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How Not to Count the Poor

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Poverty

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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,[1] the World Bank (henceforth Bank) has, beginning with the 1990 World Development Report (henceforth WDR) periodically presented comprehensive estimates of the extent of poverty in the world and in particular regions and countries for different years. These estimates have been widely accepted and employed in a range of policy analyses and assessments. They have been used to describe the world, to determine resource allocation priorities, and to judge which policies are most poverty reducing. More 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. The recent Bank last President, James D. Wolfensohn, for example, stated:

> 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% in 1990 to a record low of 23% 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."[2]

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."[3]

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 2000/01 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.[4] Alternative estimates that have been produced recently adopt in central respects the same methodology as does the Bank.

This chapter argues 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 below, 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 2000/01 WDR and in accompanying papers by Shaohua Chen and Martin Ravallion (as well as updated subsequently on the Bank's Povcalnet website). 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 capabilities (such as the ability to be adequately nourished). The commodities that are deemed necessary for an individual to achieve a set of elementary capabilities 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 PPP conversion factors for consumption (expressed in local currency

units per “international dollar”, on which see below) calculated by Summers and Heston (1988a). 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.[5] 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: 285 n. 7).

This IPL was then converted into the national currency units of different countries using the Penn World Tables (Summers and Heston 1988a) 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 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 33 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 33 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 2000/01: 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 2.1, which shows 1985 national poverty lines updated to 1993 through a country's CPI to be as much as 30 percent lower (for Nigeria) and as much as 157 percent 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.

Table 2.1. 1985 World Bank Poverty Line, updated by CPI vs. 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

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 revisions 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% and 31.4% 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% and 3.8% respectively. Depending on which PPP base year is used, Nigeria’s poverty rate is either slightly lower or 18 times higher than Mauritania’s!

Chen and Ravallion (2001: 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 2.2, 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 2.2 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% to 49.7%) and has greatly reduced the reported incidence of poverty in Latin America (lowering the poverty headcount ratio reported for 1993 from 23.5% to 15.3%). 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.

Table 2.2. Changes in Estimates of the Prevalence and Regional Distribution of Poverty Due to Methodological Revision

Region	Headcount Ratio for 1985 PPP Poverty Line (% of population living below $1.00 a day at 1985 PPP)			Headcount Ratio for 1993 PPP Poverty Line (% of population living below $1.08 a day at 1993 PPP)			Percent Change in Headcount Ratio from 1985 to 1993 PPP Poverty Lines		
	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. also WDR 1999/2000, 25). The corresponding estimates relative to the $1.08 per day PPP 1993 IPL are from Table 2 of Ravallion and Chen 2000 (cf. also WDR 2000/2001, 23). The variations between these sets of estimates are also discussed in Chen and Ravallion 2001, 290-93.

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 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.[6]

How can appropriate PPPs, suitable for deriving the amount of local currency that is "equivalent" in purchasing power to the IPL, be determined?[7] 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 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.[8] 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.[9] 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 capabilities) 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 (Eltetö-Köves and 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 e.g. 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[10]) 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 may be appropriate in the multilateral comparison of aggregate levels of real national income.[11] 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 straightforwardly 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 2.1 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.[12] 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 2000/2001) document, 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 variation 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 first 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 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 (see Reddy and Pogge 2005: 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 intertemporal 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." [13] 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 atheoretical 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.

In section 2 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, 63 countries participated in the International Comparison Program Phase V Benchmark Study in 1985.[14] 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 enrolment 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, PPPs for these two vast and heterogeneous countries with significant shares of world poverty have been largely based eon "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 (Ruouen 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 $1300 (IMF), $1600 (Ruoen), and $1950 (World Bank) to $2695 (Penn World Tables).[15] 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 $1227 to $1663. Reddy and Minoiu (2005) 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, which are only beginning to unfold (on which, see for instance Keidel (2008)).

