IMF Working Paper

Global Relative Poverty

Lynge Nielsen

INTERNATIONAL MONETARY FUND

IMF Working Paper

Office of Internal Audit and Inspection

Global Relative Poverty

Prepared by Lynge Nielsen[1]

Authorized for distribution by Barry H. Potter

April 2009

Abstract

This Working Paper should not be reported as representing the views of the IMF.
The views expressed in this Working Paper are those of the author(s) and do not necessarily represent those of the IMF or IMF policy. Working Papers describe research in progress by the author(s) and are published to elicit comments and to further debate.

The paper provides estimates of global relative poverty trends from 1970 onwards. Relative poverty is shown to have decreased significantly, but at the same time there has been a worsening poverty outcome among up to one billion of the world's poorest citizens. The paper also proposes a straightforward method for dividing an income distribution into classes of poor, rich, and middle-class.

Contents   Page

I. INTRODUCTION

An important recent contribution to our understanding of trends in international income inequality is Sala-I-Martin (2006). Sala-I-Martin painstakingly puts together annual distribution of income estimates for the 1970-2000 period by combining national accounts data for 138 countries (from the Penn World Tables) with various microeconomic survey data on intra-country income disparities. Using 1996 PPP prices, the combined data set has world GDP almost tripling from about $15 trillion in 1970 (3.5 billion people) to close to $42 trillion in 2000 (5.7 billion people) with increases in population and per capita income contributing roughly equally to this impressive increase in aggregate economic activity.[2]

The estimates suggest that the period of rapid economic growth in the last three decades of the twentieth century was associated with a sustained and significant decrease in income inequality; for example, the Gini-coefficient fell from 0.653 in 1970 to 0.637 in 2000. Sala-I-Martin also analyzes progress toward poverty alleviation and reports similar positive results; for instance, using the World Bank's $1/day poverty line, the poverty rate fell from 15 percent in 1970 to 6 percent in 2000. These results are shown to be robust across a broad range of inequality indices and absolute poverty definitions.

However, Sala-I-Martin includes no estimates on either the poverty gap (the average income short-fall relative to the poverty line) or on the relative poverty incidence. Poverty gap measures are important because there are shortcomings of poverty measures that use solely the poverty rate or solely the poverty gap; see Sen (1976). Relative poverty estimates are of interest because if the data indicate roughly constant relative poverty one may be inclined to conclude that the lowering of absolute poverty is primarily the result of strong economic growth ('a rising tide that lifts all boats'); on the other hand, if relative poverty has decreased the data may be suggestive of a world economic system that has moved in a pro-poor direction whether by design (e.g., a result of policy interventions) or accident (e.g., a result of technological shocks).

The main impetus to writing this paper was to present relative poverty estimates using the Sala-I-Martin data set, but before proceeding with that a few thoughts on poverty analysis in general are intended to motivate the discussion that follows.

II. RELATIVE POVERTY

The *sine qua non* of poverty analysis, whether of the absolute or relative variant, is the poverty line partitioning the income distribution such that those with incomes less than the poverty line are deemed to be poor. The poverty line is a quintessential normative concept reflecting society's (the social planner's) considered view as to what constitutes a minimum

---

[2] The total population in the data set accounts for 90 to 95 percent of the world's population.

acceptable level of income. Therefore, the tradition in the literature has been to treat the poverty line as exogenously given. Without attempting to constrain the policy space of the Omni-potent social planner, the question explored here is whether there is not a reasonable structure that one may expect the social planner to work within.

One such structure is to have the social planner obey the rules of lexical semantics. Designating a subset of the population as 'poor' is meaningless if there is not another subset of the population designated as 'rich' because poor and rich are opposites that can only be defined in relationship to each other.[3] Conversely, the absence of poverty must imply the absence of richness. If in a given income distribution the population located in the lower tail of the income distribution is designated as being 'poor' lexical semantics and logic demand that another subset of the population located in the upper tail of the income distribution be designated as being 'rich'. The two groups could exhaust the income distribution or there might possibly be other subsets as well; e.g., an middle-income group.

Another reasonable structure to impose on the social planner's problem is to have the social planner be guided by one or more clearly articulated principles (a decision rule). One such possible principle is elaborated in the following.

