

## Poor Results and Poorer Policy: A Comparative Analysis of Estimates of Global Inequality and Poverty

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***Abstract.** This paper examines the data and methods used to estimate world inequality and world poverty since 1950. It was found that regardless of method used, world inequality reversed a more than a century old trend during the globalization period, loosely defined as the post 1980 years. Consumption growth of the poor also accelerated during globalization, and such growth was in excess of that of the average person. Poverty declined at close to 1.5 percentage points a year, a statistic not affected much by use of different PPP data, or use of different methods, including the method adopted by the official “keeper” of world poverty statistics, the World Bank. Indeed, a striking result obtained is that world poverty, according to the World Bank method, data, and definitions, was close to 15 percent in 2002, a level that is meant to be the millennium development goal target for 2015. (JEL O15, O20, O47,O5)*

### 1 Introduction

The turn of the century brought about considerable amount of stock taking on the part of policy makers and multilateral agencies. The boom decades of the eighties and nineties had just ended. Led by the United States, the rich countries had enjoyed an unprecedented increase in prosperity and wealth – the longest, most sustainable post-war expansion. During these twenty years, per capita GDP in the US had increased by more than 50 percent. However, while the industrialized countries had enjoyed a boom, several developing countries – particularly in Africa and Latin America – had been buffeted by one crisis after another. Over in Asia, the currency crisis was still fresh in the minds of most people. While political freedom had increased in the former Soviet Union, the citizens were not so lucky with income growth; indeed, per capita incomes had declined by about 25 percent, and inequality had worsened (implying a much larger fall in the incomes of the bottom half of the population). So it did not seem to be a happy ending for the world, just a happy twenty years for the Western rich.

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Faced with these facts, the UN and associated multilateral aid agencies met at the Millennium summit in September 2000, and made what has come to be known as the United Nations Millennium Declaration: “*We will spare no effort to free our fellow men, women, and children from the abject and dehumanizing conditions of extreme poverty, to which more than a billion of them are currently subjected.*” The Summit also set targets for the world community to achieve in fifteen years – these targets are the popular Millennium Development Goals (MDG). The most recognizable of the targets is the one for reduction in the proportion of people living in extreme poverty – from 29 percent in 1990 to 15 percent in 2015, according to a poverty line of \$1.08 a day, 1993 PPP prices. This not so ambitious projection was necessitated by the “facts” on poverty provided by the World Bank. It’s analysis showed that poverty in the non-industrialized world had declined by only 5.5 percentage points to 23.5 percent in the eight years since 1990; if the same slow pace was assumed for the next 15 years, poverty could be expected to be below 15 percent in 2015. The past poverty decline had happened in the context of very high growth in both the developing and the developed world; the simultaneous presence of high growth and low poverty reduction meant that the development process was not, or more accurately had not been, “pro-poor”, and thus the growth process was definitely not suggestive of any more ambitious target than the “high” poverty level of 15 percent in 2015.

If so much growth had occurred and so little poverty decline, then it *must* have been the case that world inequality had deteriorated, and worsened by a significantly large amount. For evidence, the MDG goal setters must have received information from its staff publication: the recently published UN *Human Development Report, 1999*. The Report is unequivocal in its statement about worsening world inequality:

“Inequality between countries has also increased. The income gap between the fifth of the world’s people living in the richest countries and the fifth in the poorest was 74 to 1 in 1997, up from 60 to 1 in 1990 and 30 to 1 in 1960. In the nineteenth century, too, inequality grew rapidly during the last three decades, in an era of rapid global integration: the income gap between the top and bottom countries increased from 3 to 1 in 1820 to 7 in 1870 and 11 to 1 in 1913”. (HDR 1999, 3)

The “evidence” – high growth in the industrialized world, worsening global inequality and slow reduction in world poverty – had a strong response. It dictated the discourse, and policy response, of the world community to the presumed deleterious effects of globalization. The MDG goals, the prospects for meeting them etc. became a rich research industry. Demands for extra aid to meet these goals were made by the World Bank – it asked for a doubling of aid from the present \$ 60 billion a year to a prospective \$ 120 billion. Since per

capita incomes in the rich countries had increased at a rapid pace, and since the poor had not shared equally in the benefits of globalization, it was considered “fair” that aid be ratcheted up.

This demand for extra aid formed only part of the suggested new “reform” package for the poor countries. Research is underway, either financed or undertaken by the multilateral agencies themselves, to design a *new* approach to development, an approach that would try and ensure that equitable, pro-poor growth takes place. That such an approach was necessary, and feasible, was articulated only a few months before the Millennium Summit Meeting in the World Bank’s *World Development Report – Attacking Poverty, WDR 2000/01*. This report does not deny that growth is important; but it emphasizes that a growth only or “growth is sufficient” strategy was wrong – as had been abundantly proven by the findings contained in it and the findings of the UN Human Development Report, 1999, cited above.<sup>1</sup> WDR 2000/01 argues that growth was one of three objectives; the other two were voice and empowerment for the poor. And one method of achieving these other objectives was via asset and income redistribution; data and analysis was presented to show that a given amount of growth led to greater poverty reduction in more equal economies.<sup>2</sup> Summarizing, the new Washington-New York consensus was that it was better, much better, to go for quality rather than quantity – it was the quality of growth that really mattered.<sup>3</sup>

At the time of the MDG declaration, the in-house reports of the World Bank and UN were not the only “voice” on world trends in poverty and world inequality. Other estimates were available. Schultz (1998) had indicated that world inequality had flattened out at a high level i.e. there was no evidence to suggest that inequality was worsening. Bourguignon-Morrisson (June 1999) supported the lack of inequality trend finding, but their analysis ended in 1992. Milanovic (Oct. 1999), in contrast to both and the UN HDR for 1999, and coincidentally a World Bank staff member, stated that inequality had not only worsened, but worsened by a significantly large amount in just five years, 1988 to 1993. Unlike the UN, he did not use the per capita US dollar calculations as his basis, but rather used the “correct” PPP calculations. Even if everything was right with this paper, Milanovic’s calculations were in stark contrast to both Schultz and Bourguignon-Morrisson, and the MDG policy makers

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<sup>1</sup> Each of these documents takes over a year to complete, involves hundreds of researchers, and is a flagship forum for the policy advocacy of the respective organizations. In other words, these documents are not mere research outputs; instead, the reports are written to substantiate existing policy, or provide a rationale for new policy.

<sup>2</sup> As shown later, this seemingly intuitive result does not hold either theoretically or empirically.

<sup>3</sup> See Thomas (2000) for a book with the same name.

should have paused to at least evaluate the relative merits of the calculations. The worsening inequality conclusion *should* at best have been tentative.

In June 2000, I presented estimates of both world inequality and world poverty for the period, 1975–97, Bhalla (2000b). My conclusions on world inequality and world poverty were strongly divergent from the above received wisdom. World inequality had not only not stayed constant, but instead had improved considerably; world poverty, rather than declining by only 5 percentage points, had declined by over 14 percentage points, a magnitude almost three times as much as the estimate of the World Bank. In 2002, estimates for poverty and inequality were published in Bhalla, *Imagine there's no country: poverty, inequality and growth in the era of globalization* (hereafter referred to as *Imagine*). The conclusions are the same, almost identical, to the initial results reported in Bhalla (2000b). The 2000 paper reported quintile shares for three different distributions – world, developed economies and developing economies – and for three separate years, 1977, 1987 and 1997. The equivalent world Gini in 1997, according to the old method, was 67; today, the improved *Imagine* method estimate is 65.5. Additional new research on inequality and poverty, and not housed, or financed, by the multilateral agencies, is beginning to surface – and it unanimously endorses the inequality improving and large poverty decline conclusions e.g. Sala-I-Martin (2002a,2002b), a new paper by Milanovic (2002b) which shows that inequality improved between 1993 and 1998, and Firebaugh (2003).

But these “new” results are still radically different than those reached by the World Bank and the UN. Part of the difference in the results can be attributed to differences in the distribution data used, and in the exchange rate used to translate domestic income into comparable international incomes. As shown in Bhalla (2003d), these differences only affect the level at a point in time, but not the trend. And even the impact on levels is small. Some differences occur due to a difference in definitions e.g. is poverty defined as consumption below \$1 a day, 1985 PPP prices or below \$ 1.08 a day, 1993 prices, or below \$ 1.30 a day, 1993 prices? Does one use the PPP income exchange rate (as done by all authors outside the World Bank) to convert local currency into international dollars, or does one use PPP consumption exchange rates, as done by the World Bank to derive world poverty numbers? Just this simple choice (consumption PPP exchange rate rather than an “all products” exchange rate) means an extra 125 million people poor in India alone.

The new results have not been fully accepted – as yet. Which of the many competing estimates is right, or at least more right than wrong – that is the question for academics, and policy makers. Given that development policy is at least influenced by estimates of world poverty and inequality, it is incumbent on all of us to at least get “the facts right”. How we interpret the past has a

strong bearing on what is recommended for the future, and for the present for poor countries in sub-Saharan Africa. That is the purpose of this paper – to assess what happened, to evaluate different estimates, and to derive implications for policy. This paper provides different pieces of evidence so that the reader can decide for herself what happened to world growth, world inequality and world poverty, and whether the three sets of evidence are *consistent* with each other.

One of the startling results of this exercise is that perhaps the most important causative evidence of low poverty decline documented by the World Bank – the magnitude of growth in per capita consumption in the non-industrialized world – cannot be reproduced. If the official World Bank statistics on poverty are “wrong” and/or their computations cannot be reproduced, then important policy questions are raised. First, and most importantly, “who regulates the regulator?” Second, how did it happen? Bhalla (2002a) tentatively explores the hypothesis that this happened because of the monopoly nature of the World Bank in the *funding* of research, and in its monopoly of data on poverty. Monopolies get sloppy, they always do – just ask IBM about PCs or ask Microsoft about surfing the internet. This monopoly is now ending, or started ending with wide availability of computers and the advent of the internet.

The plan of the paper is as follows. Section 2 examines the methods used by researchers to “prepare” the data for computing world inequality and poverty estimates. This section also discusses the implications of the one major difference in the two competing approaches to poverty measurement – use of unadjusted survey means versus such means adjusted to a national accounts (NA) mean. What happens when surveys fail to adequately capture movement in the underlying NA means is of central concern for the empirics of the measurement of poverty. Section 3 evaluates the various results on inequality currently available. Section 4 presents and evaluates the different results on world poverty. Section 5 discusses the important issue of how much poverty decline one should expect from a given amount of growth i.e. how does one determine when growth is pro-poor? Section 6 concludes.

## **2 The bricks and mortar of analysis of inequality and poverty**

World Bank and *Imagine* methods yield widely different estimates of poverty even for the same poverty line. The obvious question – how much of the differences are due to differences in methods, and how much due to “errors” in estimation. This section discusses the different steps required in the assembling of data for the generation of poverty and inequality estimates.

## 2.1 The data and methods of estimating inequality and poverty

All inequality and poverty estimates require data on the *distribution* of income<sup>4</sup> and its *mean*. There is only one source for the distribution, and that is obviously from household surveys. But there are two sources for the mean – that obtained from national accounts data (NA) and that obtained from surveys. Data for income are proxied in the national accounts by GDP per capita, and for consumption, by private final consumption expenditure. At any particular point in time, the survey mean will diverge from the NA mean. This is to be expected, since definitions differ e.g. the NA mean is GDP per capita, the survey mean is personal income per capita.<sup>5</sup> There is a closer correspondence in the consumption measures; the two sources differ in coverage of the institutional and NGO population (the NA includes them, the surveys exclude).