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 97 countries. Of these, 12 have only a single survey in the 1981-2001 period and 20 more have only two surveys (ibid., 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: 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-percent reduction in global $1 per day poverty that the Bank has calculated for the 1987-2001 period (Chen and Ravallion 2004: 153) is entirely due to that empirical assumption built into its measurement approach. According to Table A.1 in Chen and Ravallion (2004: 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) 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 International Poverty Line)

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 and 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 of 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 10 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 33 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 2.4A 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 columns in each row 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 following the table, 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 percent on average (by 26 percent when weighted by population). Once again, these magnitudes are quite substantial, suggesting that the choice of an alternative PPP concept more reflective of the consumption requirements of avoiding poverty would greatly increase the estimated extent of severe income poverty worldwide.

Table 2.4A. 1993 Food Based Poverty Lines vs. General Consumption Based Poverty Line Using 'Endogenous' Food Based International Poverty Lines Calculated by Method A

Country	All Food Poverty Line in National Currency ($1.08*PPP food)	Bread and Cereals Poverty Line in National Currency ($1.10* PPP B&C)	All Consumption Poverty Line in National Currency ($1.22*PPP Consume)	Ratio, All Food Line / All Consumption Line	Ratio, Bread and Cereals Line / All Consumption Line	Country	All Food Poverty Line in National Currency ($1.08*PPP food)	Bread and Cereals Poverty Line in National Currency ($1.10* PPP B&C)	All Consumption Poverty Line in National Currency ($1.22*PPP Consume)	Ratio, All Food Line / All Consumption Line	Ratio, Bread and Cereals Line / All Consumption Line
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	U.K.	0.66	0.61	0.76	0.86	0.80
Japan	295.19	337.21	226.48	1.30	1.49	USA	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 2.4A Summary and Analysis	Full Sample (All Available Countries)	No High Income Countries	No High or High Middle Income Countries	Low Income Countries Only
Number of Countries	78	54	41	15
Number of Countries With Ratio > 1 for Food Poverty Line	47	36	26	9
Number of Countries With Ratio > 1 for B&C Poverty Line	57	41	30	14
Number of Countries With Ratio < 1 for Food Poverty Line	31	18	15	6
Number of Countries With Ratio < 1 for B&C Poverty Line	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 from World Development Report 1994.

A possible objection to this procedure is that by choosing the IPL as the median of the bottom 10 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 percent 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 7 out of 22 usable domestic poverty lines to mirror the Bank's use of the bottom 10 out of 33 usable domestic poverty lines.[16] 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).

Table 2.4B. 1993 Food Based Poverty Lines vs. General Consumption Based Poverty Line Using 'Endogenous' Food Based International Poverty Lines Calculated by Method B

