Absolute Poverty Measures for the Developing World, 1981–2008

Shaohua Chen and Martin Ravallion

For the purposes of measuring poverty in the world as a whole, the World Bank's "$1 a day" measures have aimed to apply a common standard, anchored to what "poverty" means in the world's poorest countries.[1] By this view, two people with the same purchasing power over commodities should be treated the same way—both are either poor or not poor—even if they live in different countries.[2] And by focusing on how poverty is defined in the poorest countries, the $1 a day line gives the global poverty measures a salience in focusing on the world's poorest in absolute terms.

Implementing this approach requires data on prices to permit comparisons between countries. International comparisons of economic aggregates have long recognized that market exchange rates—which tend to equate purchasing power in terms of internationally traded goods—are deceptive, given that some commodities are not traded; this includes services but also many goods, including some food staples. Furthermore, there is likely to be a systematic effect, stemming from the fact that low real wages in developing countries entail that labor-intensive, nontraded goods tend to be relatively cheap. In the literature, this is known as the "Balassa-Samuelson effect" (see Balassa 1964; Samuelson 1964). And it is the now widely accepted explanation for an empirical finding known as the "Penn effect," which is that comparisons of gross domestic product (GDP) based on market exchange rates tend to understate the real incomes of developing countries.[3] Similarly, market exchange rates overstate the extent of poverty in the world. For this reason, global economic measurement, including poverty measurement, has used purchasing power parity (PPP) rates rather than market exchange rates. A PPP is the conversion rate for a given currency into a reference currency (invariably the U.S. dollar) with the aim of assuring parity in terms of purchasing power over commodities, both internationally traded and nontraded.

This chapter reports on a major update of the World Bank's global poverty estimates. It draws on three main data sources. The first source is the 2005 International Comparison Program (ICP). The main data source for estimating PPPs has been the price surveys carried out within countries for the ICP. This started in 1968 with PPP estimates for just 10 countries, based on rather crude price surveys.[4] A better-funded round of the ICP in 2005, managed globally by the World Bank's Development Data Group, introduced a number of improvements in the data and estimation methods for PPPs (World Bank 2008). The new ICP data imply some dramatic revisions to past estimates, consistent with the view that the old ICP data had underestimated the cost of living in poor countries. The Penn effect is still evident, but it was overstated in the past.

The 2005 ICP also greatly expanded country coverage. Particularly notable is the fact that China participated officially for the first time, and the results have naturally attracted much attention, given that they suggest that China's economy in 2005 was 40 percent smaller than thought.[5] The new PPP for China is about half the market exchange rate; prior estimates for 1993 had suggested it was about one-quarter of the market rate.[6]

While the 2005 ICP round was clearly a significant advance over previous rounds, one problem was that (like prior rounds) there was a degree of "urban bias" in the ICP price surveys in that the sampling of outlets for collecting prices did not always properly represent rural areas, where, in most developing countries, prices tend to be lower. This clearly matters to poverty measurement. Based on the information provided by the ICP team at the World Bank (drawing on information from regional ICP offices), we identify a number of countries where such a bias is likely (including China), and we implement a correction, drawing on supplementary data on the differentials in national poverty lines between urban and rural areas.

The second data source is a new compilation of poverty lines for developing countries provided by Ravallion, Chen, and Sangraula (2008). Using these data, we implement an updated international poverty line and test robustness to that choice. Recognizing that the new PPPs also change the U.S. dollar value of national poverty lines in the poorest countries, our international poverty line of $1.25 per day in 2005 is deliberately lower than the 2005 value in the United States of our old international line. The new line is the mean of the national poverty lines for the poorest 15 countries in terms of consumption per capita. To test the robustness of our main qualitative results to the choice of poverty line, we also give results for $1.00 and $2.00 per day in 2005 prices. The lower bound (not to be confused with the old "$1 a day" line, which was not in 2005 prices) corresponds fairly closely to the national poverty line used by India (prior to an upward revision in 2010 to India's official poverty lines), while the $2.00 line is the median poverty line found among developing countries as a whole (Ravallion, Chen, and Sangraula 2008).

The third data source is our update of the coverage of the household survey database. As far as possible, we rely on household surveys for measuring poverty, following past practice. In this chapter, we draw on 850 surveys spanning 1979–2011 and 125 countries. Our methods of analyzing these data follow Chen and Ravallion (2010). The international poverty line is converted to local currencies in the ICP benchmark year and is then converted to the prices prevailing at the time of the relevant household survey using the best available consumer price index (CPI) for that country. (Equivalently, the survey data on household consumption or income for the survey year are expressed in the prices of the ICP base year and then converted to PPP dollars.) The poverty rate is then calculated from that survey. All intertemporal comparisons are real, as assessed using the country-specific CPI. We make estimates at three-year intervals over 1981–2008. Interpolation/ extrapolation methods are used to line up the survey-based estimates with these reference years, including 2008.