Household surveys, by definition, document expenditure in local currency units. Thus, the first choice for analysts is whether to use US dollar or PPP dollar exchange rates to obtain internationally comparable estimates. The second decision involves the conversion of distributions when both consumption and income distributions are not available for the same country e.g. China. The third choice pertains to whether the survey mean is taken to be representative of the “true” underlying mean. Fourth, while aggregating data across countries, some choice has to be made regarding the *detail* of the data i.e. does it suffice to just take the mean income in the country and assume it to be the same for all residents, (Schultz) or should the distribution be broken down into much finer components (percentiles), as in *Imagine*.

Each of these choices affects the results, and therefore the policy conclusions. However, the most important of these decisions is the first (exchange rate) and the third (raw or adjusted survey means). Besides *UN, Human Development Report 1999*, no serious analysis of world distribution or poverty uses the US exchange rate; the PPP exchange rate is preferred. There is not such unanimity on survey means as the appropriate proxy for the “true” underlying mean of income (or consumption). Broadly, the research community is split in two camps – one favoring the exclusive use of survey means (mostly researchers at the World Bank) and the other group (some World Bank authors and the rest of the research community) favoring the use of national accounts data for the means. All researchers obviously use the distribution as provided by the surveys, since that is the only source for such information.

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<sup>4</sup> Most poverty estimates require data on the distribution of consumption; as “short-hand” notation, income will be used to denote both income and consumption.

<sup>5</sup> For a few countries (e.g. US) NA data on personal incomes are easily available; for several countries, this is not the case. For cross-country consistency reasons, most analysts prefer to use GDP per capita data even when personal income data are available.

A clear divide between the two philosophies is only possible if survey and NA data are available for each year for each country. While NA data are available annually, unfortunately the same is not true for survey data. This reality forces the “only survey data” camp to use a considerable amount of NA information in their estimation of *survey based poverty*. How this impurity occurs is documented below.

## 2.2 Alternatives to survey data for estimation of consumption means

### 1. *What if survey data not available for the year of interest:*

All estimates require a transformation of the data from the year for which survey data are available to the year for which computation is made. For example, if there was one survey in a hypothetical country called Surmeth in 1970 and the next survey in 1990, and one needed to compute the inequality or poverty estimate for an intervening year, say 1987, what does one do? Estimates of both the mean and the distribution are needed for the missing survey year, 1987. Different analysts use virtually identical methods for both. The distribution is assumed to be the same as in 1980 on the grounds that there is no other information. And mean growth is taken from the growth in per capita consumption as revealed by the national accounts; again, there is no other information.

The above survey means adjustment procedure, common for intervening years, also applies to years *prior* to the first survey, and years *after* the last survey. Surmeth had its last survey in 1990, and yet we need to make an estimate of poverty for 2000. What should one, what can one, do? No new estimate of distribution is available, so one takes the *last* such estimate available – the one in 1990. What about the mean for the missing survey year? The official World Bank method (and of other analysts) is to take the survey mean for the last available year (e.g. 1990) and adjust it upward according to the per capita consumption growth (between 1990 and 2000) as measured by the national accounts.

This updating procedure suggests that it is not possible to claim that any method is “correct” because it uses “only survey” data. No method can afford to make that claim because surveys are not conducted every year in any developing country. Annual surveys are a “luxury”, and developing countries do not have this luxury, especially since monies are required to fight poverty “in the name of the many poor”. Use of the NA data for deriving growth for the many more intervening than survey years has two implications: (i) the resulting time-series on mean consumption will be considerably closer to the NA series in terms of growth; and (ii) this series will have up and down spikes in the survey

year. The question to be addressed by all is whether this mal-adjusted survey consumption series (as revealed by the World Bank method) is in any way preferable to an adjusted NA series (as used by non World-Bank researchers).

What if one needed to project the poverty level backwards to 1950, as done by *Imagine*, and Bourguignon-Morrisson who indeed project backwards all the way to 1820? Exactly the same method as projecting forwards – there is, conceptually, zero difference. Note that the classic, and the first paper on world poverty published in 1979 was by three World Bank economists Ahluwalia, Carter and Chenery. They projected mean per capita income both backwards to 1960 and forward to 2000, and used identical methods for doing both.

## ***2. Estimates of poverty when no survey data are available***

For some, and for especially poor countries like Afghanistan, North Korea (and now after twenty years of war, devastation and sanctions, Iraq) no survey data may be available. There are again two methods of calculating poverty for such countries. Ignore countries without survey data, and compute the head-count ratio on the basis of countries for which data are available. This method would attribute a level of poverty in Afghanistan in 1998 of the *measured* global poverty level e.g. 24 percent for 1998. This method is followed by the World Bank. Alternatively, *Imagine* attributes the *regional* distribution of South Asia to Afghanistan; the mean, as for all other countries, is obtained from Afghanistan's national accounts. This *Imagine* method (with the NA mean adjusted downward by 15 percent) yields a poverty level almost three times higher for Afghanistan in 1998 (than the implicit World Bank estimate of 24 percent).

## ***3. What if no PPP data are available?***

This is problematical, but fortunately, due to the pioneering efforts of Maddison (2001), the population and mean income estimates are available for every country in the world for the post World War II period.<sup>6</sup> Sala-I-Martin does not include the countries of the former Soviet Union in his estimates of global inequality trends for the period 1970-2000. He excludes these countries on the grounds that the Summers-Heston 1985 PPP data does not have these estimates. Milanovic (2002a) is strongly critical of this omission and believes that Sala-I-Martin's results on a declining trend in world inequality (identical to

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<sup>6</sup> The chain-linking method (analogous that done with price-series) is used to link the different estimates to the 1993 base PPP series.

those reached by Bhalla (2000b, and *Imagine*) would not have been possible if the data for the formerly Soviet Union countries had been included.<sup>7</sup>

#### 4. How detailed the data on distribution?

In the pioneering effort of constructing a world inequality distribution, Berry et. al. (1981,1983) use the data on *quintile* distributions for each country. For example, if the mean income for 1970 is known for India, say  $u$ , as well as the share in the distribution of each quintile, say  $x$ , then the mean income of any quintile is  $5xu$ . This mean is then assumed to be the income of every individual residing in that quintile. This is obviously an approximation, and equally obviously somewhat incorrect. Schultz computes inequality estimates for all the years 1960–1989, and instead of the quintile mean,  $5xu$ , he imputes the *aggregate* mean income  $u$  to all the residents in a country. The resulting inequality estimates are very, very different. Berry et. al. obtain a Gini of 66.2 while Schultz's estimate is a considerably more equal Gini level of around 55. This 17 percent difference in the Gini is extremely large; simulations suggest (see *Imagine*, 79–80) that this difference is equivalent to the relative incomes of the people in the rich western world being only half as high in Schultz, as compared to the relative income implied in the Berry et. al calculation. Clearly, therefore, the detail of individual country distribution is very critical to the overall assessment of inequality, and its trend.

Several authors, post Schultz, incorporate quintile adjustments into the data – see Bourguignon-Morrison, Milanovic and Sala-I-Martin. Their results are also similar. Some use data on deciles when available, thus allowing for a slightly greater degree of disaggregation. Only Bhalla (2000) and *Imagine* use data disaggregated to the percentile level. Regarding means, all the authors (except Milanovic) use GDP per capita as an estimate of mean income. Milanovic uses survey means for income, rather than GDP per capita; when income surveys are not available for a country, he uses the estimate of survey mean consumption.

While “true” in the sense that only survey data are used, the Milanovic method does not pass various smell tests of consistency and reality. For example, Milanovic pools in consumption and income distributions, *and* the respective *means*, for all countries. The former assumption (income *distribution* is the same as consumption distribution when the other is not available, and vice-versa) is reasonable and within most spirits of estimation, but the latter assumption has little justification. The simple expedient of adjusting the survey

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<sup>7</sup> Empirically, Milanovic is incorrect in his surmise – the declining trend in world inequality remains very much intact and is unaffected by data on Soviet Union republics.

consumption mean upwards by the inverse of the consumption ratio is likely to give *more* plausible results for the mean income in the economy. Since everyone in the economy does not save at the same rate, this simple adjustment is also incorrect; but it may be considerably more accurate than if this assumption was *not* made. With the joint assumptions of using whatever distribution is available, and use of survey means reflecting different survey to national accounts ratios in different countries, Milanovic is forced to conclude that Korea was richer than England and Sweden in 1993, and that India was substantially poorer than Ethiopia in the same year.

### 5. Lorenz curve approximations

Alone among the several estimates of world distribution, *Imagine* uses a modified Kakwani (1980) method to generate *percentile* level data from quintile data. Thus, a greater degree of disaggregation is achieved than heretofore possible. Such a break-up of data allows the same mean to be assumed for 12 million people in China (1 percentile) rather than 240 million if only quintile level data were available. It was noted above that movement to just quintile means from population means improved the accuracy of the inequality estimates – a movement to percentile data can further increase accuracy provided the “interpolation” method is accurate. How accurate is this “interpolation”? Very accurate.

Several tests confirm this assertion. Tests at two extremes of data were conducted – primary, unit record data for India at one extreme and published, quintile and selected percentile level data for the US on the other extreme. When the *constructed*<sup>8</sup> percentile levels were tested against unit record data, and therefore actual percentile levels, for over 250 distributions for rural and urban India, the mean error for an average percentile was only 0.4 percent. Several ratios of percentiles (e.g. 90th vs. 50th, or 50th vs 10th) were tested against US published data for 30 years, 1968–99 (*Current Population Survey*) – the error in these ratios was less than 5 percent, often only 1 or 2 percent.

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<sup>8</sup> Availability of unit record data means that actual quintile and percentile means can be computed. These are the “true” data. The true quintile levels are then used to estimate the percentile levels. The accuracy of the method is judged by comparing the estimated percentile mean to the “true” percentile mean.

### 2.3 Additional confirmation of the quintile-percentile conversion method

The collection and dissemination of quintile level survey distribution data started with a World Bank effort in the mid-seventies (Jain 1975) and has been supplemented in recent years by the Deininger-Squire (World Bank) data base (1995). The UN sponsored WIDER institute in Helsinki extended the Deininger-Squire data set; together these two data sets have over 2000 distributions. However, usable distributions are less than a 1000. The difference is due to repetition, overlap and slight difference in definitions. Further, both sets of distributions (World Bank and WIDER) share a curious problem – for some distributions, the share in income (or consumption) of a *lower* quintile is *higher* than the share of the higher quintile i.e. a definitional impossibility. Surprisingly, this error occurs in ostensibly the most “clean” of all distributions – the “accept” quality data set contained in Deininger-Squire.

The filtered<sup>9</sup> Kakwani method was so accurate that it was able to “clean” the distribution data as published in Deininger-Squire and WIDER. Atkinson-Brandolini describe in detail about the problems with several seemingly “correct” distributions present in these data sets. In *Imagine*, 8 pairs of distributions are documented to show how the Gini coefficients are not consistent with the underlying reported World Bank/WIDER data on quintile shares. This ability to identify errors in published data supports the hypothesis that the *Imagine* method of converting quintile data into percentiles is fairly accurate.

### 6. How accurate is survey data per se?

#### *Brazil*

World Bank survey data on means (obtained from the website [www.worldbank.org/research/povmonitor](http://www.worldbank.org/research/povmonitor) and part of the World Bank database for poverty and inequality calculations) shows that mean per capita consumption in Brazil in 1997 was 27 percent higher than a year earlier! Further, the income share of the first quintile increased by 40 percent in this same year – from a 2.5 percent share to 3.5 percent. *These two statistics taken together suggest that the incomes of the poor in Brazil increased by (log) 60 percent in just one year, having not increased by that level in thirty previous years.* The growth rate for mean consumption revealed by Brazil’s national accounts (NA) for the same year is a much more plausible 3.3 percent.