Country	All Food Poverty Line in National Currency ($0.92* PPP food)	Bread and Cereals Poverty Line in National Currency ($1.03* PPP B&C)	All Con-sumption Poverty Line in National Currency ($1.10* PPP Consume)	Ratio, All Food Line / All Consumpt-ion Line	Ratio, Bread and Cereals Line / All Consumpt-ion Line	Country	All Food Poverty Line in National Currency ($0.92* PPP food)	Bread and Cereals Poverty Line in National Currency ($1.03* PPP B&C)	All Con-sumption Poverty Line in National Currency ($1.10* PPP Consume)	Ratio, All Food Line / All Consumpt-ion Line	Ratio, Bread and Cereals Line / All Consumpt-ion Line
Antigua & Barbuda	2.53	3.13	2.56	0.99	1.22	Malawi	1.54	2.07	1.66	0.93	1.25
Australia	1.07	1.63	1.46	0.73	1.12	Mali	118.81	204.34	136.15	0.87	1.50
Austria	14.57	16.81	15.12	0.96	1.11	Mauritius	5.78	5.66	7.55	0.77	0.75
Bahamas	1.08	1.34	1.26	0.85	1.07	Moldova	0.25	0.30	0.20	1.24	1.46
Bangladesh	20.18	24.24	13.85	1.46	1.75	Morocco	2.63	2.97	3.36	0.78	0.88
Belarus	22.22	27.15	15.72	1.41	1.73	Nepal	12.32	14.85	10.07	1.22	1.48
Belgium	35.89	40.93	40.13	0.89	1.02	Netherlands	1.94	2.03	2.24	0.87	0.91
Belize	1.08	1.16	1.28	0.85	0.91	New Zealand	1.41	1.74	1.64	0.86	1.06
Botswana	1.48	1.95	1.51	0.98	1.29	Nigeria	17.83	24.60	12.55	1.42	1.96
Bulgaria	9.99	12.84	8.27	1.21	1.55	Norway	11.12	13.09	10.02	1.11	1.31
Cameroon	127.39	174.90	155.24	0.82	1.13	Pakistan	9.81	10.59	9.02	1.09	1.17
Canada	1.27	1.48	1.40	0.91	1.06	Philippines	6.77	9.68	6.80	0.99	1.42
Congo, Rep.	242.29	268.83	223.16	1.09	1.20	Poland	7.75	8.73	9.08	0.85	0.96
Côte d'Ivoire	165.91	223.45	173.45	0.96	1.29	Portugal	150.26	148.91	127.29	1.18	1.17
Croatia	2.42	2.68	2.20	1.10	1.21	Romania	268.34	180.81	214.38	1.25	0.84
Czech Rep.	10.09	7.24	10.07	1.00	0.72	Russian Fed.	235.06	141.44	203.17	1.16	0.70
Denmark	10.25	12.31	10.07	1.02	1.22	Senegal	114.35	189.65	139.17	0.82	1.36
Dominica	2.25	3.04	2.12	1.06	1.43	Sierra Leone	339.53	560.06	255.11	1.33	2.20
Egypt	1.06	1.40	1.27	0.84	1.11	Singapore	1.10	1.43	1.74	0.63	0.82
Fiji	0.86	1.18	0.92	0.94	1.29	Slovak Rep.	9.08	6.88	11.02	0.82	0.62
Finland	8.08	11.14	7.06	1.15	1.58	Slovenia	82.89	96.39	81.28	1.02	1.19
France	6.91	7.79	7.18	0.96	1.08	Spain	120.77	164.21	128.05	0.94	1.28
Gabon	462.86	360.88	332.42	1.39	1.09	Sri Lanka	16.31	17.55	14.01	1.16	1.25
Germany	1.89	2.31	2.21	0.85	1.04	St. Kitts & Nevis	2.06	2.82	2.08	0.99	1.35

Greece	194.56	285.75	197.91	0.98	1.44	St. Lucia	2.13	3.24	2.02	1.05	1.61
Grenada	2.05	2.30	1.82	1.13	1.26	St. Vincent & the Grenadines	2.05	2.36	1.65	1.24	1.43
Guinea	371.42	500.41	369.93	1.00	1.35	Swaziland	1.04	1.51	1.32	0.79	1.14
Hong Kong	5.63	7.07	7.88	0.71	0.90	Sweden	10.68	12.94	11.00	0.97	1.18
Hungary	36.47	46.27	52.00	0.70	0.89	Switzerland	2.46	2.64	2.41	1.02	1.10
Iceland	105.50	116.20	93.05	1.13	1.25	Thailand	14.69	13.23	14.67	1.00	0.90
Indonesia	609.73	647.25	692.98	0.88	0.93	Trinidad & Tobago	3.00	3.99	3.56	0.84	1.12
Iran	278.36	370.04	280.10	0.99	1.32	Tunisia	0.29	0.27	0.38	0.76	0.70
Ireland	0.69	0.74	0.72	0.96	1.03	Turkey	7502.03	7428.11	6468.92	1.16	1.15
Italy	1616.51	1871.28	1630.57	0.99	1.15	Ukraine	0.01	0.01	0.01	1.37	0.75
Jamaica	14.45	14.77	12.87	1.12	1.15	U.K.	0.56	0.57	0.69	0.82	0.83
Japan	251.46	315.75	204.20	1.23	1.55	USA	0.92	1.03	1.10	0.84	0.94
Kenya	11.05	18.02	12.83	0.86	1.40	Vietnam	2056.33	2307.42	1740.49	1.18	1.33
Korea, Rep.	979.62	1498.38	757.24	1.29	1.98	Zambia	290.74	516.50	243.57	1.19	2.12
Luxembourg	35.76	38.90	40.45	0.88	0.96	Zimbabwe	1.92	2.76	2.49	0.77	1.11