The 2005 ICP Round and Its Implications for Global Poverty Measures

The 2005 ICP round was the most complete and thorough assessment to date of how the cost of living varies across countries. The world was divided into six regions with different product lists for each.[7] Even though all regions participated in the 2005 ICP, the participation rate was lower for South America. The ICP collected primary data on the prices for 600–1,000 (depending on the region) goods and services grouped under 155 "basic headings" deemed to be comparable across countries. The prices were typically obtained from a large sample of outlets in each country. The price surveys were conducted by the national statistics offices in each country, under the supervision of the regional authorities.[8]

The 2005 ICP was a clear improvement over earlier rounds. First, the number of countries participating was larger (146, as compared with 117 in 1993). This is also the first time that a number of countries—including China, to which we return—participated in the ICP. Second, the surveys were implemented on a more scientific basis. The 2005 ICP used stricter standards in defining internationally comparable qualities for the goods identified in the ICP price surveys. Third, new methods were used for measuring government compensation and housing. Adjustments were also made for the lower average productivity of public sector workers in developing countries (lowering the imputed value of the services derived from public administration, education, and health). Fourth, Ring comparisons (linking regional PPP estimates through global prices) were carried out for more countries (18 in all—a marked improvement over past ICP rounds). Otherwise, the PPPs calculated from the ICP data (and reported in World Bank 2008) followed standard methods—as in the past, the Bank uses a multilateral extension of the bilateral Fisher price index known as the Gini-Éltetö-Köves-Szulc (GEKS) method.[9]

Although these are clear improvements, the 2005 PPPs still have some limitations.[10] For example, there is a problem of urban bias in the ICP price surveys for a number of countries (the next section describes our methods of addressing this problem). As argued in Ravallion, Datt, and van de Walle (1991), a further concern is that the weights attached to different commodities in the conventional PPP rate may not be appropriate for the poor. Deaton and Dupriez (2008) have estimated "PPPs for the poor" for a subset of countries with the required data, but the results do not suggest that the implied reweighting has much impact on the consumption PPP, as we show in Chen and Ravallion (2010).[11] Another limitation is that the PPP is a national average. Just as the cost of living tends to be lower in poorer countries, one expects it to be lower in poorer regions within one country, especially in rural areas. In Ravallion, Chen, and Sangraula (2007), we allowed for the urban-rural cost of living differences facing the poor, and provided an urban-rural breakdown of our prior global poverty measures using the 1993 PPP. We plan to update these estimates in future work.

Some dramatic revisions of past PPPs were implied by the 2005 ICP round, not least for the two most populous developing countries, China and India (neither of which actually participated in the 1993 ICP). For example, the 1993 consumption PPP used for China was ¥ 1.42 to the U.S. dollar (updating an earlier estimate by Ruoen and Chen 1995), while the new estimate based on the 2005 ICP is ¥ 3.46 (¥ 4.09 if one excludes government consumption). The corresponding "price level index" (PPP divided by the market exchange rate, US = 100) went from 25 percent in 1993 to 52 percent in 2005. So the Penn effect is still evident, but the size of this effect has declined markedly, with a new PPP at about half the market exchange rate rather than one-quarter. Adjusting solely for the inflation rates in the United States and China, one would have expected the 2005 PPP to be ¥ 1.80, not ¥ 3.46. Similarly, India's 1993 consumption PPP was Rs 7.0, while the 2005 PPP is Rs 16, and the price level index rose from 23 percent to 35 percent. If one updated the 1993 PPP for inflation, the result would be a 2005 PPP of Rs 11 rather than Rs 16.

These PPP revisions have important implications for our global poverty measures. At any given poverty line in $PPP, the poverty count will tend to rise, given that the bulk of PPPs have risen for developing countries. However, the same changes in the PPPs also alter the international poverty line because it is anchored to the national poverty lines in the poorest countries. Next, we turn to the international poverty line.

International Poverty Line

In setting an international poverty line using the 2005 ICP, we follow the same approach used in our past work—namely, that the line should be representative of the national lines found in the poorest countries—in the spirit of the original "$1 a day" line (Ravallion, Datt, and van de Walle 1991; World Bank 1990). For this purpose, Ravallion, Chen, and Sangraula (2008) compiled a new set of national poverty lines for developing countries drawn from the World Bank's country-specific *Poverty Assessments* and the Poverty Reduction Strategy Papers prepared by the governments of the countries concerned. While the Ravallion, Datt, and van de Walle (1991) data set on national poverty lines was drawn from sources for the 1980s, the new and larger compilation produced by Ravallion, Chen, and Sangraula (2008) are all post-1990, such that in no case do the proximate sources overlap. These national poverty lines were converted to a common currency using the new set of household consumption PPPs based on the 2005 round of the ICP.