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<sup>9</sup> Blind application of the Kakwani procedure resulted in shares of all the percentiles not adding to a 100 etc. Consequently, a “filtering” method was used to make the percentile levels add up to a 100.

*Cambodia*

Another wild survey estimate is for Cambodia for 1997. Mean consumption of PPP\$ 6.25 per capita per day makes Cambodia the 14th richest developing country in 1997, richer than Turkey, Russia and almost equal to Poland. Further, the per capita level of \$ 6.25 per day made the average Cambodian 120 percent richer than the average Chinese in that same year. According to national accounts, Cambodia was the 33rd poorest country in 1997, more than twice as poor as China and five times poorer than Poland. While NA means may suffer from problems, the errors are never so extreme.

*Ghana*

As of June 2001, the World Bank website reported consumption in Ghana to be 1993 PPP\$ 76.9 per capita per month for the 1987 national household survey year, 122.03 for the 1992 survey and 25.7 for the 1997 survey. The latest web data (as of Sept. 10, 2003) does not report any statistics for the 1997 survey year, and heavily “revises” the data for 1987 and 1992; now the mean consumption level is reported to be \$ 41.74 for 1987 and \$ 43.55 for 1992. The new survey data is about one-third the magnitude of the old survey data, and for the same survey years! (National accounts data do get revised, but by never this magnitude). By definition, survey means *cannot* get revised. The means may be wildly off (as they appear to be for 1997) but that is precisely the problem with survey data. If survey means need to be adjusted, as they appear to have been done by the World Bank “revisions” for Ghana, then is not an explicit, and non-arbitrary, adjustment as done in *Imagine* preferable?

*India*

The World Bank mean per capita consumption figure reported for India for 1997 (\$45 per capita per month, 1993 PPP) implies that Indians were all dead in 1950, if not in 1960.<sup>10</sup> Projecting backwards from the World Bank survey consumption in 1997 (using growth rates yielded by the national accounts, the same method as used by the Bank for its projections) one obtains the *mean* consumption of an Indian to be 11.4 cents a day in 1950 and 18 cents a day in 1960.

“To reiterate, these are estimates of the mean consumption of the entire population, not the poor population, at constant 1993 prices. History (at

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<sup>10</sup> This problem is only partly due to a “bad” survey mean. The World Bank uses internally computed “consumption PPP exchange rates” rather than the widely disseminated all products or income PPP exchange rates. According to the latter, and with exactly the same survey mean (in local currency) mean consumption, and therefore the consumption of the poor, is observed to be 20 percent higher. If these correct PPP exchange rates are used, the projected results for 1950 and 1960 are not as bizarre, or absurd.

least since 1950) has yet to record such low levels for any economy. The lowest consumption level (NA data) for any country in 1950 was 44 cents a day for China. For 1960, the lowest average consumption level was in Tanzania, at 60 cents a day” (*Imagine*, 100).

### 3 World inequality: Issues and results

Estimates of world inequality essentially vary with the magnitude of disaggregation of the data, and whether survey or national account means are used. Table 1 documents the inequality results obtained by the different methods/studies. For policy purposes, the trend in inequality is more important than the level, since the latter at any point in time is determined by the different data and assumptions that are employed.

**Table 1**

**World individual income distribution – some estimates**

Year	Schultz	B-M	Mi- lano- vic	Bhalla	Bhalla	Sala-I- Martin	Bhalla (2003)	
	1998	1999	1999	2000	2001	2002	National Accounts	Household survey
1820		50.0						
1910		61.0						
1929		61.6						
1950		64.0					68.7	66.6
1960	54.7	63.5			66.4		66.6	64.1
1970	57.5	65.0			68.6	65.7	68.8	66.6
1980	55.3	65.7		74.4	68.5	66.2	68.6	66.2
1987	54.8		62.5	69.4	67.3	65.0	67.4	64.8
1990	55.2				67.5	65.4	67.4	64.5
1993		65.7	65.9		67.0	63.9	66.8	64.0
2000				67.0	65.1	63.3	64.9	63.5
2002							64.0	62.6

Sources: Schulz (1998); Bourguignon and Morrisson (1999), Milanovic (1999); Bhalla (2000; 2001; 2003); Sala-I-Martin (2002).

The studies in Table 1 are ordered according to the date of the circulated draft. The two “first” studies on the globalization-inequality experience were those by Schultz and Bourguignon-Morrisson. Both showed no trend for the latter half of the twentieth century, with Schultz revealing much lower inequality

levels. This level difference is entirely due to the level of disaggregation employed, with Schultz not using any. There were several innovations in the Bourguignon-Morrisson study – the time-period (1820 to 1992), and the use of different survey data for the same country over time if such data existed.<sup>11</sup> Unlike Schultz who uses only national means of GDP per capita, Bourguignon-Morrisson use distributional data, in the form of quintile (and sometimes decile) means. They find inequality to have increased since 1820 but having stabilized since 1980.

Milanovic's study was also a significant departure from others. It eschewed the use of national accounts data and instead used only means revealed in household surveys. His study shows a large increase in inequality; indeed, such a large increase (from 62.5 in 1988 to 65.9 in 1993) that it is implausible. Survey data per se does not account for this increase (see final column in the table); what does cause this unusual result is the use of much lower survey *consumption* means as a proxy for mean *income* in countries for which income distribution data were not available to the author. The error is further compounded by the fact that except for China, most poor countries in Asia and Africa have only consumption distribution data.

My 2000 paper was the first to document a large decline in world inequality – from a Gini level of 74 in 1977 to 67 twenty years later. *Imagine* improved the method of converting quintile means into percentile means and arrived at the same trend decline result. The results in this paper (last 2 columns in the table) differ from *Imagine* in that only original distributions are used i.e. if for a particular country only consumption survey distributions are available (e.g. Indonesia), these are not transformed into a more unequal income distribution. Instead, the (more equal) consumption *distribution* is assumed to be the same as the income distribution. In contrast, *Imagine* had converted the more equal consumption distributions, when available, to less equal income distributions.

Sala-i-Martin uses a kernel curve to derive the percentile distribution for the *world* Lorenz curve.<sup>12</sup> His estimates indicate a downward trend in world inequality<sup>13</sup>; in particular, a decline of 3 Gini points between 1980 and 1998. Sala-i-Martin shows that inequality declined, not just according to the Gini, but

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<sup>11</sup> Note that the original study on this topic was by Berry-Bourguignon-Morrisson in 1981 and 1983. These papers used the same distribution for each country from 1970 onwards.

<sup>12</sup> In contrast, *Imagine* constructs such percentile distributions for each country.

<sup>13</sup> The interesting exception to the declining inequality result is the Bourguignon-Morrisson study which shows that inequality stayed constant at a Gini level of 65.7. One explanation for this divergence could be the pooling of all the countries into 33 regions that the authors have to do in order to project backwards till 1820. If some of the poor countries that have been pooled show faster growth than the average (e.g. Bangladesh, Viet-Nam etc.) then the Bourguignon-Morrisson method will be biased against showing an improvement.

according to seven different inequality measures. His results reinforce the result that world inequality was not increasing in the globalization period, and nor was it constant – it declined, and declined by a significant amount, and for the first time in almost 200 years.

The final two columns of Table 1 report the updated estimates for world inequality according to both national accounts and survey means.<sup>14</sup> The level of inequality estimated by survey data is *lower* than that estimated with national accounts data. But the trend decline according to both methods is virtually identical – about 4 Gini percentage points between 1980 and 2002.

### 3.1 Greater disaggregation leads to greater inequality.

Different authors use different data and different estimation techniques. To abstract from such differences, Table 2 reports results using the data set assembled in *Imagine*. Inequality estimates are reported for quintile and percentile means, and for household and survey data, and for US current dollar and constant PPP dollars.

Using only quintile means rather than the more appropriately disaggregated percentile means biases downward the estimate of world inequality by a few percentage points. (If even quintile data are not used (e.g. Schultz), then the level is underestimated by about 10 Gini points).

#### *US dollar inequality*

The dollar per capita GDP calculations of Gini inequality are about 15-20 Gini points higher than the corresponding PPP calculations, using identical data for distributions. No matter what assumption is used, the US dollar exchange rate inequality is both the highest, and yields a large increase in inequality, and particularly so for the globalization period 1980 to 2000. As mentioned earlier, this method was used by the United Nations in its 1999 *Human Development Report*, but after widespread criticism, this method was deemed incorrect even by the UN. No economist uses US dollar exchange rates to compute world inequality anymore.

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<sup>14</sup> As per convention, if new distribution data are not available, the old distribution is assumed; if no new survey is undertaken, the last survey S/NA ratio is used.

**Table 2****World distribution (Gini) of income – PPP and US dollar estimates**

	1950	1960	1980	1990	1993	2000	2002
World, 1993 PPP							
National accounts data							
Quintile mean	78.6	77.2	78.7	78.2	78.0	77.0	76.5
Percentile mean	68.7	66.6	68.6	67.4	66.8	64.9	64.0
Household Surveys							
Quintile mean	77.2	75.5	77.1	76.2	76.3	76.1	75.7
Percentile mean	66.5	64.0	66.0	64.2	63.7	63.3	62.8
World, Current US \$							
National Accounts data							
Quintile mean		81.9	83.2	86.7	86.6	86.4	
Percentile mean		74.0	76.1	81.0	81.2	80.5	
Household Surveys							
Quintile mean		80.6	81.9	85.4	85.4	85.5	
Percentile mean		71.8	73.7	79.0	79.6	79.5	
Notes: 1. PPP \$ are 1993 base. – 2) Above simulations are based on Simple Accounting Procedure(SAP), dataset contained in Bhalla, <i>“Imagine There’s No Country: Poverty, Inequality and Growth in the Era of Globalization”</i> . The results are slightly different because consumption distributions have not been “transformed” into income distributions. – 3) National accounts data refers to mean incomes, GDP per capita, in 1993 PPP; survey data refers to mean incomes as reported in household surveys. –4) Distributions are formed from readily available quintile data; these have also been converted into percentiles following a procedure outlined by Kakwani (1980). See <i>Imagine</i> , chapter 8 and appendix II for details.							

Sources: World Bank, World Development Indicators, CD Rom, 2003; various household surveys, Deininger-Squire (1996), WIDER (2002) , Bhalla et al. (2003), [www.pwt.econ.upenn.edu](http://www.pwt.econ.upenn.edu).

***Inequality according to different PPP series***

Table 3 reports inequality according to three different PPP series – 1985, 1993 and 1996.<sup>15</sup> All three reveal the same trend – a persistent decline since 1980, and the lowest inequality levels are observed in 2002 e.g. a Gini of 62.1, 64.0 and 63.3 for the 1985, 1993 and 1996 PPP series respectively. For the 1985

<sup>15</sup> Post 1992, data for the 1985 PPP series are not published. Such levels have been estimated for 1993 to 2002 by assuming that the annual growth rate is the same as revealed for each country by the 1993 PPP series.

PPP series, a Gini level of close to 62.1 was last observed by Bourguignon-Morrisson in 1910 (Gini of 61.0). In other words, the Gini level today is close to that observed almost a hundred years ago.