Inequality analysis is welfare analysis in disguise with an underlying welfare function obtaining its optimum at an equal income distribution; see Dalton (1920). Dalton's key insight was that inequality analysis is inherently an analysis of the difference between an actual and a counterfactual welfare-maximizing income distribution. In the same way a social planner concerned about equity uses an inequality index that measures some notion of distance between the actual and the equal income distribution, a social planner concerned about the outcome at the lower end of the income distribution uses a poverty index that measures some notion of distance between the actual and the poverty-free income distribution. In other words, poverty analysis can be viewed as having a similar welfare foundation as inequality analysis with the underlying welfare function obtaining its optimum when poverty has been eradicated; i.e., when nobody has an income below the poverty line.

Dalton posited a few basic principles that reasonable inequality measures should conform to among those being a transfer principle which states that a (sufficiently small) transfer from someone earning more to someone earning less should result in a decrease in the inequality measure. Building on Dalton's approach, one may want to consider poverty analysis as an analysis of the difference between an actual income distribution, inhabited by 'poor' and 'rich', and a counterfactual income distribution where no such designations pertain owing to

---

[3] Opposites are pairs of words that are in an incompatible binary relationship; to give meaning to such word pairs they have to be defined as a set. Examples of opposites include up/down, precede/follow, and male/female. In *absolute* poverty analysis, the word poor is shorthand for a longer description of what constitutes the poverty line. If the absolute poverty line is $1/day then "$x$ million people are poor" and "x million people earn no more than $1/day" are equivalent statements because 'poor' and 'earning no more than $1/day' mean the same. Likewise, "y million people are non-poor" and "y million people earn more than $1/day" are equivalent statements. Note that it is a non sequitur that 'poor' and 'non-poor' are opposites.

appropriate transfers from the 'rich' to the 'poor'. The following *Daltonian transfer principle* could provide guidance in establishing the poverty line:

> A poverty line is a level of income that permits a rank-order preserving transfer of income from among those earning more than the poverty line to those earning less that would eradicate poverty.

The rank-order preserving condition limits the level of income that can be transferred thus ensuring that the transferors don't themselves slip into poverty in the process of helping others out of poverty. As income has to be transferred from among those earning more than the poverty line there are obvious limits to how high the social planner can set the line, but the principle places no constraints on how low the line can be set. More formally, the poverty line must obey the following constraint:

$$\sum (y^* - y_i) \leq 0$$

were y* is the poverty line and y_i is the income of person *i*. The highest feasible poverty line is seen to be the arithmetic mean.[4] At that level, the designated 'poor' are those earning no more than the average and the designated 'rich' those earning more than the average.

A poverty index with a poverty line at the mean income level obtains its optimum value at an equal income distribution pointing to the interrelatedness of inequality and poverty analysis.[5] At poverty lines below the mean, the poverty index obtains its optimum value before full equality has been obtained. In such cases, the social planner is indifferent about inequality as long as it is clustered fairly (!) close to the mean of the distribution with the distance between the mean and the poverty line providing an indication of the inequality that the social planner is willing to disregard. In some sense then, poverty analysis can be viewed as inequality analysis *lite*.

Starting with a poverty line at the mean income level and then shifting the poverty line down further and further away from the mean the number of poor falls. This suggests that a middle-class gap opens up between the poor and the rich. The transfer principle then recommends a definition of 'rich' as being those in the upper tail of the distribution selected such that if all of their excess income (defined as income above the income of the poorest among this subset) were to be transferred to the 'poor' the poverty gap would be eliminated. For a given poverty line an application of the transfer principle will uniquely classify the population into one of three categories: poor, rich, and middle-class. If the poverty line is set at the mean there is no middle-class because the designated 'poor' and designated 'rich' exhaust the

---

[4] Analyzing the eradication of poverty by means of a negative income tax, Kakwani (1977) proved the infeasibility of a poverty line above the mean, but his result was model-specific. Note also that the $5,000 poverty line explored in Sala-I-Martin is inadmissible under the transfer principle.

[5] An interesting example in that regard is Kakwani (1977) who uses a poverty index that reduces to the relative mean deviation inequality index when the poverty line is set at the mean.

income distribution and if, for a given poverty line below the mean, poverty has been eradicated, there are no rich and therefore the middle-class income range is equal to the support of the income distribution.