Figure 20.1 plots the poverty lines compiled by Ravallion, Chen, and Sangraula (2008) converted to $PPPs per day against log private consumption per capita also at 2005 purchasing power parity. Complete data are available for the 74 developing countries shown in figure 20.1. The figure also includes a nonparametric regression of the national poverty lines against log mean consumption. Above a certain point, the poverty line rises with mean consumption. The overall elasticity of the poverty line to mean consumption is about 0.7. However, the slope (and hence elasticity) is essentially zero among the poorest 20 or so countries, where absolute poverty clearly dominates.

On the basis of the pattern evident in figure 20.1, Ravallion, Chen, and Sangraula (2008) proposed an international poverty line of $1.25 per day for 2005, which is the mean of the lines found in the poorest 15 countries in terms of consumption per capita: Chad, Ethiopia, The Gambia, Ghana, Guinea-Bissau, Malawi, Mali, Mozambique, Nepal, Niger, Rwanda, Sierra Leone, Tanzania, Tajikistan, and Uganda. (Their median poverty line is very similar, at $1.27 per day.) Consumption per capita for this group ranges from $1.03 to $1.87 per day with a mean of $1.40 per day. The level of this poverty line is quite robust to the choice of the poorest 15 countries (taking plus or minus five countries ranked by consumption per capita). However, it makes sense to focus on the poorest 15, since the econometric tests reported by Ravallion, Chen, and Sangraula imply that national poverty lines tend to rise with consumption per person when it exceeds about $2.00 per day, which is near the upper bound of the consumption levels found among these 15 countries. Of course, there is still a variance in the national poverty lines at any given level of mean consumption, including among the poorest countries. The poverty lines found among the poorest 15 countries vary from $0.70 to $1.90 per day, and Ravallion, Chen, and Sangraula estimate the robust standard error of the $1.25 line to be $0.10 per day.

We use the same PPPs to convert the international lines to local currency. As noted at the outset of this chapter, the main source of sampling bias in the 2005 ICP appears to be that the surveys were largely confined to urban areas in some countries. For example, the ICP survey for China was confined to 11 cities. Although the survey included some surrounding rural areas of these cities, it cannot be considered representative of rural China—evidence on this point

FIGURE 20.1 National Poverty Lines Plotted against Mean Consumption
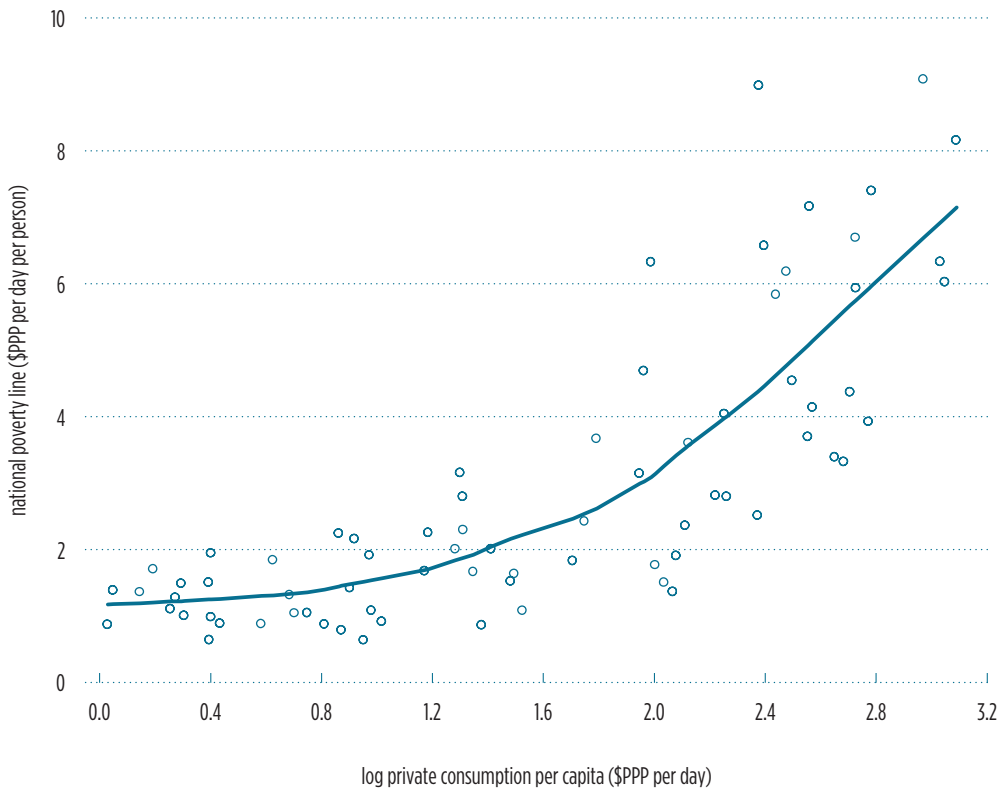
is provided by Chen and Ravallion (2008a). Based on ICP sampling information, we treat the 2005 consumption PPPs as urban PPPs for Argentina, Bolivia, Brazil, Cambodia, Chile, China, Colombia, Ecuador, Pakistan, Peru, Thailand, and Uruguay. We then use existing differentials in urban-rural poverty lines at the country level for these countries (from Ravallion, Chen, and Sangraula 2007) to correct the national PPP for the purpose of measuring poverty. For India, the ICP included rural areas, but they were underrepresented. We derived urban and rural poverty lines consistent with both the urban-rural differential in the national poverty lines and the relevant features of the design of the ICP samples for India.[12]