**Table 3a****World income inequality: total, across, and within**

Year	Gini			Theil, 1993 PPP %			
	PPP 1985	PPP 1993	PPP 1996	Total	within	across	% share of within
1950	67.7	68.7	65.1	94.6	27	67.6	28.6
1960	64.6	66.6	64.3	85.4	26.7	58.7	31.2
1970	66.4	68.8	66.4	91.9	28.5	63.4	31
1980	65.4	68.6	66.8	90.6	26.9	63.7	29.7
1990	65.6	67.4	66.1	89.2	28.5	60.7	32
2000	63.1	64.9	64.3	83.4	30.2	53.3	36.2
2002	62.1	64	63.3	80.6	30.1	50.5	37.4

Notes: Income is defined as GDP per capita in the respective year PPP prices.

Sources: World Bank, World Development Indicators, CD Rom, 2003; various household surveys, Deininger-Squire (1996), WIDER, Bhalla et al. (2003), www.pwt.econ.upenn.edu.

***Within and across country inequality***

The table also reports the within-country and across country Theil inequality indices for the 1993 PPP series. The former accounted for about 30 percent of total inequality in 1950; today, its absolute value has gone up by 10 percent, but the share of within-country inequality in total inequality has increased by more than 30 percent (to almost 40 percent today). This large increase has occurred because across-country inequality (the dominant contributor to world inequality) declined from a level of 67.6 in 1950 to only 50.5 today.

Tables 3b and 3c report similar data for the industrialized and the non-industrialized world, respectively. What is striking and noteworthy is that almost the entire inequality in the industrialized world is accounted for by *within* country inequality. For developing countries, this component was less than 50 percent till 1990; today, it accounts for two-thirds of total inequality. In other words, globalization has had a tendency to equalize between country incomes.

**Table 3b****Non industrialized world income inequality: total, across, and within**

Year	Gini			Theil, 1993 PPP %			% share of within
	PPP 1985	PPP 1993	PPP 1996	Total	within	across	
1950	49.5	58.5	54.2	72.4	31.8	40.6	44
1960	50.4	57.8	55.3	69.9	33.3	36.6	47.6
1970	54	61.2	58.3	79.3	35.2	44.1	44.4
1980	56	63.3	60.2	84.5	35.5	49	42
1990	54.4	58.2	56.4	70.3	35.4	34.9	50.3
2000	52.6	54.3	53.6	59.9	36.5	23.4	61
2002	51.5	53.1	52.4	56.5	36.1	20.4	64

Notes: Income is defined as GDP per capita in the respective year PPP prices.

Sources: World Bank, World Development Indicators, CD Rom, 2003; various household surveys, Deininger-Squire (1996), WIDER, Bhalla et al. (2003), www.pwt.econ.upenn.edu.

**Table 3c****Industrialized world income inequality: total, across, and within**

Year	Gini			Theil, 1993 PPP %			% share of within
	PPP 1985	PPP 1993	PPP 1996	Total	within	across	
1950	48.9	47.3	46.1	39	24.4	14.6	62.5
1960	42.9	41.4	41	29.7	23	6.7	77.3
1970	40.5	39.5	39.3	27.1	24.8	2.4	91.3
1980	37.2	36.4	36.6	22.7	21.1	1.6	93.1
1990	38	37.7	37.9	25	23.5	1.5	94.1
2000	38.2	37.8	38.2	26.3	24.7	1.6	93.9
2002	38.3	37.8	38.3	26.4	24.9	1.5	94.4

Notes: Income is defined as GDP per capita in the respective year PPP prices.

Sources: World Bank, World Development Indicators, CD Rom, 2003; various household surveys, Deininger-Squire (1996), WIDER, Bhalla et al. (2003), www.pwt.econ.upenn.edu.

***World Bank on world inequality***

Not mentioned above are the implicit estimates of inequality in the developing world as estimated by World Bank authors, Chen-Ravallion. Inequality estimates are embedded in their poverty calculations, and intriguingly, in two papers they report both that inequality worsened significantly (Chen-Ravallion 2000) and that it improved significantly, (Chen-Ravallion 2001). The two papers have the same title and identical results for poverty, “*How did the world’s poorest fare in the nineties?*” If poverty levels are the same, then inequality change *has* to be the same. But the authors contend otherwise.

Chen-Ravallion (2000) on trends in inequality, 1987–98:

The lack of any significant decline in world poverty despite record growth suggests that something was drastically wrong with the policies pursued over the last twenty years. What went wrong? *Rising inequality was one factor.* There is now evidence of quite sharply rising inter-personal income inequality in the world during this period; Milanovic (1999) estimates that the world Gini index increased by 5 percent between 1988 and 1993 (from 0.63 to 0.66). This could easily wipe out the gains to the world’s poor from global economic growth.” Chen-Ravallion (2000,p.18, emphasis added).

Chen-Ravallion (2001) on trends in inequality, 1987–98:

*“There is a seemingly widespread view that rising income inequality between and within countries in the 1990s has been stifling the prospects for poverty reduction through economic growth....these results do not support the view that rising inter-personal inequality in the developing world (either within or between countries) has been putting a brake on the aggregate rate of poverty reduction. In short, the proximate cause of slow progress in reducing poverty in the aggregate was not worsening distribution but too little growth”* (emphasis added, Chen-Ravallion (2001, 16–17).

Which of the two estimates is “correct”? The second. Using only the Chen-Ravallion web data, inequality in the non-industrialized world decreased by 7.9 percent during 1987–98 (from a Gini of 55.5 to 51.4). Thus, world inequality at the time of the MDG declaration in Sept. 2000, using World Bank data and methods, had declined, and declined significantly, with globalization, a conclusion consistent with that reached in *Imagine* with different assumptions.

***Why world inequality has to have declined***

Besides Milanovic, no study reports an increase in inequality, and most report an improvement (including Milanovic (2002b) for the period 1993–98). World inequality *must* have declined in the last twenty years, given the above average rate of growth in two large poor countries of the world, India and China. Together, these two countries account for almost 40 percent of world population and incomes in these two poor countries grew at an average rate above 5 percent per annum for twenty years compared to incomes in the rich industrialized west growing at 1.6 percent per annum.

Heuristically, the incontrovertibility of the inequality improving result can be documented as follows. Assume the 600 million in the rich west all are in the top 10 percent; the 2.3 billion Chinese and Indians constitute the bottom 40 percent. Over 20 years, the bottom 40 percent increased its income five-fold while the top 10 percent increased its income by less than 50 percent. *There isn't a method, or a calculation, or attempted obfuscation, in the world that can show inequality has increased given the above statistics – except “methods” that lead us to believe that per capita consumption in Nepal in 1995 was thirty percent higher than India, that Cambodia was twice as rich as China in 1997 (results yielded by survey data used by some World Bank authors).*

**4 Trends in world poverty**

The first estimate of world poverty was made by three World Bank economists – Ahluwalia, Carter and Chenery in 1979. They used national account means. Latin American economists (see Altimir 1981) used NA means. Indeed, until the late eighties, only US analysts estimated US poverty purely on the basis of household survey data.<sup>16</sup> The World Bank started using survey means with the publication of the *World Development Report* 1990, and the Indian government converted to this new “method” soon afterwards. As noted by both Bhalla (2000a) and Deaton (2001) no satisfactory reason was ever given by the Indian government for this major change in procedure – a “new” procedure which had well known, and automatic reasons to reveal more poverty than by the previous NA means method i.e. mean survey consumption was considerably lower than mean national accounts consumption. It is possible that the switchover had a political economy element to it – higher poverty levels meant

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<sup>16</sup> A little commented upon result is that US poverty rates in 1968 and 2001 are virtually identical at around 13 percent of the population. While inequality has undoubtedly worsened, and continuous migration at the lower end has occurred, it nevertheless is the case that some part of the lack of poverty decline in the US over 35 years is due to the declining survey to national accounts ratio in mean household incomes.

that cash-strapped Indian states (all of them!) could ask for more money to fight poverty alleviation. Indian policy is to allocate more central funds to states with higher poverty levels.

If distribution of consumption is available<sup>17</sup>, along with an estimate of the mean, then only one important step remains before determining the magnitude of poverty and its trend. This step pertains to the specification of the poverty line. The popular poverty line – consumption less than one PPP \$ a day, 1985 prices – is used by most researchers, but important differences obtain; some researchers (e.g. Sala-I-Martin) prefer to use an income poverty definition rather than consumption poverty.<sup>18</sup> Differences are also present in keeping constant the poverty line e.g. World Bank believes that international inflation was only eight percent between 1985–93, while *Imagine* calculates such inflation to be almost four times higher at 30 percent.

#### 4.1 International Inflation between 1985–93 – 8 or 30 percent?

The availability of the new 1993 PPP data base meant that poverty analysts would have to decide on the 1993 value of the 1985 PPP \$ a day poverty line. Conceptually, this adjustment should be a reflection of international PPP inflation between 1985 and 1993. To be sure, relative prices have changed, and therefore a country may be richer, or poorer, with the new PPP data, *ceteris paribus*. But such individual differences cannot significantly alter the underlying change in international inflation.

Chen-Ravallion calculate the new poverty line to be \$ 1.08 day in 1993 PPP prices, and state that it is equal, in purchasing power, to one \$ a day in 1985 PPP prices. This calculation implies that inflation between 1985 and 1993 was 8 percent. *Imagine* provides *three* separate pieces of evidence to suggest that international inflation was much higher, namely 30 percent. First, and most importantly, the definitional increase is 30 percent; this is obtained via the increase in the *numeraire* inflation provided by the US GDP deflator (or US CPI). The US GDP deflator increased by 27.6 percent, and US CPI inflation by 34 percent between 1985 and 1993.

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<sup>17</sup> Either from consumption distributions or assumed equal to income distributions (e.g. China) when the former is not available.

<sup>18</sup> For both theoretical and measurement reasons, a consumption based poverty assessment is preferred, and this has become standard practice when analysis veers to poverty measurement in the developing countries. In the US, however, the practice is to measure poverty in terms of income; perhaps this is the reason why Sala-I-Martin chooses to compute income poverty estimates.

Second, 30 percent is the difference in PPP estimates for income for the only over-lapping year, 1985. Third, “international” inflation observed for the poorest 8 countries in the world, and the countries which formed the basis of the original \$ a day poverty line, was close to 30 percent (actually 29.2 percent). (*Imagine*, 66)

These three pieces of evidence (actually only the inflation evidence is needed, the difference in incomes is meant to be supportive since different relative prices prevent the relationship from being exact) strongly indicate that world inflation, 1985–93, was 30 percent. This has an obvious bearing on the level of poverty in any given year – a (log) 18.5 percent difference in poverty lines (1.08 vs. 1.30) is expected to result in approximately a 10 percentage points lower poverty level, *ceteris paribus*.<sup>19</sup> In other words, by lowering the poverty line, the World Bank has lowered the level of poverty in any given year by approximately 10 percentage points, *ceteris paribus*.

#### 4.2 Adjusted versus Unadjusted Survey Means

Besides the poverty line, the most important difference between the World Bank’s poverty-estimating procedures and all others (including *Imagine*) is in the exclusive use of survey means (World Bank) versus the alternative of using national accounts data on personal expenditures to appropriately adjust the survey mean. (No such choice exists with respect to the distribution – all authors use the survey distribution as given).

