than 1985 as PPP base year raises the assessed purchasing power of all AUD amounts—prices, incomes, consumption expenditures—in all years by 31 per cent relative to that of all CAD amounts. And the choice of 1985 rather than 1993 as PPP base year raises the assessed purchasing power of all CAD amounts in all years by 31

per cent relative to all AUD amounts. The outcome of such income comparisons thus is heavily influenced by a factor that is obviously irrelevant to these comparisons: namely by the Bank's arbitrary choice of PPP base year.[15]

As Table 3.1 (pp. 46–8) demonstrates, such base year sensitivity—some of even much larger magnitude—is common across rich and poor countries alike. It is bound to occur, because conversions using CPIs and PPPs are based on very different consumption patterns: the Canadian CPI is based on the Canadian consumption pattern, the Australian CPI on the Australian, and the PPPs of 1985 and 1993 are based on the differing international consumption patterns of those years. No wonder, then, that different conversion paths yield diverse results.

The Bank's choice of PPP base year obviously also affects profoundly who is classified as poor. Let me illustrate this by considering China and Bangladesh which, as it happens, are related like Australia and Canada: the choice of 1993 rather than 1985 as PPP base year raises the assessed purchasing power of all Chinese amounts in all years by 31 per cent relative to all Bangladeshi amounts—and *vice versa*. Now take any pair consisting of a Bangladeshi person in some year living below $1.075 1993 PPP and a Chinese person in some other year living above this IPL and no more than 31 per cent above the Bangladeshi. For each such pair, if 1985 is chosen as PPP base year, then the Chinese person is deemed poorer than the Bangladeshi. If 1993 is chosen, then the Bangladeshi is deemed poorer than the Chinese. The choice of base year affects then the classification of at least one of the two persons. The Bank's method makes the poverty classification of millions of people—today and in past and future years—dependent on the arbitrary choice of PPP base year. This is bad, because the Bank's choice of PPP base year is no more significant to the real situation of human beings than the weather on Jupiter.

The Bank now states that all its extreme poverty headcount figures based on its IPL of $1.075 (1993 PPP) were far too low because it had overestimated the purchasing power of the currencies of many poor countries: "We find that the incidence of poverty in the world is higher than past estimates have suggested. The main reason is that the 2005 ICP price data suggest than past PPPs had implicitly underestimated the cost of living in most developing countries". (Chen and Ravallion, 2008, p. 6). The idea here expressed is that one can use the PPPs of one base year (2005) to correct the PPPs of another (1993). To do this, one would have to rely on the national CPIs covering the intervening period: by adjusting the 2005 PPPs by the national rates of consumer price inflation between 1993 and 2005. Such reliance assumes that a circular journey—from 1993 USD to 2005 USD to 2005 LCU to 1993 LCU to 1993 USD—must lead back to the original amount. If this assumption were sound, then any three of these conversion rates would determine the fourth. But the assumption is false, because the four conversions in the circle are based on national and international consumption patterns that differ greatly from one another.[16]

What can replace the Bank's method of poverty measurement?

If we want to assess income poverty through a headcount measure, then we should find a more direct method than the Bank's: a method that focuses on the prices a person faces in order to determine whether her income suffices to meet her basic human requirements.

Ravallion misunderstands this proposal of ours in two respects. He writes that "they appear to be proposing to price a single bundle of goods in each country relative to a reference country" (p. 90). What we have in fact proposed is to assess each person's income against "the cost of purchasing commodities containing relevant characteristics (for example, calorie content)" (p. 79) that are needed to achieve the basic requirements of human beings.

Ravallion also writes that we "ignore an important lesson from the literature on nutrition and poverty (and from common sense), namely that a given food energy intake can be attained in multiple ways, requiring very different levels of income" (p. 97). We are not quite so ignorant. Our proposal was to define the poor as those whose income affords them *no* acceptable way of meeting their basic human requirements, given the cultural and environmental conditions they face. What these nutritional and other basic requirements are, and what counts as an acceptable way of meeting them, are matters for debate. There is certainly some need for judgment in specifying a poverty criterion of this kind, as there is in any poverty assessment exercise. But making such contestable judgments in the specification phase is certainly much better than choosing a criterion that—even after it has been fully specified—makes its results depend on arbitrary contingencies such as the Bank's choice of PPP base year and the prices and consumption patterns in all countries on earth. Moreover, we have argued that making such judgments should involve transparent participatory processes. This would be in contrast to the approach of the Bank which eschews public consultation behind a false facade of science-like objectivity.