Household Survey Data

We have estimated all poverty measures ourselves from the primary (unit record or tabulated) sample survey data rather than relying on preexisting poverty measures. And all of our previous estimates have been updated to assure internal consistency. Households are ranked by either consumption or income per person. The distributions are weighted by household size and sample expansion factors. Thus our poverty counts give the number of people living in households with per capita consumption or income below the international poverty line. The primary data come in

various forms, ranging from microdata (the most common) to specially designed grouped tabulations from the raw data, constructed following our guidelines.

Our reliance on survey data merits comment in the light of a debate in the literature about the implications for global poverty measures of the discrepancies found between aggregate household consumption as estimated from surveys and the private consumption component of domestic absorption in the national accounts, which tends to be higher than the survey mean. Some researchers have argued that the survey mean should be ignored and replaced by consumption per capita from the national accounts, though still using the surveys for measuring inequality.[13] This will yield lower poverty measures for most countries; for some countries (including India) it will also yield a higher rate of poverty reduction over time. However, other researchers (including us) have argued that there is no basis for assuming that the gap between the survey mean and national accounts consumption is entirely due to errors in the surveys. The national accounts numbers are no less questionable in many developing countries, and the discrepancy between the two data sources reflects a number of real factors, including differences in what is being included in the two measures (Deaton 2005; Ravallion 2000, 2003).[14] Nor is it plausible that the discrepancy is distribution-neutral in that the surveys get inequality right and the mean wrong. There is likely to be some underreporting or selective compliance in a household survey, but it would seem unlikely that these sources of error would only affect the mean and not the measure of inequality.[15]

We draw on 850 surveys for 125 countries. The most recent survey for each country is used for our 2008 estimate; in those surveys about 2.1 million households were interviewed. Overall, the surveys were conducted mostly by national statistics offices as part of their routine operations. Not all the available surveys are included. A survey was dropped if there were known to be serious comparability problems with the rest of the data set. Also, we do not use surveys for 2006 or 2007 when we already have a survey for 2008—the latest reference year for which we provide estimates in this chapter. As in past work, we have tried to eliminate obvious comparability problems, either by re-estimating the consumption/income aggregates or the more radical step of dropping a survey. However, there are problems with which we cannot deal. For example, it is known that differences in survey methods (such as questionnaire design) can create non-negligible differences in the estimates obtained for consumption or income.

Following past practice, poverty is assessed using household per capita expenditure on consumption or household income per capita as measured from the national sample surveys.[16] When there is a choice, we use consumption in preference to income on the basis that consumption is likely to be the better measure of current welfare on both theoretical and practical grounds.[17] Of the 850 surveys, 521 allow us to estimate the distribution of consumption expenditures. This is true of all the surveys used in the Middle East and North Africa, South Asia, and Sub-Saharan Africa, though income surveys are more common in Latin America.[18] Given that savings and credit can be used to smooth consumption from income shocks, one expects higher inequality for income than for consumption for the same place and data.

The measures of consumption (or income when consumption is unavailable) in our survey data set are reasonably comprehensive, including both cash spending and imputed values for consumption from own production. But we acknowledge that even the best consumption data may not adequately reflect certain "nonmarket" dimensions of welfare, such as access to certain public services, or intrahousehold inequalities. For these reasons, our poverty measures need to be supplemented by other data, such as on infant and child mortality, in order to obtain a more complete picture of how living standards are evolving.

We use standard poverty measures for which the aggregate measure is the (population-weighted) sum of individual measures. In this chapter, we report three such poverty measures.[19] The first measure is

the *headcount index*, given by the percentage of the population living in households with consumption or income per person below the poverty line. We also give estimates of the *number of poor*, as obtained by applying the estimated headcount index to the population of each region under the assumption that the countries without surveys are a random subsample of the region. Our third measure is the *poverty gap index*, which is the mean distance below the poverty line as a proportion of the line where the mean is taken over the whole population, counting the nonpoor as having zero poverty gaps.

Having converted the international poverty line at purchasing power parity to the local currency in 2005 prices, we convert it to the prices prevailing at each survey date using the best available country-specific consumer price index.[20] The weights in this index may or may not accord well with consumer budget shares at the poverty line. In periods of relative price shifts, this will bias our comparisons of the incidence of poverty over time, depending on the extent of utility-compensated substitution possibilities for people at the poverty line.