While a social planner should always obey the rules of lexical semantics there is of course no particular reason why the social planner should be guided by the Daltonian income transfer principle and indeed other principles may be superior to the one proposed here. In a possible quest for alternative principles, the reader may find it useful to keep in mind the main advantages of the Daltonian income transfer principle: (1) it imposes a reasonable limit on the extent of poverty (nobody earning more than the average can be poor), (2) it links developments in the two tails of the income distribution in a dynamic and intuitive manner, and (3) it makes poverty analysis dovetail nicely with inequality analysis.

III. RESULTS

Before presenting estimates of global relative poverty outcomes, it is worth first to consider what exactly is meant by *global* relative poverty. Two interpretations are possible. One interpretation of the concept of relative poverty is as a *tool of economists* to measure the well-known phenomenon observed in psychology of people benchmarking their well-being to those of their neighbors ('keeping up with the Jones''). To the extent that people compare their income with the income of the average world citizen the concept of global relative poverty is meaningful. Undoubtedly, this has not always been the case, but as the world economy has become more integrated and new technology has enabled the sharing of information at lower costs the concept of global relative poverty has become increasingly more meaningful. A second interpretation of the concept of relative poverty is as a *tool of policy-makers* to structure available information with a view toward formulating appropriate policies toward poverty alleviation. At the global level, one such policy-maker is the United Nations General Assembly. Even if the vast majority of the world's poor were oblivious to the standard of living in other countries (an increasingly untenable view given ubiquitous and affordable internet access), it is perfectly meaningful for the United Nations General Assembly to establish a global relative poverty line to help guide and coordinate global efforts at alleviating poverty.

Ideally one would want to apply a globally-agreed poverty line to the Sala-I-Martin data set. However, no such poverty line has been established by the United Nations or any other intergovernmental organization with a global mandate. As international solidarity is presumably weaker than national solidarity, a representative national poverty line could perhaps serve as an upper-bound estimate for a global poverty line. As argued in the previous section, a reasonable relative poverty line would be some proper fraction of the mean income, but it is surprisingly difficult to find examples of official poverty lines linked to the mean income level. For example, the official poverty line in the European Union (established separately for each member country) is set at 60 percent of the *median* income[6] and when the

---

[6] Report from the Social Protection Committee on indicators in the field of poverty and social exclusion annexed to the presidency conclusions of the European Council meeting in Laeken, December 2001.

first official poverty line in the United States was established in 1964 it was pitched at, though not explicitly linked to, a level of 50 percent of the median income.[7] Japan does not have an official poverty line and most developing countries that establish poverty lines use the absolute variant. In its analytical work, the Organization of Economic Cooperation and Development (OECD) uses a poverty line of 50 percent of median income. The advantage of linking the poverty line to the median rather than to the mean is unclear (neither the European Union nor the OECD rationalize their choice); in fairly even income distributions the two approaches may not be all that different, but the more unequal is the distribution, the more problematic is the use of the median. For instance, using a poverty line linked to a proper fraction of the median income one would get the bizarre result that there is no poverty in a society where half the population receives no income whatsoever. Note also that the poverty rate can never exceed 50 percent using such poverty lines. In contrast, a poverty line linked to a proper fraction of the mean imposes no a priori restriction on the value of the poverty rate.

This admittedly broad-brushed review of official poverty lines suggests that an upper bound estimate for a global poverty line is somewhere around one half of the mean world income level. As it is difficult to pin down a lower bound estimate, the approach taken here is to study a sequence of poverty lines of the form μ/n, where μ is the mean and n a progression of integers (two through ten). For each of the nine poverty lines, the poverty rate and the poverty gap are calculated (Table 1). An *income span* measure is defined as the ratio of the income of the poorest rich to that of the richest poor; i.e., the poverty line (Table 2). In addition to indicating the range of income outcomes in the middle-class, the measure also provides an indication of the income dispersion in the upper tail of the distribution because for a given poverty outcome (i.e., for a given poverty line, poverty rate and poverty gap), the lower is the income span the more equal is the income distribution in the upper tail. This summary indicator is suggested here as an alternative to the popular measurement of the ratio between the incomes of the top and bottom one or two deciles of the population. Finally, detailed income and population data are shown in Tables 3 and 4; electronic workbooks detailing these and other calculations are available upon request.