Ravallion asserts that "the Reddy and Pogge critique collapses under even moderate scrutiny" (p. 86). For the sake of the poor, one can only hope that the scrutiny of some readers will not be quite so moderate.

Notes

* Many thanks to Branko Milanovic, Matt Peterson, and Sanjay Reddy for their insightful comments and suggestions.
1. Rome Declaration on World Food Security, 1996, <http://www.fao.org/wfs>, author's emphasis.
2. *UN Millennium Declaration*, General Assembly Resolution 55/2, 2000, <http://www.un.org/millennium/declaration/ares552e.htm>, author's emphasis.

3. In terms of the Bank's international poverty line (IPL) at the time, these two reinter-pretations of the goals stated in the Millennium Declaration have increased, by roughly 250 million, the number of those whose confinement below the Bank's IPL in 2015 will be deemed acceptable and have thereby cut the envisaged reduction in the number of extremely poor people to less than 20 per cent (Pogge, 2004, pp. 378–80; 2008, pp. 11–13). In terms of the Bank's new IPL, and the much higher extreme poverty count associated with it, the two reinterpretations are raising the acceptable 2015 extreme poverty count by 323 million, from 1,004 million to 1,327 million (calculated on the basis of Chen and Ravallion, 2008, Tables 4 and 5, and UN Population Division, 2009).

4. The average shortfall of those living below some poverty line is the ratio of the relevant poverty gap and headcount indices provided in Chen and Ravallion (2008), Tables 9 and 6 respectively. These calculations are performed in terms of PPPs. Valued at market exchange rates, the global poverty problem is substantially smaller still.

5. Analogous to Edwin Boring's (1923) famous definition of intelligence as whatever these tests measure—or indeed Jacob Viner's crack that economics is what economists do.

6. The Bank's new poverty figures readily confirm this point. Between 1981 and 2005, the reported change in the number of people deemed poor by the Bank's $1.00, $1.25, $2.00, and $2.50 per day (2005 PPP) standards was minus 43 per cent, minus 27 per cent, plus 2 per cent, and plus 15 per cent, respectively. And similarly for the shorter 1990–2005 period, where the change relative to the same four lines is given as minus 33 per cent, minus 23 per cent, minus 6 per cent, and plus 2 per cent, respectively (Chen and Ravallion, 2008, Table 8). With the Bank's choice of IPL, in 2005 we were 34 per cent ahead of schedule toward achieving MDG1. Had $2.00 or $2.50 per day (2005 PPP) been chosen instead, we would in 2005 have been behind schedule by 67 or 112 per cent, respectively (Pogge, 2009, Section 3.2).

7. Following the Bank's method, I have here converted its latest IPL—defined as $1.25 per day in 2005 US dollars (USD)—via the US consumer price index, <http://www.bls.gov/data/inflation_calculator.htm> (accessed June 20, 2009). The Bank's earlier IPLs—$1.02 (1985 PPP), $1.00 (1985 PPP), 1.075 (1993 PPP)—have higher equiva-lents in 2009 USD, namely $2.03, $1.99, and $1.59, respectively (ibid.).

8. The unabridged version of our paper (<http://www.socialanalysis.org>) cites evi-dence that such an amount is not nearly sufficient to meet even just the food needs of a human being. The elaborately designed thrifty food plan (USDA, 1999) is an equal-cost revision of the Economy Food Plan first presented in 1961 "as a nutrition-ally adequate diet for short-term or emergency use." The lowest cost stated for this minimal diet was $80.40 per person per month in 1999. The Bank counts as non-poor anyone who lived in the US in 1999 on $32.42 per person per month (<http://www.bls.gov/data/inflation_calculator.htm>, accessed June 20, 2009). Such a person could have bought about 40 per cent of the USDA's emergency diet—but only by spending *nothing* on clothing, shelter, health care, utilities, and everything else.

9. See <http://siteresources.worldbank.org/ICPINT/Resources/Indian_country_report.pdf>, accessed June 20, 2009.

10. For example, rice accounts for a fraction of 1 per cent of household spending in the US and other affluent countries, and its price therefore plays a minuscule role in determining the PPP of the Indian rupee. But the price of rice is of very great significance for the real value of the rupees that very poor people in India have available to them.

11. Many thanks to Shaohua Chen for conveying information used in this paragraph, which I hope to have summarized accurately. See also Ravallion, Chen, and Sangraula (2008, pp. 19–21).

12. Intuitively speaking, transitivity fails because the left side of the equation in the text is substantially influenced by the spending pattern in country B, while the right side is not so influenced at all.