Given the steep rise in food prices around 2008, we made an extra effort to ensure that the price indexes we were using adequately reflected those increases at the country level. This step was carried out in consultation with the World Bank's poverty experts for each country. In some cases, such as India, we were already using CPIs that were anchored reasonably well to the consumption behavior of the poor, so nothing needed to be done. However, for about 15 countries (including China) for which food prices increased faster than other prices, we determined that the currently available CPI attached too low a weight to food, and we reweighted the index to assure that its food share accorded reasonably well with food spending patterns in a neighborhood of the poverty line. For another 22 countries, we used CPIs provided by the Bank's country offices that were deemed to adequately reflect the rise in food prices. Most of these showed higher inflation than the CPI from the World Bank's Development Data Platform (DDP).

In the remaining 75 countries in our database, the CPI is from the DDP. As a check, we compared the implied rates of inflation with the food price index produced by the International Labour Organization (ILO). For 65 of these countries, the rate of inflation between 2005 and 2008 was over 90 percent of the rate implied by the ILO's food price index. (In 15 countries, the inflation rate was actually higher than the ILO food price index, and for 39 it was over 95 percent.) In the remaining 10 countries, the CPI increased by less than 90 percent of the ILO index. We cannot rule out the possibility that the price indexes we have used for these 10 countries are understating price increases for the poor over the period 2005–08, although the countries concerned represent only 3 percent of total population in the developing world, and so the problem is minor.

The population weights for urban and rural poverty measures, as well as across countries, are also from the World Bank's DDP.

We started the series in 1981 and made estimates at three-year intervals, up to 2008. Of the 125 countries, 20 have only one survey, 15 have two surveys, 12 have three surveys, while 78 have four or more surveys over the period, of which 31 have 10 or more surveys. If there is only one survey for a country, then we estimate measures for each reference year by applying the growth rate in real private consumption per person from the national accounts to the survey mean—assuming that the Lorenz curve for that country does not change.[21] This seems to be the best option for dealing with this problem, though there can be no guarantee that the Lorenz curve would not have shifted or that a survey-based measure of consumption would have grown at the same rate as private consumption in the national accounts. For example, growth in the latter might reflect growth in spending by nonprofit organizations (which are not separated from households in the national accounts for most developing countries) rather than household spending (Ravallion 2003).

For those countries with multiple surveys, we use the annual national accounts data for interpolation purposes given the irregular spacing of the surveys. We first estimate mean consumption

at the reference year using the national accounts growth rate between the survey year and the reference year. Suppose the reference year is 1993 and we have two surveys for, say, 1989 and 1995. We have two means at the reference year based on two surveys, M93(89) and M93(95), where M93(t) is the estimated mean for 1993 using the survey for year t. Based on the 1989 distribution and M93(89), we get H93(89), the headcount index obtained using the 1993 mean and the 1989 distribution. Similarly, based on the 1995 distribution and M93, we get H93(95). The poverty headcount for 1993 is then estimated by the weighted average of H93(89) and H93(95).[22]

In the aggregate, 90 percent of the population of the developing world is represented by surveys within two years of 2008.[23] Survey coverage by region varies from 47 percent of the population of the Middle East and North Africa to 98 percent of the population of South Asia. Naturally, the further back we go, the fewer the number of surveys, reflecting the expansion in household survey data collection for developing countries since the 1980s. And coverage deteriorates in the last year or two of the series because of the lags in survey processing.

Most regions are quite well covered from the latter half of the 1980s (East and South Asia being well covered from 1981 on).[24] Not surprisingly, the coverage is weak in Eastern Europe and Central Asia for the 1980s; many of these countries did not officially exist then. More worrying is the weak coverage for Sub-Saharan Africa in the 1980s; indeed, our estimates for the early 1980s rely heavily on projections based on distributions around 1990. Table 20.1 gives the average survey year by region for each reference year.

Comparing table 20.1 with the corresponding table in Chen and Ravallion (2008b) reveals how much improvement there has been in reducing the lags in survey data availability. In 2004 and 2008, we reported results (see Chen and Ravallion 2004, 2008b) for reference years (2001 and 2005) that were three years prior to the time of writing (namely, 2001, 2005, versus 2008). Table 20.2 gives the average lag in survey data availability by region (where zero means no lag for the latest reference year). The overall mean lag fell between 2001 and 2005 from 1.6 to 0.6 years, but only fell slightly (to 0.5 years) between 2005 and 2008. For the region with the lowest mean lag for 2001, East Asia and Pacific, the average lag is down to zero. For the region with the highest lag in 2001, Sub-Saharan Africa, the lag has also fallen appreciably, from 4.0 to 1.4 years. The Middle East and North Africa is now the region with the highest mean lag in survey data availability, 2.9 years, and the lag has actually increased in that region—the only one in which this has happened.