The poverty rate is seen to decrease from 1970 to 2000 for all poverty lines, and significantly so for all, but the lowest poverty line. One can therefore with a reasonable degree of confidence conclude that relative poverty has decreased. However, it is worth noting that progress was not steady over the period as most of the improved poverty outcome took place in the 1990s.[8] The poverty gap measure provides a mixed picture. Encouraging improvements in this indicator at fairly ambitious poverty lines give way to deteriorating

---

[7] See Atkinson (1983), p. 246. There has been no major revisions to the poverty line since its establishment, but it is periodically adjusted in line with inflation. Since the mid-1960s real income gains have shifted down the poverty line relative to median income. According to the United States Census Bureau the official poverty rate was 11 percent in 2000; in comparison, in the same year the OECD estimates it to be 17 percent using a poverty line of 50 percent of median income.

[8] Likewise, virtually all the income convergence that took place over the 1970-2000 period took place in the 1990s (see Table III in Sala-I-Martin).

results at lower poverty lines. As to the income span, it increases, except at the lowest poverty line, reflecting relatively higher income growth among the rich.

A further look at the poverty gap measure is warranted. As a *diagnostic tool* one can treat the poverty gap as a function of the poverty line μ/n. As n increases in the ratio μ/n, one would expect the poverty gap to fall. For a very low poverty line (n large), the poverty gap should be close to zero because the poverty line would be close to the subsistence level of income. For instance, in 1970, the poverty gap falls consistently from 57.4 percent (n = 2) to 25.7 percent (n = 10). In all four years shown in Table 1, the decrease in the poverty gap is as expected for n up to and including 5. At lower poverty lines, the year 2000 is a clear outlier. In prior years, the poverty gap continues to fall so that at n = 10, the poverty gap is about half of what it is at n = 2. However, in 2000 there is no further decrease in the poverty gap measure (indeed, it increases) so that at n = 10 the poverty gap is about three-fourth of what it is at n = 2.

Recasting this development differently, one can say that at poverty lines of one-sixth of the mean or lower (up to 1.1 billion people), there was no meaningful income gain for the poor in the 1990s (at these poverty lines income increased by at most 7 percent; at higher poverty lines income increased by at least 20 percent). This suggests that the benefits of the strong economic growth in the 1990s were not shared by the poorest segment of the world's population.[9] The Sala-I-Martin dataset thus supports the contention of Collier (2007) that although recent economic progress has resulted in a widely shared prosperity (among peoples in developing and developed countries alike), a significant minority in developing countries has been left behind.

IV. PROSPECTS FOR FURTHER POVERTY ALLEVIATION

In this section, the global poverty outcome for the first decade out of the sample period is forecasted. The forecasting exercise requires data on country-specific population and income growth as well as data on changes in the within-country income distributions. Whereas population and income data are readily available (the source here is the World Economic Outlook database as of April 2009), data on within-country income distributions are not. It is therefore assumed that all income distributions within countries remain constant, but it must be stressed that this is a problematic assumption to use given the rapid economic change currently taking place. Notwithstanding the economic downturn in 2009 and expected below trend growth in 2010 global real per capita income growth is accelerating significantly in this decade. Whereas real per capita income increased by about one fifth per decade in the 1970s, 1980s, and 1990s, it is expected to increase by about one third in the 2000s.[10] Against this

---

[9] Further evidence of troubling poverty outcomes at the lowest level of the world income distribution can also be found by setting the poverty line even lower. For example, at a poverty line of one twentieth of mean income ($1/day in 2000), the poverty rate *increases* from 0.9 percent in 1970 to 3.5 percent in 2000.

[10] The average increase in real per capita income of one-third in the sample of 138 countries is to a large extent driven by 16 countries with income gains more than double that of the average. These countries are Angola, Armenia, Azerbaijan, Belarus, China, Equatorial Guinea, Georgia, India, Kazakhstan, Mozambique, Sierra Leone, Tajikistan, Trinidad and Tobago, Turkmenistan, Ukraine, and Uzbekistan.

background there is no reason to expect within-country income distributions remaining constant and caution is therefore called for when interpreting the forecasts.

The forecasts of global relative poverty in 2010 are shown in Table 5.[11] The poverty rate is expected to continue to fall sharply from 57.2 percent in 2000 to 49.7 percent in 2010 at a poverty line of one-half of the mean. At a poverty line of one-sixth of the mean the decrease in the poverty rate is somewhat lower (from 20.0 percent to 17.7 percent), but at a poverty line of one-tenth of the mean the poverty rate is forecasted to *increase* (from 8.9 percent to 9.2 percent). Encouragingly, the poverty gap improves for all three poverty lines, but the lower is the poverty line the smaller is the improvement.