13. One pertinent reason is this. If PPPs were not transitive, then the Bank's poverty measurement exercise would not be robust with respect to the choice of base country. Then the relation between the domestic poverty lines of any two countries would change depending on which currency they are converted into and compared in.

14. See <http://www.fao.org>, accessed June 20, 2009.

15. Another way of bringing out the problem involves a circular journey of conversions. Using the Bank's method, we can convert our CAD280 (1980) via 1985 PPPs into AUD831 (1999) and then convert this amount back via 1993 PPPs into CAD367 (1980). The blatant failure of transitivity—CAD280 (1980) is surely not equivalent to CAD367 (1980)—shows that the Bank's conversions do not preserve equivalence. Note that I am using in this section two earlier IPLs in my examples because I do not yet have access to country breakdowns for the new $1.25 (2005 PPP) IPL.

16. Another reason mentioned earlier is that bilateral PPPs are adjusted on the basis of data from all other countries so as to achieve transitivity. We see here *en passant* why it makes no sense to insist that the latest available PPP base year is always best. This may be so when one seeks a snapshot of poverty in or near that year. But there is no such advantage with regard to the all-important trend figures delivered by the Bank. The choice of a later base year may give a more accurate picture of the end of the period, but only at the cost of a less accurate picture of its beginning.

Bibliography

Chen, S. and Ravallion, M. (2008) 'The Developing World is Poorer than We Thought, but no Less Successful in the Fight against Poverty'. World Bank Policy Research Working Paper WPS 4703. Available at <http://econ.worldbank.org>, accessed June 20, 2009.

Heston, A. (2008) 'The 2005 Global Report on Purchasing Power Parity Estimates: A Preliminary Review'. *Economic and Political Weekly*, March 15, pp. 65–9.

Pogge, T. (2004) 'The First UN Millennium Development Goal: a Cause for Celebration?' *Journal of Human Development*, 5, pp. 377–97.

—— (2008) *World Poverty and Human Rights: Cosmopolitan Responsibilities and Reforms* (2nd edn). Cambridge: Polity Press.

—— (2009) *Politics as Usual: What Lies behind the Pro-Poor Rhetoric*. Cambridge: Polity Press.

ivallion, M., Chen, S., and Sangraula, P. (2008) 'A Dollar a Day Revisited'. World Bank Policy Research Working Paper WPS 4620. Available at <http://econ.worldbank.org>, accessed June 20, 2009.

N Population Division (2009), *World Population Prospects: The 2008 Revision*. Available at <http://esa.un.org/unpp>, accessed June 20, 2009.

SDA (1999). *Thrifty Food Plan, 1999*. Washington DC: USDA. The relevant cost table is available at <http://www.cnpp.usda.gov/Publications/FoodPlans/1999/CostofFood-Nov99.pdf>, accessed June 20, 2009.

'HO (World Health Organization) 2008. *The Global Burden of Disease: 2004 Update*. Geneva: WHO Publications. Available at <http://www.who.int/healthinfo/global_burden_disease/2004_report_update/en/index.html>, accessed June 20, 2008.

4

Raising the Standard: The War on Global Poverty[1]

Surjit S. Bhalla[2]

Introduction

It would be an understatement to say that poverty reduction is one of the most important goals of our time. Much has been written on this topic, and the fight against world poverty is now almost forty years old. In 1973, Robert McNamara, President of the World Bank, made a speech about the need to fight global poverty, a speech that launched concentrated work, effort, and aid towards poverty reduction by the developed and developing world.

The World Bank estimate for world poverty for 2004 was 970 million.[3] That is, close to a billion people have consumption expenditures of less than $1.08 a day at 1993 PPP prices.[4] This number is not that much different from the one that prevailed a decade earlier—1.13 billion in 1990. In 1981, global poverty was estimated as 1.5 billion. What has changed over the last two decades is the composition of the poor—in 1981, both India and China contributed two-thirds (1 billion) to the total. Poverty then was essentially an India–China story. More than two decades of growth later, the importance of India–China is substantially reduced, but for some methods, the share in world poverty for these two Asian economies is around 30 per cent.

Both Bhalla (2002b) and Sala-i-Martin (2006) have contended that world poverty is significantly below the World Bank estimates. Depending on assumptions, our estimates for global poverty for 2005 range from about 200 to 500 million, an order of magnitude lower than the official estimates. Which set of estimates are "correct" has enormous implications for aid and development policy, and for evaluations of how the globalization growth process in the past twenty years has affected the lives of the poorest.

These "new" estimates have been partly based on the old method of estimating poverty, and the one followed universally until the early 1990s (see Ahluwalia