*A priori*, the obvious choice for the mean of a distribution is the *survey* mean – after all, it is what households themselves are stating they are consuming. The survey mean has the correct coverage (it excludes prisons, hospitals, NGO’s etc.), and has the correct definitions e.g. intermediate goods are ignored. However, there is no guarantee that the survey mean will be even close to the true unknown mean. This unknown mean is approximated by another, independent method of estimation – national accounts. The latter involves estimation of consumption of several different categories of consumption. Data from production, exports, imports, intermediate stages of production, and consumption are all “unified” into a common accounting framework. The NA mean is cross-

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<sup>19</sup> The poverty decline expected from a given amount of increase in real expenditures is a function of the “shape of distribution elasticity” or SDE. This concept was developed in detail in *Imagine* and is explored further in Section 5. The SDE is a function of the distribution of consumption “congestion” near the poverty line, and for a poverty line of one \$ a day, the empirical result is an elasticity of 0.45 i.e. each 10 percent (log) increase in expenditures is associated with a 4.5 percentage point decline in poverty. SDE is not a constant and its magnitude is purely a reflection of statistical properties of the distribution close to the exogenously given poverty line.

checked with several other data, and cross-checked on an annual, if not quarterly basis. It is very likely that the NA mean will be more accurate than the survey mean.<sup>20</sup>

The real problem with the survey means, and this problem has only surfaced over the last decade (as extensively documented in *Imagine*), is in the radically different *growth* rates of consumption that they contain. For example, the average annual growth rate in the non-industrialized world yielded by the World Bank web data for all the surveys conducted between 1987 and 1998 is 0.4 percent per annum versus a growth rate of 1.4 percent per annum revealed by the national accounts. (Table 9). While there is some reason to expect the levels of expenditure to be different according to the two sources of data, there is very little reason to expect the growth rates to be so different.

Table 4 documents the decline in the survey to national accounts ratio (S/NA) for various regions of the world. Countries with less than 2 household surveys were excluded because they cannot yield a trend in S/NA. The surveys closest to 1987 and 2000 were then chosen for analysis according to two classifications – consumption and income surveys. The results are striking – for both income and consumption surveys (mostly in the developing world), the decline in the S/NA ratio is of the order of at least 1 percent a year, or about 15 percent over the years 1987–2000.

Out of 64 countries with income surveys (mostly in developed economies and Latin America), 39 witnessed a decline between 1987 and 2000. Most of the developing countries have consumption surveys, and several such surveys have been conducted under the advice and guidance of the World Bank (which is also advising the countries on improving their national accounts). Only 13 out of 37 countries witnessed an increase in the consumption S/NA ratio; 24 countries witnessed a decline. Thus, the decline in the S/NA ratio in the nineties is in the nature of a stylized fact.<sup>21</sup> In population weighted terms, the mean consumption captured by the surveys is about 16 percent lower in the nineties than in the mid-eighties.

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<sup>20</sup> It is also the case that the NA consumption and income data are used, vetted, and ‘cross-checked’ by politicians, international organizations, policy makers, journalists, and financial markets. It is unheard of that world financial markets will look at what a *household* survey is saying about trends in income, consumption, or inflation. Indeed, it is a moot question whether policy makers anywhere in the world even know about the existence of household surveys, let alone incorporate that data into their calculations of policies towards income generation, reducing unemployment etc.

<sup>21</sup> Why this is happening is a major research undertaking; a likely cause is the wider choice of consumption items (which do not make it to the interview list of questions) and the increasing opportunity cost of time (people do not have time for the typical 5 to 6 hour interview – they have other work to do).

**Table 4** The universality of a declining survey to national accounts (S/NA) ratio

Region	Unweighted data, S/NA, (in %)				Population weighted data, S/NA (in %)					
	No. of surveys	Closest to 1987	No. of Surveys	Closest to 2000	% (log) change 1987-00	No. of surveys	Closest to 1987	No. of Surveys	Closest to 2000	% (log) change 1987-00
<b>Consumption surveys</b>										
East Asia	6	83.9	6	75.9	-10.0	6	85.8	6	76	-12.1
Eastern Europe	5	113.6	5	62.8	-59.3	5	129.7	5	65.6	-68.2
EMENA	6	81.3	6	85.5	5.0	6	74.2	6	77.1	3.8
South Asia	5	79.8	5	70.1	-13.0	5	75.5	5	59.8	-23.3
Sub-Saharan Africa	13	112.4	13	100.1	-11.6	13	119.4	13	126.6	5.9
All	37	95.9	37	82.2	-15.4	37	87.2	37	74	-16.4
<b>Income surveys</b>										
Industrialized countries	19	51.5	19	51.8	0.6	19	49	19	48.3	-1.4
East Asia	5	62.7	5	58.3	-7.3	5	54.2	5	41.5	-26.7
Eastern Europe	19	86.6	19	62.8	-32.1	19	83.2	19	67.1	-21.5
Latin America	16	56.2	16	56	-3.9	16	57.6	16	58	0.7
All	64	67.7	64	57.7	-16.0	64	58.8	64	50.2	-15.8

Notes: If a country had only one survey, it was excluded from the above computations.

Sources: World Bank, World Development Indicators, CD Rom, 2003; various household surveys, Deininger-Squire (1996), WIDER (2002), Bhalla et al. (2003), [www.dwf.eco.upenn.edu](http://www.dwf.eco.upenn.edu)

The magnitude of the decline in the S/NA ratio reflects the magnitude of consumption expenditures that have gone “missing”. These expenditures are not attributed to any individual or sets of individuals – they accrue to nobody. It is important to explore the implications of this missing consumption for the generation of results on poverty. For example, the S/NA ratio for India declined from 66.7 percent in 1987 to 55.8 percent in 1999. This is a decline of (log) 18 percent. This means that if the average Indian (or the Indian poor) increased their consumption by as much as (log) 18 percent, the survey consumption estimate in 1999 would conclude that there was no growth in their consumption! To further highlight the abnormality of this conclusion, it can be noted that log 18 percent over 12 years corresponds approximately to an increase of 1.5 percent per capita per year – an increase recorded by very few poor countries over such an extended length of time. Non-accounting for this artificial decline in consumption also implies that the head count ratio in India will be overstated by approximately 14–16 percent in 1999. For country the size of India, that is an error of 140–160 million in the *change* in Indian poverty.

For China, the decline is equally large – from an S/NA level of 53.2 in 1987 to 38.7 in 1998. This S/NA is for income i.e. ratio of mean per capita survey income to GDP per capita. China also reports a single per capita mean consumption number for its *income* surveys. This shows a decline from 91.4 percent in 1985 to 80.8 percent in 1999. Large declines are also observed for other poor populated countries like Bangladesh, Pakistan and Indonesia. (see Bhalla et. al. 2003 for a detailed discussion). The S/NA decline for these countries is 13, 16 and 16 percentage points respectively.

If the growth in mean consumption is 15 to 20 percent lower for no reason other than problems in survey design or interviewee fatigue, then both the level, and trend decline, in poverty will be estimated to be roughly 7 to 10 percentage points less. This simple calculation suggests that the World Bank poverty estimate of 22 percent in 2000 is likely to be closer to 12–15 percent – which means that about the time the Millennium declaration was being made in 2000, the goal of 15 percent poverty in 2015 was already reached.

### 4.3 What is to be done?

Given the large drawbacks in using exclusively survey data, and the presumed non-representative nature of national accounts, what should an analyst do? Stated differently, is there a method whose results can be accepted by both those who advocate only survey data and those who advocate the use of national accounts means as a proxy for the measurement error prone survey means?

There are two alternatives – the procedure used in *Imagine* and the procedure adopted for a report produced for the Asian Development Bank, Bhalla et al. (2003). Survey means have the advantage in that they incorporate different properties of the consumption pattern, and survey accuracy, of different countries. Given that the decline in the S/NA ratio really started post 1987, *Imagine* offered a method to “retain” the S/NA ratio observed in 1987. On a weighted basis, surveys were capturing approximately 87 percent of national accounts consumption. Hence, national accounts means were used and reduced by 15 percent (inverse of 0.87) for all countries and for all the years. It was shown that the reduction of this magnitude in NA means assumes that inequality in each country (at least the share of the top 20 percent) was a lot worse than revealed by the surveys. Indeed, that a typical developing country had a distribution of consumption equivalent to the most unequal country, Brazil. Further, (see Bhalla 2003b), this 15 percent reduction is well in excess of plausible estimates of NGO consumption, non-coverage of the rich, and greater under-estimation of consumption by the rich. In other words, the *Imagine* method is biased in the direction of overstating poverty even if NA means are used.

In the Bhalla et al. study for the Asian Development Bank, *The End of Asian Poverty?*, an alternate to the *Imagine* method for adjusting survey means was offered. In order to preserve country-specific attributes of the S/NA ratio, I assumed the country specific 1987 ratio<sup>22</sup> (or year closest to 1987 with prior years getting preference) for each of the country years. This level is different for each country, and reflects the level of statistical expertise, differing nature of coverage and compliance etc. This level, combined with national accounts growth rates, can “forecast” a survey mean for any year. This means that the S/NA ratio is assumed to be 72.1 for all the years for India, 91.4 for all the years for China, 59.3 for Sri Lanka, 159.1 for Ethiopia, etc.

The constant “survey to national accounts” ratio method (referred to as KSNA), prevents the bias caused by a fluctuating survey “capture”, or a wildly fluctuating survey to national accounts ratio. Poverty calculations are reported using this method with exclusively World Bank data and World Bank definitions (consumption deflated by domestic CPI and World Bank provided PPP consumption exchange rates). The World Bank data are used despite the fact that these data have a lot of credibility problems, and that some of the most basic results (e.g. mean growth in consumption between 1987 and 1998) cannot be replicated. The data are retained so that the “true” underlying decline in poverty as suggested by World Bank data and methods can be isolated and discussed. An additional advantage of using only World Bank data is because

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<sup>22</sup> Any year can be chosen as the base year e.g. if 1998 is chosen, then the level of survey mean is as in 1998, and the growth rate remains as revealed by national accounts.

such data have ostensibly been vetted by several other international organizations (e.g. United Nations) and authors for the last decade. In other words, these data are likely to be “clean” and “accurate”.

#### 4.4 World Bank data

A major advantage of using exclusively World Bank data is that the debate can then be centered on the issues, rather than being side-tracked into claims of data inferiority or superiority. These data are described thus: “Drawing on the set of suitable household surveys currently available, this web site provides access to poverty and inequality measures made by staff of the World Bank’s Research Group...the methods used are summarized in the paper, “*How did the world’s poorest fare in the 1990s*” (www.worldbank.org/povmonitor page entitled Global Poverty Monitoring). The web site contains distribution and means data for 75 countries, and some 220 odd surveys spanning the years 1980–98.<sup>23</sup>

#### 4.5 Poverty – Results

Table 5 documents the available estimates of world poverty. These estimates differ on the measure of poverty (all use the consumption definition other than Sala-I-Martin who uses income poverty), on whether 1985 PPP or 1993 PPP base are used (Bourguignon-Morrisson and Sala-I-Martin employ the 1985 PPP base while Bhalla and the World Bank use the 1993 base), and on whether consumption or income PPP estimates are used. World Bank publications are the only ones using consumption PPP estimates. *Imagine* discusses the peculiarities of these consumption PPP estimates and how they differ from the official and conventional PPP exchange rates. One striking result – these consumption PPP exchange rates suggest consumption levels in South Asia about 20 percent lower than official PPP exchange rates, or poverty ratios *for the same poverty line* about 16 percentage points higher.

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<sup>23</sup> Chen-Ravallion poverty papers cover a slightly larger population than the web data set, and a few more countries e.g. South Korea. For some important large population poor countries, e.g. Nigeria and Viet-Nam, *no* data on the web is posted by the Bank. If a bias is present, it is that the mean consumption of the excluded countries is higher, and growth rate lower, than those countries for which data are posted. But the bias is not large – thus, the web data are an ideal vehicle to test the World Bank results and whether they possess the “what you see is (not) what you get” property.