Table 2.4B Summary and Analysis	**Full Sample (All Available Countries)**	**No High Income Countries**	**No High or High Middle Income Countries**	**Low Income Countries Only**
Number of Countries	78	54	41	15
Number of Countries With Ratio > 1 for Food Poverty Line	35	29	23	9
Number of Countries With Ratio > 1 for B&C Poverty Line	59	41	30	14
Number of Countries With Ratio < 1 for Food Poverty Line	43	25	18	6
Number of Countries With Ratio < 1 for B&C Poverty Line	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 Bread & Cereals 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 World Development Report 1994.

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 2.3. In Table 2.4B 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 percent higher (31 percent 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.

Table 2.3. Calculation of 'Endogenous' Food-Based International Poverty Lines 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 Poverty Line	Domestic Poverty Line Converted to $/day Using 1993 PPPs for All Consumption	Countries Ordered Lowest to Highest by Converted Poverty Line	Domestic Poverty Line Converted to $/day Using 1993 PPPs for All Food	Countries Ordered Lowest to Highest by Converted Poverty Line	Domestic Poverty Line Converted to $/day Using 1993 PPPs for Breads & Cereals
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	U.K.	7.34	Belgium	7.48	Belgium	7.34
18	Belgium	7.99	U.K.	7.52	U.K.	8.24
19	USA	10.79	Canada	10.72	Canada	10.23
20	W. Germany	11.50	USA	10.79	W. Germany	10.34
21	Canada	11.61	W. Germany	11.27	USA	10.79
22	Australia	13.92	Australia	15.92	Australia	11.68

Method A: Median of bottom 10

International Poverty Line Using PPPs for All Consumption:	1.22
International Poverty Line Using PPPs for All Food:	1.08
International Poverty Line Using PPPs for Bread & Cereals:	1.10

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

International Poverty Line Using PPPs for All Consumption:	1.10
International Poverty Line Using PPPs for All Food:	0.92
International Poverty Line Using PPPs for Bread & Cereals:	1.03

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 that follow Tables 2.4A and 2.4B and by the regressions in Tables 2.5A and 2.5B. 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 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 2.5. Ratios of Poverty Lines for 1993, International Poverty Line Determined 'Endogenously'

Table 2.5A. 1993 Ratio of Food and Bread and Cereals Poverty Lines to Consumption Poverty Lines Using 'Endogenous' Food Based International Poverty Lines Calculated by Method A

	Dependent Variable: Ratio of 1993 Food Poverty Line to 1993 All Consumption Poverty Line				Dependent Variable: Ratio of 1993 Bread and Cereals Poverty Line to 1993 All Consumption Poverty Line			
Log Per Capita GDP in constant 1995 US Dollars at Exchange Rates	-0.032**				-0.064***			
	(0.014)				(0.021)			
	[-2.33]				[-3.11]			
Log GDP in US Dollars at PPP		-0.044**				-0.116***		
		(0.020)				(0.029)		
		[-2.15]				[-3.95]		
Log Infant Mortality Rate			0.026				0.088***	
			(0.022)				(0.033)	
			[1.20]				[2.70]	
Log Under 5 Mortality Rate				0.025				0.085***
				(0.020)				(0.029)
				[1.24]				[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 2.5B. 1993 Ratio of Food and Bread and Cereals Poverty Lines to Consumption Poverty Lines Using 'Endogenous' Food Based International Poverty Lines Calculated by Method B