It is also possible to forecast the effects on poverty by holding constant either population or income. Holding population constant, poverty rates decline rapidly with income growth, whereas poverty rates increase with population growth while keeping income constant. Again the poverty line of one-tenth of the mean is the outlier; at that poverty line the poverty rate improves the least with higher income and deteriorates the fastest with higher population.

In line with the results obtained earlier for the 1990s, the tentative conclusion therefore is that there are good prospects for continued poverty alleviation in the 2000s with the exception of poverty alleviation among the poorest of the poor.

V. EXTENSION

The approach suggested here may have broader applicability. In many empirical studies, researchers are often faced with the need to categorize large collections of amorphous items. For example, in Kashyap and Stein's (2000) well-received study of how the monetary policy transmission mechanism differs according to the size of the bank (measured by the bank's assets) one reads the following: "…an overwhelming majority of the banks in our sample are what anyone would term "small" by any standard" (p. 412). After having made this observation, the authors proceed to divide the sample into small, medium, and large banks without the application of *any* standard whatsoever. What one could suggest in this and similar cases is the following. First, the sample should be divided into small (below the mean) and large (above the mean) and the resulting 'transfer' amount should be calculated. Subsequently, the range of the medium size should be determined by adjusting the amount of the 'transfer' leaving the cut-off points between small, medium, and large being determined by the data and not by the researcher.

---

[11] For ease of exposition, forecasts are only presented for poverty lines of one-half, one-sixth, and one tenth of the mean.

VI. CONCLUDING REMARKS

Sala-I-Martin has constructed a unique world income distribution data set covering the years 1970 to 2000 and showed that absolute poverty fell over this period. Using this data set, the paper shows that the same result holds true using a relative poverty concept. The significant lowering of relative poverty is impressive and suggestive of major structural changes having taken place in the world economy over this period.[12] However, the data also indicate a worsening relative income outcome among the world's poorest particularly in the 1990s (with indications that this trend continues in the 2000s). This latter result should temper anyone's optimism with regard to the progress having been made in the fight against poverty. Finally, the paper argues that relative poverty lines are more appropriately defined relative to the arithmetic mean than relative to the median and proposes a straightforward principle for dividing an income distribution into classes of poor, rich, and middle-class.

---

[12] An important factor here being China's decision in the late 1970s to open up its economy. An exhaustive discussion of regional and country-specific poverty trends is included in Sala-I-Martin.

Table 1. Global Relative Poverty, 1970-2000

	1970	1980	1990	2000	Change from 1970 to 2000	
					Absolute	In percent
Poverty rate 1/						
Poverty line: One half of mean income	62.1	61.2	61.7	57.2	-5.0	-8.0
Poverty line: One third of mean income	53.2	51.5	46.8	45.7	-7.5	-14.1
Poverty line: One fourth of mean income	40.7	43.4	38.4	36.9	-3.8	-9.4
Poverty line: One fifth of mean income	35.7	34.4	29.4	28.0	-7.7	-21.7
Poverty line: One sixth of mean income	25.5	29.7	25.0	20.0	-5.4	-21.3
Poverty line: One seventh of mean income	20.6	20.5	20.7	16.6	-4.0	-19.5
Poverty line: One eighth of mean income	16.2	16.4	16.8	13.6	-2.6	-16.1
Poverty line: One ninth of mean income	12.3	12.6	13.3	11.0	-1.3	-10.3
Poverty line: One tenth of mean income	8.9	12.6	10.3	8.9	-0.0	-0.4
Poverty gap 2/						
Poverty line: One half of mean income	57.4	59.3	55.1	55.0	-2.4	-4.3
Poverty line: One third of mean income	46.8	50.1	50.4	46.8	-0.0	-0.0
Poverty line: One fourth of mean income	42.7	42.6	43.8	40.9	-1.8	-4.2
Poverty line: One fifth of mean income	34.0	39.1	41.3	39.9	5.8	17.1
Poverty line: One sixth of mean income	33.8	33.0	36.0	42.4	8.6	25.4
Poverty line: One seventh of mean income	29.7	35.0	32.4	40.4	10.7	36.0
Poverty line: One eighth of mean income	27.1	32.6	30.4	40.0	13.0	47.8
Poverty line: One ninth of mean income	25.8	31.4	29.7	41.1	15.3	59.3
Poverty line: One tenth of mean income	25.7	23.8	30.3	43.3	17.5	68.2
Memorandum items:						
Total population						
In millions	3,472.5	4,175.4	4,938.2	5,660.3	2,187.9	63.0
Percent change over decade	…	20.2	18.3	14.6	…	…
Mean per capita income						
In US dollars 3/	4,301.3	5,191.0	6,164.5	7,360.5	3,059.2	71.1
Percent change over decade	…	20.7	18.8	19.4	…	…
Total GDP						
In billions of US dollars 3/	14,936.3	21,674.4	30,441.4	41,662.8	26,726.5	178.9
Percent change over decade	…	45.1	40.4	36.9	…	…