Table 5

## World poverty at \$ a day, headcount ratios (1950–2000)

Year	World Bank 2001	B-M 1999	Bhalla 2000	Bhalla 2002	Sala-I-Martin 2002a	Sala-I-Martin 2002b	Bhalla this paper
1820		83.9					
1929		56.3					
1950		76.1		63.2			72.4
1960		61.6		52.5			64.0
1970		48.0		46.4	23.2	42.4	59.9
1980		41.0	47.3	43.5	17.0	36.3	52.0
1987	28.3		34.4	29.9	11.2	27.3	39.1
1990	29.0		32.4	25.4	10.8	26.1	35.3
1993	28.2	29.6	29.0	22.8	9.5	23.5	32.1
1998	23.5		20.5	16.2	8.3	19.8	23.1
1999	22.7			14.2			22.0
2000				13.1			20.8
2002							18.2

Notes: The poverty figures reported by B-M and Sala-I-Martin in their respective papers have been converted to developing world population to be consistent with the other estimates.

Sources: Bourguignon and Morrissson (2002), World Bank contained in Chen and Ravallion (2000), Bhalla (2000; 2002; 2003); Sala-I-Martin (2002a; 2002b).

There is a close correspondence in the results of Bourguignon-Morrison, *Imagine* and Sala-I-Martin's consumption based poverty measure. All show a large trend decline in poverty ratios post 1980. The only study showing a miniscule poverty decline is the "official" estimate of world poverty provided by the World Bank (Chen-Ravallion 2001) – this estimate shows only a 4.8 percentage point decline in the head-count ratio between the high growth years of 1987 and 1998.

Is the "official" World Bank level estimate of world poverty and its decline right or wrong? Given the differences in magnitude of poverty decline, a "both are right answer" is just not possible. But how given the different data and definitions used can one determine which of the two competing estimates – World Bank and others – is right?

#### *Poverty numbers using only World Bank data and methods*

Table 6 presents estimates of poverty in the non-industrialized world for the period, 1980 to 2002. Several published World Bank estimates for poverty are

reported, as well as one estimate of mean consumption growth. In addition, estimates based on an attempted replication of the World Bank method is reported, as well as estimates based on the KSNA method and World Bank data and definitions. Recall that the KSNA method “preserves” the 1987 survey to national accounts ratio for each country. Another interpretation of the KSNA method is that it uses survey means for 1987, and national account growth rates grafted onto this mean for estimates for other years.

Curiously, the most important “causative” statistic of poverty reduction, mean growth in per capita consumption, cannot be reproduced. Chen-Ravallion (2001) report this to be 0.9 percent a year, 1987–1998, or a cumulative 10.4 percent gain. Our reproduction suggests that this growth is about half or only 5.5 percent.<sup>24</sup> This is especially surprising given that our reproduction of poverty estimates is reasonably close – 29.4 percent in 1987 vs. 28.7 percent by Chen-Ravallion; 28.3 percent in 1990 (compared to World Bank estimates between 28.3 and 29.6 percent); and 23.2 percent in 1998 (compared to World Bank estimate of 24.3).

Reproduction of data on mean growth in consumption is a simple arithmetic calculation. There is no question of analysis here; also, this non-matching of mean consumption growth is independent of the fact that for some countries (e.g. Brazil, Cambodia) the World Bank data show levels and/or inter-temporal changes in mean consumption (a most important determinant of poverty) to be either too large or too small, given one’s knowledge of non-survey data.

The fact that poverty decline broadly matches, and the mean growth in consumption does not, is inexplicable. The distributions are exactly as that of the World Bank; and only World Bank survey means are used. If the World Bank published estimate of consumption growth is wrong, then is it possible to be off by such a large amount? Some high growth countries data are not reported on the web (e.g. Korea); equally, for some low growth countries (e.g. Nigeria). Data for both the large population countries, China and India, are included, so it seems implausible that a missing country, or missing set of countries, can account for this large difference in mean consumption growth.

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<sup>24</sup> These World Bank *survey* growth rates are to be contrasted with the national accounts growth rate of 2.5 percent per year or 31.7 percent for these 11 years.

Table 6

## Head count ratios of poverty, 1950–2002

Year	World Bank				World Bank	KSNA
	Web 2001	Web 2003	GEP	Chen-Ravallion	reproduced	method
1950					64.9	64.4
1960					55.4	55.1
1980					43	42.3
1987				28.7	29.4	29.4
1990	29.3	28.3	29.6	29.3	28.3	26
1993				28.5	27.1	22.9
1996				24.9	23.2	16.3
1998	24.3			24.3	23.2	15.4
1999			23.2		19.5	14.2
2000		21.6			18.4	13.2
2002					16.2	11.3

Source: World Bank, World Development Indicators, CD Rom, 2003; various household surveys, Deininger-Squire(1996), WIDER(2002) , Bhalla et. al. (2003), www.pwt.econ.upenn.edu.; Web 2001 refers to data obtained from www.worldbank.org/research/povmonitor , July 2001; Web 2003 refers to data obtained from www.worldbank.org/research/povmonitor , Oct 2003; GEP refers to World Bank, *Global Economic Prospects*, 2003; World Bank reproduced represents our faithful reproduction of the World Bank method (as reported in Chen-Ravallion) and exclusively World Bank data, www.worldbank.org/research/povmonitor , July 2001; KSNA refers to the method of poverty estimation developed for the Asian Development Bank, see Bhalla et. al. 2003; the acronym KSNA stands for “c(k)onstant survey to national accounts” ratio. This method forces the survey to national accounts ratio to be the same for all the years for ` particular country.

There are two sets of differences in the results of poverty decline. First, there is the difference in the results between our reproduction and the published data. Second, there is the difference in results obtained by our “KSNA” method and the World Bank method. The former does not have an explanation; the latter is exclusively due to one factor – not to the *level* of the S/NA ratio but rather due to this ratio shifting downward in a non-random fashion in the nineties. One hypothesis could be that if the rich understate their consumption more than the poor<sup>25</sup>, and if inequality increases, then the S/NA ratio is likely to decrease as well. However, if this is the explanation for a declining S/NA ratio, then since

<sup>25</sup> *Imagine* suggests it is so, but the magnitude is found to be small for India.

inequality change is not a new phenomenon, one should have observed such S/NA declines in the sixties, seventies and eighties as well. But one does not.

### ***Implications of the World Bank, and other, results***

This lack of replicability of World Bank results on poverty raises several issues – and questions. The first point pertains to our interpretation of what works in the war against poverty and what does not. We know what works by looking at the evidence on growth and poverty. If the growth or poverty numbers are ‘flawed’ the relationship between the two can be misinterpreted. If (log) 9.9 percent growth in mean consumption is correct, then this would imply an elasticity of poverty reduction with respect to growth of 1.9, close to the 2 level generally reported in the literature.<sup>26</sup> If, however, the calculated change in per capita consumption of (log) 5.5 percent is correct, then the elasticity is 3.4, a level considerably higher than any elasticity reported in any World Bank publication.<sup>27</sup> Such a high elasticity (versus the expectation of only 2) implies that using World Bank’s own definitions, data, and methods, the globalization era (1987 to 1998) was better for the poor, more pro-poor, than virtually any other period in history. This is also the conclusion reached in *Imagine*.

The second point pertains to the politics and economics of aid and policy advice. The poverty numbers are “news” and determine policies of the World Bank and other international organizations like the IMF, the UN, ADB etc. Several documents of each of the quasi-government organizations or QGOs, (including their flagship reports like the *World Development Report*, *World Economic Outlook*, *Human Development Report* etc.) look at the World Bank poverty numbers and then proceed with policy design for the developing countries, aid packages, and recommendations for implementation. The recent demand for doubling of aid to developing countries is partly motivated by the conclusion that given the low growth-poverty elasticity of 1.7, existing growth policies have been flawed.

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<sup>26</sup> The elasticity of poverty with respect to growth is given by the ratio of the log change in the head count ratio (log 18.5 percent from 28.3 in 1987 to 23.5 percent in 1998) and the log change in growth, 9.9 percent (from a cumulative gain of 10.4 percent).

<sup>27</sup> For their global poverty projections till 2015, Collier-Dollar assume an elasticity of 2; this paper advocates more aid on the basis that poverty reduction was too low during 1987-1998. The recent World Bank World Development Report, 2004, assumes even a lower elasticity of 1.5 for the MDG projections till 2015.

***Poverty according to different poverty lines***

The KSNA method results can be used to accurately gauge as to what actually did happen to poverty according to three different poverty lines – \$ 1.08, \$ 1.30 and \$ 2.02. (Table 7). The 2.02 dollar line is the population weighted average, in 1993, of country-specific poverty lines in the non-industrialized world. As discussed in Bhalla et. al.(2003), use of a country specific poverty line incorporates criticisms such as those contained in Reddy-Pogge (2002) i.e. that the \$ a day line, while representative of the poorest in the world, is not representative of the poor. Further, because domestic consumer price indices have been used to deflate consumption expenditures, the other Reddy-Pogge criticism (that *average* international price increases do not reflect the price increase experienced by the *poor*) also does not apply. Estimates of poverty according to the domestic poverty line are based on domestic price indices, consumption exchange rates, country-specific poverty lines, country specific S/NA ratios circa 1987; the only data from national accounts is the growth in mean consumption.

The KSNA method reveals poverty decline between 1987 and 2000 of at least 16 percent, a level more than three times the magnitude of the World Bank estimates. For the \$ 1.08 poverty line, the MDG 2015 goal (in terms of halving the 1990 poverty level) was reached in 2000 (13.2 percent poor); for the almost 20 percent higher \$1.3 poverty line, it was reached in 2002 (at 18.2 percent poor compared to 35.3 percent in 1990); and for the country specific poverty line, there has been a 20 percentage point reduction (from 58.3 percent poor in 1990 to 39.3 percent poor in 2002). The recently released 1996 PPP data, as well as the old 1985 PPP data, do not alter any of the conclusions; indeed, the 1996 PPP data shows both a halving of poverty and a level below 15 percent for the higher \$ 1.3 poverty line.

Thus, no matter what the data, or assumption, or method, all results point to rate of poverty decline of about 1.5 percentage points a year. Given that the poverty level in 1990 was close to 30 percent, all data and methods (including World Bank) point to the MDG being reached in 2000 or 2002. The growth rate in mean consumption revealed by the *World Bank* method and assumptions, is log 15.6 percent between 1987 and 2002 (Table 6b); the poverty decline is a log change of 59.6 percent (decline from 29.4 percent to 16.2 percent, Table 6a). The growth poverty elasticity is therefore close to 4 (actually 3.8) i.e. growth was exceptionally pro-poor, given that the average level commonly assumed is 2.

**Table 7**  
**Headcount ratios (in percent) of poverty, different PPPs and poverty lines, KSNA method**

	1960	1980	1987	1990	2000	2002	Decline 87-00
<b>Poverty line = \$ 1.08 per capita per day, 1993 PPP</b>							
PPP 1993 data	55.1	42.3	29.4	26	13.2	11.3	16.2
PPP 1996 data	53.3	38.1	25.5	22.5	9.9	8.5	15.6
PPP 1985 data	54.2	36.1	24.2	21.3	10.6	9.5	13.6
<b>Poverty line = \$ 1.30 per capita per day, 1993 PPP</b>							
PPP 1993 data	64	52	39.1	35.3	20.8	18.2	18.3
PPP 1996 data	61.4	47.1	35.3	31.4	16.1	14.1	19.2
PPP 1985 data	64	46.1	34	30.2	16.8	14.9	17.2
<b>Poverty line = \$ 2.02 per capita per day, 1993 PPP</b>							
PPP 1993 data	79.4	70.1	60.4	58.3	42.2	39.3	18.2
PPP 1996 data	76	65.3	57.3	54.1	36.2	33.3	21.1
PPP 1985 data	81.6	68.1	57.3	54.1	37.2	34.3	20.1

Notes: The average value of the *national poverty line* in the developing world was \$ 2.02 per capita per day, 1993 PPP prices.