	Dependent Variable: Ratio of 1993 Food Poverty Line to 1993 All Consumption Poverty Line			Dependent Variable: Ratio of 1993 Bread and Cereals Poverty Line to 1993 All Consumption Poverty Line		
Log Per Capita GDP in constant 1995 US Dollars at Exchange Rates	-0.031**			-0.067***		
	(0.013)			(0.021)		
	[-2.36]			[-3.10]		
Log GDP in US Dollars at PPP		-0.042**			-0.120***	
		(0.019)			(0.030)	
		[-2.18]			[-3.93]	
Log Infant Mortality Rate			0.025			0.091***
			(0.021)			(0.034)

			[1.22]				[2.69]	
Log Under 5 Mortality Rate				0.024				0.088***
				(0.019)				(0.030)
				[1.26]				[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 2.6A and 2.6B, a 1-percent increase in the poverty line due to the use of all-food PPPs rather than general-consumption PPPs is associated with a 0.96 percent increase (method A) and a 0.95 percent increase (method B) in the poverty headcount ratio. Similarly, on average, as shown in the tables, a 1-percent 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 percent increase (method A) and a 1.02 percent increase (method B) in the poverty headcount ratio. Roughly, then, a 1-percent increase

in the poverty line is associated with a 1 percent 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 percent (method A) and from 33.88 to 35.59 percent (method B). The effect of using bread-and-cereals rather than general-consumption PPPs is much more dramatic. It raises the average headcount ratio from 39.85 to 60.31 percent (method A) and from 33.88 to 56.81 percent (method B).

Table 2.6. Comparisons of Poverty Lines and Estimated Poverty Headcounts, 1993
Selected Countries

Table 2.6A. Poverty Lines and Headcounts Using Method A

Country	Year	Estimate of Head Count Ratio for Consumption Poverty Line (Pov. Line = CPI*1.22*PPP Con-sumption)	Estimate of Head Count Ratio for All Food Poverty Line (Pov. Line = CPI*1.08 *PPP All Food)	Estimate of Head Count Ratio for Bread and Cereals Poverty Line (Pov. Line = CPI*1.10*PPP B&C)	Ratio of Head Count for All Food PL to Head Count for Consumption PL	Ratio of Head Count for Breads & Cereals PL to Head Count 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	1995-96	30.68	63.66	69.56	2.08	2.27	1.35	1.35
Cote 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	1995-96	33.25	51.29	57.69	1.54	1.73	1.19	1.22
Nigeria	1996-97	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 2.6B. Poverty Lines and Headcounts Using Method B

Country	Year	Estimate of Head Count Ratio for Consumption Poverty Line (Pov. Line = CPI*1.10* PPP Con-sumption)	Estimate of Head Count Ratio for All Food Poverty Line (Pov. Line = CPI*0.92 *PPP All Food)	Estimate of Head Count Ratio for Bread and Cereals Poverty Line (Pov. Line = CPI*1.03*PPP B&C)	Ratio of Head Count for All Food PL to Head Count for Consumption PL	Ratio of Head Count for Breads & Cereals PL to Head Count 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	1995-96	23.44	51.72	65.23	2.21	2.78	1.51	1.59
Cote 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	1995-96	26.47	39.96	53.18	1.51	2.01	1.23	1.36
Nigeria	1996-97	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 to Table 6: We construct headcount estimates using the World Bank's Povcal Program (see http://www.worldbank.org/LSMS/tools/povcal/). Shaohua Chen of the World Bank has kindly provided us with 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. Simple geometric means for each column are reported at the bottom of each table.

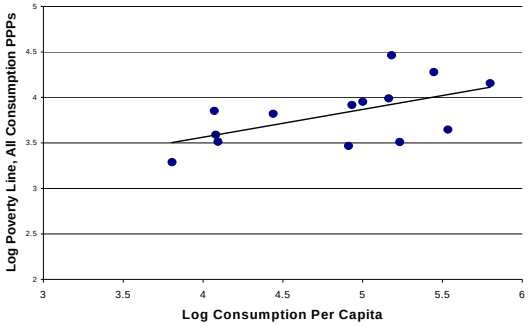
How "Representative" Are the Bank's International Poverty Lines?