1/ Percent share of world population that is poor.
2/ Difference between poverty line and average income of the poor in percent of the poverty line.
3/ PPP-adjusted GDP in 1996 prices.

Table 2. Income Span, 1970-2000 1/

	1970	1980	1990	2000	Change from 1970 to 2000	
					Absolute	In percent

(Unit free; unless otherwise indicated)

	1970	1980	1990	2000	Absolute	In percent
Poverty line: One half of mean income	7	8	8	8	1	14
Poverty line: One third of mean income	17	17	19	19	2	14
Poverty line: One fourth of mean income	32	28	32	32	0	0
Poverty line: One fifth of mean income	41	47	53	53	12	29
Poverty line: One sixth of mean income	60	60	68	78	18	29
Poverty line: One seventh of mean income	78	88	88	101	23	29
Poverty line: One eighth of mean income	101	114	114	114	14	14
Poverty line: One ninth of mean income	130	130	130	148	18	14
Poverty line: One tenth of mean income	217	148	168	168	-49	-23

(US dollars, PPP-adjusted GDP in 1996 prices; unless otherwise indicated)

Income of richest poor 2/

	1970	1980	1990	2000	Absolute	In percent
Poverty line: One half of mean income	2,081	2,365	3,055	3,473	1,392	67
Poverty line: One third of mean income	1,417	1,610	1,830	2,365	948	67
Poverty line: One fourth of mean income	965	1,246	1,417	1,830	866	90
Poverty line: One fifth of mean income	849	965	1,097	1,417	568	67
Poverty line: One sixth of mean income	657	849	965	1,097	440	67
Poverty line: One seventh of mean income	578	657	849	965	387	67
Poverty line: One eighth of mean income	509	578	747	849	340	67
Poverty line: One ninth of mean income	447	509	657	747	299	67
Poverty line: One tenth of mean income	394	509	578	657	263	67

Income of poorest rich

	1970	1980	1990	2000	Absolute	In percent
Poverty line: One half of mean income	14,209	18,357	23,717	26,958	12,749	90
Poverty line: One third of mean income	23,717	26,958	34,828	44,997	21,280	90
Poverty line: One fourth of mean income	30,641	34,828	44,997	58,134	27,493	90
Poverty line: One fifth of mean income	34,828	44,997	58,134	75,107	40,279	116
Poverty line: One sixth of mean income	39,587	51,145	66,078	85,370	45,783	116
Poverty line: One seventh of mean income	44,997	58,134	75,107	97,035	52,038	116
Poverty line: One eighth of mean income	51,145	66,078	85,370	97,035	45,890	90
Poverty line: One ninth of mean income	58,134	66,078	85,370	110,295	52,161	90
Poverty line: One tenth of mean income	85,370	75,107	97,035	110,295	24,925	29

1/ Ratio of income of poorest rich to richest poor.
2/ In principle this is equal to the poverty line which increased by 71 percent from 1970 to 2000. However, the sample income distribution is not continuous.

Table 3. Global Average Income Levels, 1970-2000
(US dollars, PPP-adjusted GDP in 1996 prices; unless otherwise noted)