TABLE 20.1 Average Date of Surveys Used for Each Reference Year by Region

Region	Average date of surveys used for each reference year									
	1981	1984	1987	1990	1993	1996	1999	2002	2005	2008
East Asia and Pacific	1982.2	1984.5	1987.1	1990.1	1993.0	1995.9	1999.1	2001.9	2004.9	2008.0
Eastern Europe and Central Asia	1988.5	1988.5	1988.7	1990.9	1993.0	1996.5	1998.8	2001.7	2004.8	2007.5
Latin America and the Caribbean	1983.9	1985.0	1987.0	1990.3	1993.0	1996.0	1999.0	2001.9	2004.9	2007.6
Middle East and North Africa	1990.8	1990.8	1990.6	1992.2	1994.0	1996.9	1999.9	2002.0	2003.8	2005.1
South Asia	1981.3	1985.3	1987.5	1990.2	1993.4	1998.5	1999.0	1999.5	2004.7	2007.9
Sub-Saharan Africa	1991.9	1992.2	1992.3	1992.4	1994.9	1997.7	1999.9	2001.9	2005.0	2006.6
Total	**1984.3**	**1986.2**	**1988.2**	**1990.6**	**1993.4**	**1997.2**	**1999.2**	**2001.0**	**2004.8**	**2007.5**

TABLE 20.2 Average Lag in Survey Data Availability for Latest Reference Year by Region

Region	2001	2005	2008
East Asia and Pacific	0.6	0.1	0.0
Eastern Europe and Central Asia	1.3	0.7	0.5
Latin America and the Caribbean	0.9	0.4	0.4
Middle East and North Africa	2.2	1.6	2.9
South Asia	1.6	0.5	0.1
Sub-Saharan Africa	4.0	1.5	1.4
Total	**1.6**	**0.6**	**0.5**

Sources: 2001: Chen and Ravallion 2004; 2005: Chen and Ravallion 2008b; 2008.

The lags in table 20.2 reflect both the frequency of surveys and our access to the data. Based on our observations in assembling the database for this study, we would conjecture that the large lag for the Middle East and North Africa is due more to access to existing surveys than to the frequency of those surveys, while for Sub-Saharan Africa it is due more to the infrequent production of adequate surveys.

The second indicator is the percentage of the population covered by household surveys. Table 20.3 gives the coverage rate by region for each reference year. A country is defined as being covered if there is a survey (in our database) within two years of the reference date (a five-year window). Note that our method only requires one survey per country, although we have almost six surveys per country on average. But naturally, *ceteris paribus*, the more surveys we have for a given country the more confident we are about the estimates.

The weak coverage for Eastern Europe and Central Asia, the Middle East and North Africa, and Sub-Saharan Africa in the 1980s is evident in table 20.3. Our estimates for these regions in the 1980s are heavily dependent on the extrapolations from the national accounts data. We will discuss the likely biases.

Note that there is a "hole" in coverage for South Asia in 1999. This gap reflects the well-known comparability problem due to India's National Sample Survey (NSS) for 1999/2000.[25]

TABLE 20.3 Percentage of Population Represented by Household Surveys, 1981–2008

Region	Survey-covered population (%) two years away from reference year									
	1981	1984	1987	1990	1993	1996	1999	2002	2005	2008
East Asia and Pacific	73.4	85.1	88.5	92.4	93.3	93.7	93.4	93.5	93.2	93.6
Eastern Europe and Central Asia	0.0	8.4	93.6	81.5	87.3	97.1	93.9	96.3	94.7	89.9
Latin America and the Caribbean	55.9	71.5	92.3	94.9	91.8	95.9	97.7	97.5	95.9	94.5
Middle East and North Africa	0.0	40.3	40.7	76.8	65.3	81.7	70.0	21.5	85.7	46.7
South Asia	87.6	89.0	96.6	96.6	98.2	98.2	19.6	98.1	98.0	97.9
Sub-Saharan Africa	11.3	23.6	32.8	46.0	68.8	68.0	53.1	65.7	82.7	77.9
Total	**56.7**	**67.3**	**82.9**	**86.4**	**89.5**	**91.6**	**67.7**	**87.9**	**93.1**	**89.7**

We decided to drop that NSS survey round, given that we now have a new survey for 2004/05 that we consider to be reasonably comparable to the previous survey round of 1993/94. We also decided to only use the five-year rounds of the NSS, which have larger samples and more detailed and more comparable consumption modules (aside from the 1999/2000 round). Unfortunately, this leaves a 10-year gap in our survey coverage for India; the estimates for India over the intervening period use our interpolation method, as described earlier. Including all available survey rounds for India adds to the variability in the series but does not change the trend.[26]

Measures of Global Poverty

We report aggregate results over 1981–2008 for the regions of the developing world and (given their populations) China and India. Jointly with this chapter, we have updated the World Bank's