Sources: World Bank, World Development Indicators, CD Rom, 2003; various household surveys, Deininger -Squire (1996), WIDER (2002), Bhalla et al. (2003), [www.pwt.econ.upenn.edu](http://www.pwt.econ.upenn.edu).

***Regional Poverty: Some estimates***

Table 8 shows the poverty decline experienced in different regions of the world, according to the World Bank and KSNA methods and the World Bank's \$1.08 poverty line (again, both use the same World Bank data and World Bank definitions). By construction and assumption, both methods yield identical level of poverty in 1987. For all other years, the difference between the KSNA and World Bank estimate of poverty reflects entirely the impact of a differing S/NA ratio or survey capture on poverty estimate.

As was documented in *Imagine*, and also revealed by the World Bank and KSNA estimates, the story of the last two decades is about poverty decline in Asia. Such declines were minor in the other regions of the world, with Eastern Europe registering an increase (both methods). Within Asia, the two methods diverge, and diverge by 364 million i.e. the World Bank method indicates that there were approximately 400 million more poor in 1998 than that indicated by the KSNA method. The largest difference (almost two-thirds) between the World Bank and KSNA method is observed for India, and then in varying degrees, the rest of the economies of Asia. The head-count ratio in the world had already reached the 2015 target in 1998, according to the KSNA method. This decline in poverty of close to 1.5 percentage points a year was shown in *Imagine* to be historic i.e. there is no other period in history when poverty declined at such a fast rate.

The example for India is illustrative, and provides a "smell" test of which of the two competing methods is accurate. The HCR according to the World Bank shows a marginal decline between 1987 and 1998, from 51.3 percent to 46.2 percent. This decline was not enough to warrant a decline in the absolute poor whose number increased from 410 million in 1987 to 453 million in 1998! This miniscule decline is observed despite inequality staying constant (see Bhalla 2003b) and a cumulative per capita consumption growth of 45 percent according to the KSNA method i.e. a method which keeps the S/NA fixed at the 1987 level. This consumption increase, and flat inequality, allows the HCR to decline from 51.3 to 22.5 percent, and yields the number of poor in 1998 as 221 million – a decline of 189 million. The difference between the World Bank and KSNA methods – 189 plus 43 million or 232 million. The overall decline for all the countries is 372 million or that India accounts for nearly two-thirds. Which method is right can easily be gauged by evaluating the poverty estimates for India. In Bhalla (2003b), *Recounting the Poor*, it is documented that even if consumption levels in India increased at the same rate as the increase in total income of casual workers in agriculture (the poorest of the poor) between 1983 and 1999–2000, one would obtain results very similar to the KSNA method.

**Table 8**

Effects of a changing S/NA ratio on estimates of poverty (poverty line = \$ 1.08 a day)

Region	In 1987				In 1998				Decline in # poor — 1987-98	
	World Bank method		KSNNA method		World Bank		KSNNA		Method	Difference (mil)
	Population 1998 (mil)	Headcount Ratio (%)	No. of poor (mil)	No. of Headcount ratio (%)	No. of poor (mil)	No. of Headcount ratio (%)	No. of poor (mil)	No. of Headcount ratio (%)		
China	1240	29.5	320	16.9	210	11.8	147	110	173	63
India	980	51.3	410	46.2	453	22.5	221	-43	189	232
China-India	2220	39	733	30	666	16.8	373	67	360	293
East Asia	1830	28.3	444	16.3	298	10.4	190	146	254	108
South Asia	1280	47.4	488	42.4	543	24.1	308	-55	180	234
Asia	3110	36.4	946	28.1	874	16.4	510	72	436	364
Sub Saharan Africa	524	36.2	142	33.1	173	33.4	175	-32	-33	-2
Latin America	482	17.3	69	10.6	51	12.4	60	18	9	-9
Middle East and North Africa	246	1.6	3	4.6	11	1.7	4	-8	-1	7
East Europe	403	0	0	0	0	1.5	6	0	-6	-6
<b>Non industrialized world</b>	<b>4765</b>	<b>29.4</b>	<b>1170</b>	<b>23.2</b>	<b>1105</b>	<b>15.4</b>	<b>734</b>	<b>64</b>	<b>436</b>	<b>372</b>

Notes: World Bank method is as described in Chen - Ravallion (2001). - KSNNA method assumes that the S/NA ratio for each country is kept constant at its 1987 level; in all other respects, the two methods are identical. - The final column contains the effects of the observed change in S/NA ratio between 1987 and 1998 on observed levels of poverty.

Given all this data on poverty and growth, academics and policy makers have to make a simple choice – are they going to make their entire decision about what happened to poverty on the mis-interpretation of one single noisy and trending downward statistic, the S/NA ratio? If there is room for consideration about what happened to poverty decline independent of the decline in the S/NA ratio, then the incontrovertible conclusion which emerges is that the poverty decline experienced in the globalization period was very large, of historic proportions, that the growth was manifestly pro-poor, and that the MDG goal was reached before the formulation of the goals.

## 5 How much growth equals how much poverty reduction

This section is concerned with the analysis of how given a certain amount of growth, what poverty decline should be expected. The question is important. The disaffection with growth as a poverty reducer stems from the World Bank finding of too little poverty decline in the presence of high growth during 1987–98. This finding likely led to (and is still leading many others) to search for better “growth” policies, or better quality of growth. In other words, what is being aimed at is growth which delivers more than “normal”; growth which is pro-poor.

There are two aspects to the identification of whether pro-poor growth is being achieved or not. First, and most importantly, is whether there has been any change in inequality – if an improvement, then growth was likely pro-poor. But what happens if growth declines more than inequality improves? Can this process be construed as pro-poor, especially if one contrasts it with another society where inequality worsens a lot, but growth is also tremendous e.g. China? In this case, the incomes of the poor rise much more, and poverty declines much more, with an “anti-poor” strategy than with a pro-poor one. In *Imagine* (also see Bhalla 2003g) a simple definition of pro-poor growth was offered – the excess of the growth in consumption of a pre-defined poor relative to the average growth rate. These “pre-defined” poor are the fraction of people observed poor in any particular year. For example, if 29 percent are the percent poor observed in 1987, then the growth rate in consumption of the bottom 29 percent should be compared with the growth rate in average consumption.

The general evaluation of pro-poor growth has been via the elasticity of poverty reduction with respect to growth, a flawed method with no basis in theory. Datt-Ravallion state the following tautology:

$$(1) \quad \text{Poverty Reduction} = \text{Poverty reduction due to income growth} + \\ \text{Poverty reduction due to improvement in inequality}$$

The first term is the contribution due to growth, and the second is the contribution due to distribution.<sup>28</sup> But how does one measure each contribution? The suggested (but incorrect) method is to measure all variables (head count ratio, growth in mean consumption and an inequality index like the Gini) in log changes and obtain an elasticity of poverty reduction. Additional variables can be inserted into this definitional model e.g. initial inequality, urbanization etc. If the regression is estimated without an inequality term, one obtains an *average* elasticity of poverty reduction with respect to growth. Note that this estimated elasticity says nothing about how much poverty reduction should one expect with an increase in distributional growth for a given country, *ceteris paribus*.

The elasticity of poverty reduction can be estimated from “first principles” (see *Imagine*). Let  $F(Y)$  be the cumulative distribution of per capita consumption,  $H$  the head count ratio and  $P$  the poverty line. Then,  $H = F(Y)$ . Differentiating,  $dH = f(Y).dY$ , where  $f(Y)$  is the density. Evaluating the equation at the poverty line  $P$ , and dividing both the numerator and denominator by  $P$ , one obtains,

$$(2) \quad dH = P*f(Y)dY/Y \quad \text{or}$$

dividing both sides by  $H_{t-1}$  (poverty in the initial time-period), and primes referring to log change,

$$(3) \quad H' = (P/H_{t-1})*f(Y)*Y'$$

The italicized term  $P/H_{t-1}$  is known *ex-ante* since  $H_{t-1}$  is poverty in the initial period and  $P$  the poverty line.

The log change in the head count ratio  $H'$  is equal to the product of the amount of economic growth that occurs  $Y'$  and a non-linear term  $(P/H_{t-1})*f(Y)$  whose value is a function of the poverty line  $P$  and the density of the distribution function (at the poverty line  $P$ ). Equation 3 is the conventionally defined elasticity i.e. the percentage decline in poverty that can be expected with a 1 percent growth in per capita consumption is given by the non-linear term  $(P/H_0)*f(Y)$ .

The decline in *percentage points* in poverty is given by  $dH$  in equation (2). Policy makers, and policy discussions, are concerned about the impact of growth on the decline in the head-count ratio  $dH$  and not  $H'$ . (A decline from a

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<sup>28</sup> Since the equation is a reduced form, Datt-Ravallion are compelled to add a third residual term which is equal to “the difference between the growth (redistribution) components evaluated at the terminal and initial Lorenz curves (mean incomes) respectively” (p. 5)

HCR of 29 percent to a head-count ratio of 23 percent is a 6 percentage point decline or a (log) 23 percent decline – the latter is hard to relate to). Hence, *Imagine* defined the term  $P \cdot f(Y)$  in equation (2) as the “elasticity” of poverty reduction (in percentage points) with respect to growth (defined as log percentage change). This elasticity is always changing, and was termed shape of distribution elasticity (SDE). Note that this elasticity is not a function of the growth process but is known *ex-ante* i.e. SDE at (t-1) determines the impact of growth (from t-1 to t) on poverty (also from t-1 to t).

These equations can be used to explore the impact of some of the presumed common determinants of the elasticity or pro-poor growth. Consumption (log) growth is by definition equal to the log change in mean consumption,  $g$ , and log change in the share of consumption of any group,  $i$ . In other words,  $Y' = g + i$ . If this change is considered for those close to the poverty line, then this decomposition of consumption growth, along with knowledge of  $SDE_{t-1}$ , can help translate income *and* inequality changes (without a residual term a la Datt-Ravallion) into expected changes in poverty, via the following formula:

$$(4) \quad dH = (g + i) \cdot SDE_{t-1}, \text{ or}$$

$$(5) \quad dH = (g + i) \cdot (P / H_{t-1}) \cdot f(Y)$$

where all figures relate to changes *at or near the poverty line*,  $P$ . For non-small changes, the relationship does not hold exactly, for the simple reason that the large changes in income most likely traverse a large portion of the distribution and the arc elasticity estimated by SDE is an average of several “arcs”. However, as documented in *Imagine*, the approximation for large changes provided by equation (4) is reasonably close.

The determinants of change in poverty can be easily explored via equation 4. The first result is that growth can, and does, affect poverty *differentially* depending on the value of SDE in the initial period i.e. the same amount of growth can often lead to a higher, or lower, reduction in poverty depending on the density of the distribution,  $f(Y)$ . The more congested is the population close to the poverty line, the larger will be the impact on poverty reduction, for a given amount of growth.

The second important result is that this density has no obvious relationship with either growth or initial inequality. A highly unequal economy like Brazil can have income ranges where the distribution is equal; a relatively equal economy like India can have income ranges where the distribution is unequal.

This simple fact has not been appreciated enough and has led many to conclude from “normal” differences in growth yield (defined as  $dH/Y'$ ) that what is required is a change in policy and/or that non-growth instruments are needed. Several research documents (e.g. WDR 1990; WDR 2000/01) highlight the impor-

tant role of “initial conditions”, “initial inequality”, non-farm growth, infrastructure investments etc. to explain why the growth poverty relationship has been observed to be weak. Indeed, the “explanation for all seasons” is that it wasn’t growth that did it – it was the “catch-all” initial differences.