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, 288). We show in Figure 2.1, 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 necessarily robust to the choice of PPP concept. In that figure, we replicate their core result that there is a (to visual appearances) 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.

Figure 2.1. Domestic Poverty Lines Converted into Dollars Using PPPs for Food vs. PPPs for General Consumption, Poorest 14 Countries

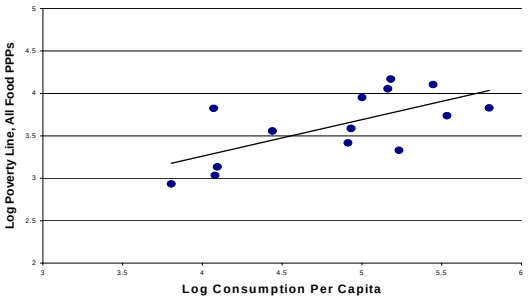
Domestic Poverty Lines Converted at PPP Using PPPs for All Consumption



Mean Log Poverty Line: 3.82
Standard Deviation Log Poverty Line: 0.34

$\ln z_i = 2.347 + 0.304 \ln y_i$ + residual (0.620) (0.127)

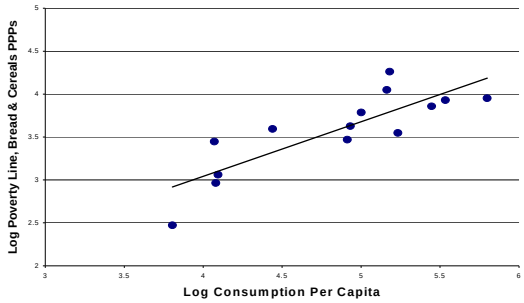
Domestic Poverty Lines Converted at PPP Using PPPs for All Food



Mean Log Poverty Line: 3.62
Standard Deviation Log Poverty Line: 0.40

$\ln z_i = 1.538 + 0.430 \ln y_i$ + residual (0. 670) (0.137)

Domestic Poverty Lines Converted at PPP Using PPPs for Bread and Cereals



Mean Log Poverty Line: 3.57
Standard Deviation Log Poverty Line: 0.48

$\ln z_i = 0.498 + 0.636 \ln y_i$ + residual (0.588) (0.121)

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 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: 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,[17] 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.[18] 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 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 Angus 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, presented by Nanak Kakwani, recommends the following six step procedure, as we understand it. 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 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 requirements of achieving a

specific set of ends. These ends should be specified at the global level and can include elementary human capabilities 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 capabilities).[19] 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 frameworks (for example concerning the relevant elementary capabilities) 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 capabilities (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.[20] 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 (forthcoming) 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 capability-based approach of this 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 eighteen 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.

[1] See e.g. Ahluwalia, Carter and Chenery (1979).

[2] Remarks to the G-20 Finance Ministers and Central Governors, Ottawa, November 17, 2001, previously available at www.worldbank.org/html/extdr/extme/jdwsp111701.htm. Wolfensohn is relying on how the number of persons living below $1 per day is said to have evolved in World Bank (2002: 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: 141).

[3] See WDR 1999/2000, 25. This is the very period for which the Bank later shows the steepest decline in the global poverty headcount (World Bank 2002: 8).

[4] In two recent papers, Sala-i-Martín (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 at 1985 PPPs 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 are subject to similar concerns.

[5] "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).

[6] 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).

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

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

[9] An example is the *Economist*'s so-called "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.

[10] 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.

[11] See Reddy and Plener 2006.

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

[13] Chen and Ravallion 2001: 290. There is more modest five-digit precision in WDR 2000/01: 23, and Chen and Ravallion 2004.

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

[15] These different estimates and their differences are discussed in Heston, n.d.

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

[17] A spreadsheet with these comparisons is available from the authors on request.

[18] See e.g. Appendix E in Reddy and Minoiu (2006).

[19] 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.

[20] See Reddy and Plener 2006.

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