| | 1970 | 1980 | 1990 | 2000 | Change from 1970 to 2000 | | |
					Absolute	Relative 1/	In percent
Average income of the poor							
Poverty line: One half of mean income	916	1,057	1,385	1,657	741	90	81
Poverty line: One third of mean income	763	864	1,019	1,305	543	0	71
Poverty line: One fourth of mean income	616	744	866	1,087	471	33	76
Poverty line: One fifth of mean income	567	632	724	885	318	-86	56
Poverty line: One sixth of mean income	475	580	658	707	232	-105	49
Poverty line: One seventh of mean income	432	482	595	627	195	-112	45
Poverty line: One eighth of mean income	392	437	536	552	160	-119	41
Poverty line: One ninth of mean income	355	395	481	482	127	-125	36
Poverty line: One tenth of mean income	320	395	429	418	98	-129	31
Average income of the middle-class							
Poverty line: One half of mean income	5,884	7,173	8,881	9,541	3,657	-528	62
Poverty line: One third of mean income	6,467	7,252	8,224	9,961	3,494	-1,106	54
Poverty line: One fourth of mean income	5,907	7,122	8,008	9,553	3,647	-554	62
Poverty line: One fifth of mean income	5,756	6,843	7,682	9,077	3,321	-772	58
Poverty line: One sixth of mean income	5,242	6,656	7,497	8,496	3,255	-473	62
Poverty line: One seventh of mean income	5,088	6,127	7,308	8,351	3,262	-356	64
Poverty line: One eighth of mean income	4,934	5,959	7,119	8,092	3,158	-351	64
Poverty line: One ninth of mean income	4,786	5,728	6,862	8,000	3,214	-190	67
Poverty line: One tenth of mean income	4,674	5,795	6,725	7,830	3,156	-169	68
Average income of the rich							
Poverty line: One half of mean income	22,667	29,343	37,446	43,959	21,292	5,171	94
Poverty line: One third of mean income	31,539	37,650	48,977	64,027	32,487	10,056	103
Poverty line: One fourth of mean income	38,099	45,144	58,839	77,594	39,495	12,398	104
Poverty line: One fifth of mean income	42,278	54,994	71,412	93,777	51,499	21,431	122
Poverty line: One sixth of mean income	47,329	61,205	79,233	103,438	56,109	22,448	119
Poverty line: One seventh of mean income	53,670	68,696	88,557	114,748	61,077	22,906	114
Poverty line: One eighth of mean income	62,188	78,145	100,081	114,748	52,559	8,330	85
Poverty line: One ninth of mean income	74,985	78,145	100,081	128,385	53,399	69	71
Poverty line: One tenth of mean income	213,324	91,035	115,228	128,385	-84,940	-236,658	-40

1/ Change relative to the 71 percent increase in mean income.

Table 4. Global Population Distribution, 1970-2000

(In millions; unless otherwise indicated)

| | 1970 | 1980 | 1990 | 2000 | Change from 1970 to 2000 | | |
					Absolute	Relative 1/	In percent
Number of poor people							
Poverty line: One half of mean income	2,157	2,556	3,048	3,236	1,079	-281	50
Poverty line: One third of mean income	1,847	2,149	2,312	2,587	740	-424	40
Poverty line: One fourth of mean income	1,414	1,813	1,897	2,089	675	-216	48
Poverty line: One fifth of mean income	1,241	1,435	1,453	1,584	344	-438	28
Poverty line: One sixth of mean income	885	1,239	1,233	1,135	250	-307	28
Poverty line: One seventh of mean income	717	857	1,024	941	224	-227	31
Poverty line: One eighth of mean income	563	683	831	770	207	-148	37
Poverty line: One ninth of mean income	426	527	659	623	197	-71	46
Poverty line: One tenth of mean income	309	527	509	502	193	-2	62
Number of middle-class people							
Poverty line: One half of mean income	1,004	1,287	1,559	2,042	1,038	405	103
Poverty line: One third of mean income	1,505	1,858	2,467	2,932	1,426	478	95
Poverty line: One fourth of mean income	1,999	2,270	2,954	3,494	1,495	235	75
Poverty line: One fifth of mean income	2,194	2,698	3,444	4,038	1,844	461	84
Poverty line: One sixth of mean income	2,565	2,911	3,679	4,500	1,935	319	75
Poverty line: One seventh of mean income	2,743	3,304	3,899	4,704	1,961	232	71
Poverty line: One eighth of mean income	2,904	3,485	4,099	4,875	1,972	142	68
Poverty line: One ninth of mean income	3,044	3,641	4,272	5,029	1,985	67	65
Poverty line: One tenth of mean income	3,163	3,645	4,425	5,150	1,987	-6	63
Number of rich people							
Poverty line: One half of mean income	311	332	330	383	72	-125	23
Poverty line: One third of mean income	120	169	159	142	22	-54	18
Poverty line: One fourth of mean income	59	92	87	77	18	-19	31
Poverty line: One fifth of mean income	38	42	41	39	1	-23	1
Poverty line: One sixth of mean income	23	26	26	25	3	-11	12
Poverty line: One seventh of mean income	12	15	15	16	3	-5	26
Poverty line: One eighth of mean income	6	8	8	16	9	5	149
Poverty line: One ninth of mean income	3	8	8	9	6	4	203
Poverty line: One tenth of mean income	0	4	4	9	9	8	3,462

1/ Change relative to the 63 percent increase in population.