### ***Initial Conditions - Does initial inequality matter?***

The most important presumed initial condition affecting poverty is initial inequality. This has been a oft-repeated argument, and made ever since the World Bank World Development Report outlined the “logic” in 1990:

WDR 1990, p.47: “A 10 percent increase in the incomes of the poor in Bangladesh and India would reduce the incidence of poverty by about 7 percentage points. *Where the distribution of income is more unequal*, as in Venezuela and Brazil, the corresponding figure would be only 3 percentage points” (emphasis added).

As the “observed” poverty decline post 1990 was found to be too little (primarily due to a declining S/NA ratio), the advocacy of this line of reasoning intensified.

“High initial inequality reduces the poverty impact of a given rate economic growth. (World Bank 2000, 56). Even when the distribution of income itself does not change with growth, countries, with similar rates of growth can have very different poverty outcomes, depending on their initial inequality. Others things being the same, growth leads to less poverty reduction in unequal societies than in egalitarian ones. If poor people get a small share of existing income and if inequality is unchanged, they will also get a small share of the new income generated by growth, muting the effects of growth on poverty. Evidence confirms this: when initial inequality is low, growth reduces poverty nearly twice as much as when inequality is high”. (World Bank 2000, 55)

Other researchers have also reaffirmed their belief.

Ravallion (2001, 15): “Even if inequality is not rising, a high initial level of inequality can stifle prospects for pro-poor growth”.

Klasen 2001, 3) “A given rate of pro-poor growth will lead to different rates of poverty reduction, *depending on the level of initial inequality*” (emphasis added)

A more equal distribution may be desirable for several reasons, but a higher impact on poverty reduction is *not* a theoretically valid reason. The above reasoning betrays a confusion between levels and changes. Regardless of initial inequality, the change in poverty is a function of the change in consumption. If

inequality does not change (as assumed in the above quotes) then a 10 percent growth will result in a 10 percent increase in the consumption of the bottom 20 or bottom 40 percent i.e. not a differential increase as presumed. So if a poor person consumed \$ 1 a day per capita in 1987 in unequal Brazil or equal India, and if both societies experienced a 10 percent change in average consumption, and both societies experienced no change in inequality, then in both societies the poor person would be consuming \$1.10 in 1998, and in both societies the person would be non-poor in 1998; i.e. initial inequality is *irrelevant* for conclusions about the impact on poverty of growth.

Even a “sophisticated” interpretation of the above quotes does not lead to the inference that initial inequality affects poverty decline. First, note that there is no *direct* role for initial inequality in equation 4 – it does not appear in the equation, while both the poverty line and initial head count ratio do. Indirectly, though, the initial distribution of income can enter into the equation via the density  $f(Y)$  in the initial time-period. However, the impact is non-linear and is high or low depending on *not* overall inequality but the *congestion (or inequality) of people close to the poverty line*. It is not overall inequality in the initial period that matters, as conjectured by most, but rather the inequality levels of those close to the poverty line. It can indeed be, and often is the case, that the density at the poverty line is higher for an *unequal* economy than an equal economy; this can especially occur at the tails of the distribution where even very equal economies will have a low elasticity.

Some empirical evidence is illustrative. With a Gini of 27.8, China was a very equal society in the early eighties. At that time, each 10 percent increase in incomes would have led to a 5.9 percent decline in the HCR. A decade later, China had become very unequal; but the same amount of increase in income would now have led to a decline in the HCR of a *higher* amount - 7.6 percent. Analogously, China is more equal than Brazil, yet in the late nineties, and with national poverty lines (PPP 1993 0.9 per capita per day in China and \$ 8.2 a day in Brazil), China would need higher growth to bring down poverty by the same amount as in Brazil.

The reason the yield (percentage point decline in poverty for a given amount of growth) moves around, unpredictably and paradoxically to some, is because of the simple fact that where the poverty line cuts the distribution of income is an important component of how much poverty decline can be expected with growth, *ceteris paribus*. This effect can be quite large and can generally swamp other effects. The following heuristic example illustrates the non-linearity. Assume the poverty line is 100 and the mean income of the poor is 50 and the standard deviation is 10. An increase in consumption of 10 percent will have a zero impact on the head count ratio. Now assume that the mean income of the poor was 99. Now a 10 percent increase in consumption will lead to a very

large decline in the head count ratio – so the elasticity has changed from zero to infinity with virtually no change in the underlying reality – except the phenomenon of where the poverty line cuts the distribution of income.

***Was growth pro-poor, 1980–2000, 1987–98***

Table 9 summarizes several statistics on inequality, growth and poverty for the non-industrialized world, 1960–2002. Of particular interest is in the nature of growth during 1960–80 (pre-globalization) and subsequent to 1980 (during globalization). No matter what the method, or statistic, the last twenty years were truly the golden age of development, and especially so for the poor.

Whether growth was pro-poor is best revealed by examining growth for the poor, a fraction kept constant at the 1987 level of 29 percent. This consumption growth can be compared with that of the growth of the average person – the magnitude of the difference reveals the extent of pro-poor growth. Average growth according to the World Bank method was 5.5 percent; that of the poor (bottom 29 percent) was double this amount at 11.1 percent. So the World Bank method, data, and definitions indicates that growth was very pro-poor at the time so little poverty reduction took place! The KSNA method reveals a much higher elasticity than 2: the average growth was 11.1 percent, and the consumption of the poor more than 150 percent higher at 29.1 percent (elasticity close to 3). No other prior decades reveal this magnitude of relative growth i.e. growth during the globalization period was the most pro-poor that the developing world has ever experienced.

## **6 Conclusions**

The Millennium Development Goals of poverty reduction are a major policy concern. This paper has attempted to evaluate the progress of the world towards the goal of 15 percent poverty in 2015. Surprisingly, and one of the major findings of this paper, is the conclusion that this goal was already reached at the time of the declaration in September 2000! If the World Bank method of estimating poverty is preferred, then this goal was almost reached in 2002.

**Table 9:** Non-industrialized world: growth, inequality and poverty, 1960-2002

	1960	1980	1987	1988	2000	2002	Growth		
							1960-80	1987-98	1980-00
<b>Inequality</b>									
Gini	54.7	63	58.9	51.4	50.2	50	14.1	-13.6	-22.7
Share of bottom 40%	11.31	8.74	10.16	12.23	12.64	12.7	-25.8	18.5	36.9
<b>Mean consumption per capita per day</b>									
KSNA method	1.67	2.62	3.03	3.55	3.71	3.89	45.0	15.8	34.8
World Bank method	1.67	2.62	3.03	3.2	3.39	3.54	45.0	5.5	25.8
<b>Consumption of 1987 poor</b>									
KSNA method	0.44	0.58	0.77	1.03	1.09	1.15	27.6	29.1	63.1
PL = \$ 1.08	0.51	0.67	0.87	1.19	1.25	1.32	27.3	31.3	62.4
PL = \$ 1.30	0.68	0.88	1.13	1.56	1.65	1.74	25.8	32.2	62.9
World Bank method									
PL = \$ 1.08	0.44	0.58	0.77	0.86	0.96	1.01	27.6	11.1	50.4
PL = \$ 1.30	0.51	0.67	0.87	0.99	1.1	1.16	27.3	12.9	49.6
PL = \$ 2.20	0.67	0.87	1.13	1.31	1.44	1.52	26.1	14.8	50.4

**Table 9 (continued): Non-industrialized world: growth, inequality and poverty, 1960-2002**

Poverty, Headcount ratio (in %)	Growth								
	1960	1980	1987	1998	2000	2002	1960-80	1987-98	1980-00
<i>KSMA method</i>									
PL = \$ 1.08	55.1	42.3	29.4	15.4	13.2	11.3	-12.8	-14.0	-29.1
PL = \$ 1.30	64	52	39.1	23.1	20.8	18.2	-12.0	-16.0	-31.2
PL = \$ 2.20	79.4	70.1	60.4	44.4	42.2	39.3	-9.3	-16.0	-27.9
<i>World Bank method</i>									
PL = \$ 1.08	55.4	43	29.4	23.2	18.4	16.2	-12.4	-6.2	-24.6
PL = \$ 1.30	64.2	52.3	39.1	31.9	27.3	24.9	-11.9	-7.2	-25.0
PL = \$ 2.20	79.4	70.3	60.4	53	49.2	46.4	-9.1	-7.4	-21.1

Notes: PL refers to poverty line, per capita per day, 1993 PPP prices. – The poor for each poverty line refers to the fraction of population poor according to that line in 1987 – Growth refers to log change for all variables except the head –count ratio for which it refers to the arithmetic difference between the two years.

Sources: World Bank, World Development Indicators, CD Rom, 2003; various household surveys, Deininger –Squire (1996), WIDER (2002), Bhalla et al. (2003), [www.pwt.econ.upenn.edu](http://www.pwt.econ.upenn.edu).

The Bank, the official “scorer” for poverty statistics, has the highest poverty estimates among all researchers. There is only one “factor” causing the difference in poverty estimates as produced by the World Bank and others. The Bank uses a method which overwhelmingly relies on the accuracy of household surveys. If this accuracy deteriorates, as it apparently has over the last decade or so, then poverty estimates will contain large errors and for each 10 percent decline in the S/NA ratio, poverty is likely to be over-estimated by 5 percentage points. On average, over the last fifteen years, the S/NA ratio has declined by about 15 percent – or that poverty has been over-estimated by about 7 to 8 percentage points. The point estimate for the HCR (World Bank published) is 21.5 percent in 2000; our analysis showed that this is very likely an over-estimate and that the true underlying poverty in the world was below 15 percent in 2000.

The cumulative increase in per capita expenditure in the non-industrialized world, 1987–98, was reported by the World Bank to be 10.4 percent. This paper uses only World Bank data; means of household surveys for different years have been posted by the World Bank on its website. Our attempt at reproduction of the World Bank results on the head-count ratio, based on World Bank data, were successful. Curiously, a successful reproduction of the estimate of expenditure growth (the simpler and more straightforward of the variables being reproduced) was not possible. Instead of the 10.4 percent increase, we were able to obtain an increase of only half – about 5.5 percent. Simple measurement or computation errors cannot account for this large difference for a non-industrialized world population of almost 5 billion.

Computations of poverty involve computations of inequality change and expenditure or income growth. World inequality was shown to have declined dramatically over the last two decades and the 2002 level of the Gini coefficient is very close to that observed almost a 100 years earlier. A two century old increase in world inequality has not only been arrested, but reversed. Projections for the future suggest that the declining inequality trend will continue.

Consumption growth of the poor, and poverty decline, was the most rapid during the last twenty years. So much so that the MDG goal of poverty reduction for 2015 was reached by 2000 itself – and it did so regardless of which PPP series was used – either the old 1985 base series, or the well established 1993 PPP series, or the new 1996 PPP series. The consumption growth was also pro-poor – typically, regardless of the method, the elasticity of growth in consumption of the poor was at least 2 i.e. for each 10 percent growth in average consumption, the consumption of the poor increased by more than 20 percent; more precisely, using the KSNA method, the elasticity is 3.

World poverty today (in 2002) is close to 10 percent according to the \$ 1.08 a day poverty line. (As argued in Bhalla (2003c), the time has come for the in-

ternational community to raise the poverty line.) Most of the poor used to reside in Asia, a continent that contains over 3 billion people and a continent with record growth for the last twenty years. It is time the international community, instead of publishing and believing wrong statistics, applied the lessons of growth of Asia to the poor continent of Africa and the poor growth region of Latin America.

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