TABLE 20.4 Poverty Measures for $1.00 per Day by Region, 1981–2008

Region	Percentage of population below \$1.00 per day in 2005 PPP
	1981	1984	1987	1990	1993	1996	1999	2002	2005	2008
East Asia and Pacific	66.1	49.4	38.7	40.6	35.4	23.3	23.6	17.8	9.5	7.8
China	73.5	52.9	38.0	44.0	37.7	23.7	24.1	19.1	9.2	7.4
Eastern Europe and Central Asia	1.0	0.8	0.8	1.1	1.5	2.1	2.1	1.2	0.8	0.3
Latin America and the Caribbean	7.9	9.2	8.5	8.8	8.1	8.1	8.8	8.9	6.5	5.0
Middle East and North Africa	4.0	3.2	2.6	2.2	1.7	1.8	2.0	1.6	1.4	1.2
South Asia	43.6	39.7	37.6	36.1	33.7	30.7	27.9	26.9	22.9	19.9
Sub-Saharan Africa	40.4	44.2	43.6	45.6	48.7	47.2	47.0	44.7	41.1	37.3
Total	**41.6**	**34.7**	**30.1**	**30.8**	**28.7**	**23.5**	**23.1**	**20.6**	**16.0**	**14.0**
Total, excl. China	29.9	28.2	27.3	26.2	25.6	23.4	22.8	21.0	18.1	16.0
Region	Number of persons (millions) below \$1.00 per day in 2005 PPP
	1981	1984	1987	1990	1993	1996	1999	2002	2005	2008
East Asia and Pacific	939.5	736.1	606.8	669.0	607.4	415.2	434.3	336.9	185.2	154.7
China	730.4	548.6	412.4	499.1	444.4	288.7	302.2	244.7	119.7	97.4
Eastern Europe and Central Asia	4.1	3.4	3.5	4.9	6.9	9.8	9.7	5.6	3.6	1.3
Latin America and the Caribbean	28.9	35.8	34.9	38.5	37.5	39.0	44.3	47.0	35.8	28.2
Middle East and North Africa	6.8	6.0	5.3	4.8	4.2	4.7	5.3	4.5	4.3	3.8
South Asia	405.1	396.5	403.0	413.6	411.6	397.7	382.7	389.1	346.8	315.1
Sub-Saharan Africa	160.8	191.4	205.5	233.9	270.5	283.6	305.5	313.4	310.4	302.8
Total	**1,545.3**	**1,369.3**	**1,258.9**	**1,364.7**	**1,338.1**	**1,150.0**	**1,181.9**	**1,096.5**	**886.1**	**805.9**
Total, excl. China	814.9	820.7	846.6	865.6	893.7	861.3	879.7	851.8	766.4	708.6

Note: Regions with survey coverage less than 50 percent are highlighted.

PovcalNet website to provide public access to the underlying country-level data set, so that users can replicate these results and try different assumptions, including different poverty measures, poverty lines, and country groupings.[27]

Tables 20.4–20.6 give the estimated poverty rates—the percentage of the population living below the poverty line—for $1.00, $1.25, and $2.00 per day, at three-year intervals from 1981 to 2008. Over the 28-year period, the percentage of the population of the developing world living below $1.25 per day was halved, falling from 52 percent to 22 percent. The number of poor fell by 600 million, from 1.9 billion to 1.3 billion over 1981–2008 (table 20.5). The trend rate of decline in the $1.25 per day poverty rate over 1981–2008 was 1 percentage point per year. (Regressing the poverty rate on time, the estimated trend is –1.03 percent per year with a standard error of 0.06 percent, $R^2 = 0.97$). Projecting this trend forward to 2015, the estimated headcount index for that year is 16.1 percent (standard error of 1.4 percent). Given that the 1990 poverty rate was 43.1 percent, this calculation implies that the developing world as a whole is on track to