Table 5. Global Relative Poverty Forecast for 2010

		2010			Change from 2000 to 2010	
	2000	Only population growth	Only income growth	Both	Absolute	Percentage change
Poverty line: One half of mean income	3,680.2	3,546.9	5,080.3	4,887.8	1,207.6	32.8
Poor (in percent)	57.2	58.7	51.7	49.7	-7.5	-13.1
Middle-class (in percent)	36.1	34.9	40.3	42.8	6.7	18.6
Rich (in percent)	6.8	6.4	8.0	7.5	0.8	11.5
Poverty gap 1/	55.0	53.9	49.7	53.0	-2.0	-3.6
Income span 2/	7.8	7.8	6.0	6.8	-0.9	-12.0
Poverty line: One sixth of mean income	1,226.7	1,182.3	1,693.4	1,629.3	402.5	32.8
Poor (in percent)	20.0	21.2	16.2	17.7	-2.4	-11.8
Middle-class (in percent)	79.5	78.3	83.3	81.9	2.4	3.0
Rich (in percent)	0.4	0.4	0.5	0.5	0.0	1.6
Poverty gap 1/	42.4	41.2	42.6	41.3	-1.0	-2.4
Income span 2/	77.8	77.8	53.0	53.0	-24.8	-31.9
Poverty line: One tenth of mean income	736.0	709.4	1,016.1	977.6	241.5	32.8
Poor (in percent)	8.9	9.7	8.2	9.2	0.3	3.9
Middle-class (in percent)	91.0	90.1	91.6	90.6	-0.3	-0.4
Rich (in percent)	0.2	0.2	0.2	0.2	0.0	1.1
Poverty gap 1/	43.3	42.1	44.0	42.4	-0.9	-2.0
Income span 2/	167.9	167.9	114.3	114.3	-53.6	-31.9
Memorandum items:						
Mean per capita income (in US dollars) 3/	7,360.5	7,093.8	10,160.5	9,775.6	2,415.1	32.8
Population (in millions)	5,660.3	6,385.4	5,660.3	6,385.4	725.1	12.8
Total GDP (in billions of US dollars) 3/	41,662.8	45,296.7	57,512.1	62,421.4	20,758.6	49.8

1/ Difference between poverty line and average income of the poor in percent of the poverty line.
2/ Ratio of the income of the poorest rich to the richest poor.
3/ PPP-adjusted GDP in 1996 prices.

REFERENCES

Atkinson, A. B., *The Economics of Inequality*, 2nd ed., Clarendon Press, Oxford, 1983.

Collier, Paul, *The Bottom Billion*, Oxford University Press, Oxford, 2007.

Dalton, Hugh, "The Measurement of the Inequality of Incomes," *Economic Journal*, 30 (September 1920), 348-361.

Förster, Michael and Mira d'Ercole Marco, "Income Distribution and Poverty in OECD Countries in the Second Half of the 1990s," OECD Social Employment and Migration Working Papers No. 22, Paris, 2005.

Kashyap, Anil K. and Jeremy C. Stein, "What do a Million Observations on Banks say About the Transmission of Monetary Policy," *American Economic Review*, 90 (June 2000), 407-428.

Kakwani, Nanak C., "Measurement of Poverty and Negative Income Tax," *Australian Economic Papers*, 16 (1977), 237-248.

Sala-I-Martin, Xavier, "The World Distribution of Income: Falling Poverty and … Convergence, Period," *Quarterly Journal of Economics*, CXXI (2006), 351-397.

Sen, Amartya, "Poverty: An Ordinal Approach to Measurement," *Econometrica*, 44 (March 1976), 219-231.

US Census Bureau: "Poverty in the United States: 2000," US Department of Commerce, September 2001.

European Union: Presidency Conclusions, European Council Meeting in Laeken, December 2001.