TABLE 20.5 Poverty Measures for $1.25 per Day by Region, 1981–2008

Region	Percentage of population below $1.25 per day in 2005 PPP									
	1981	1984	1987	1990	1993	1996	1999	2002	2005	2008
East Asia and Pacific	77.2	65.0	54.1	56.2	50.7	35.9	35.6	27.6	17.1	14.3
China	84.0	69.4	54.0	60.2	53.7	36.4	35.6	28.4	16.3	13.1
Eastern Europe and Central Asia	1.9	1.6	1.5	1.9	2.9	3.9	3.8	2.3	1.3	0.5
Latin America and the Caribbean	11.9	13.6	12.0	12.2	11.4	11.1	11.9	11.9	8.7	6.5
Middle East and North Africa	9.6	8.0	7.1	5.8	4.8	4.8	5.0	4.2	3.5	2.7
South Asia	61.1	57.4	55.3	53.8	51.7	48.6	45.1	44.3	39.4	36.0
Sub-Saharan Africa	51.5	55.2	54.4	56.5	59.4	58.1	58.0	55.7	52.3	47.5
Total	**52.2**	**47.1**	**42.3**	**43.1**	**40.9**	**34.8**	**34.1**	**30.8**	**25.1**	**22.4**
Total, excl. China	40.5	39.1	38.1	37.2	36.6	34.3	33.6	31.5	27.8	25.2
Region	Number of persons (millions) below $1.25 per day in 2005 PPP									
	1981	1984	1987	1990	1993	1996	1999	2002	2005	2008
East Asia and Pacific	1,096.5	970.0	847.6	926.4	870.8	639.7	655.6	523.1	332.1	284.4
China	835.1	719.9	585.7	683.2	632.7	442.8	446.3	363.1	211.9	173.0
Eastern Europe and Central Asia	8.2	6.9	6.8	8.9	13.7	18.2	17.8	10.6	6.3	2.2
Latin America and the Caribbean	43.3	52.9	49.3	53.4	52.5	53.6	60.1	62.7	47.6	36.8
Middle East and North Africa	16.5	15.1	14.6	13.0	11.5	12.3	13.6	12.0	10.5	8.6
South Asia	568.4	573.8	593.0	617.3	631.9	630.8	619.5	640.5	598.3	570.9
Sub-Saharan Africa	204.9	239.1	256.8	289.7	330.0	349.4	376.8	390.4	394.9	386.0
Total	**1,937.8**	**1,857.7**	**1,768.2**	**1,908.6**	**1,910.3**	**1,704.0**	**1,743.4**	**1,639.3**	**1,389.6**	**1,289.0**
Total, excl. China	1,102.8	1,137.8	1,182.5	1,225.5	1,277.6	1,261.2	1,297.0	1,276.2	1,177.7	1,116.0

Note: Regions with survey coverage less than 50 percent are highlighted.

TABLE 20.6 Poverty Measures for $2.00 per Day by Region, 1981–2008

Region	Percentage of population below $2.00 per day in 2005 PPP									
	1981	1984	1987	1990	1993	1996	1999	2002	2005	2008
East Asia and Pacific	92.4	88.3	81.6	81.0	75.8	64.0	61.7	51.9	39.0	33.2
China	97.8	92.9	83.7	84.6	78.6	65.1	61.4	51.2	36.9	29.8
Eastern Europe and Central Asia	8.3	6.7	6.3	6.9	9.2	11.2	12.1	7.9	4.6	2.2
Latin America and the Caribbean	23.8	26.8	22.4	22.4	21.7	21.0	22.0	22.2	16.7	12.4
Middle East and North Africa	30.1	27.1	26.1	23.5	22.1	22.2	22.0	19.7	17.4	13.9
South Asia	87.2	85.6	84.5	83.6	82.7	80.7	77.8	77.4	73.4	70.9
Sub-Saharan Africa	72.2	74.7	74.3	76.0	78.1	77.5	77.5	76.1	74.1	69.2
Total	**69.6**	**68.0**	**64.8**	**64.6**	**63.1**	**58.6**	**57.4**	**53.5**	**46.9**	**43.0**
Total, excl. China	59.3	59.1	58.2	57.7	57.8	56.4	56.1	54.2	49.9	47.0
Region	Number of persons (millions) below $2.00 per day in 2005 PPP									
	1981	1984	1987	1990	1993	1996	1999	2002	2005	2008
East Asia and Pacific	1,312.9	1,316.3	1,279.0	1,333.8	1,300.7	1,139.9	1,137.6	983.9	757.5	659.2
China	972.1	963.3	907.1	960.8	926.3	792.1	769.7	654.9	481.6	394.6
Eastern Europe and Central Asia	35.7	29.5	28.8	31.9	43.1	52.8	57.0	37.2	21.7	10.4
Latin America and the Caribbean	86.6	104.2	92.2	97.6	99.9	101.7	111.4	117.6	91.7	70.5
Middle East and North Africa	51.8	51.2	53.9	52.9	53.5	57.1	59.8	56.8	52.7	44.4
South Asia	810.6	854.8	905.9	958.8	1,010.4	1,047.3	1,068.8	1,119.7	1,113.1	1,124.6
Sub-Saharan Africa	287.6	323.8	350.4	389.2	434.0	466.0	503.3	533.3	559.1	562.3
Total	**2,585.3**	**2,680.0**	**2,710.2**	**2,864.1**	**2,941.5**	**2,864.8**	**2,937.9**	**2,848.4**	**2,595.8**	**2,471.4**
Total, excl. China	1,613.2	1,716.7	1,803.1	1,903.3	2,015.2	2,072.7	2,168.2	2,193.5	2,114.2	2,076.8

*Note:* Regions with survey coverage less than 50 percent are highlighted.

achieve well before 2015 the first Millennium Development Goal (MDG) of halving the 1990 poverty rate.[28]

The 1 percentage point per year rate of decline in the poverty rate also holds if one focuses on the period since 1990 (not just because this is the base year for the MDG but also recalling that the data for the 1980s are weaker). The $1.25 poverty rate fell 9 percentage points in the 10 years of the 1980s (from 52 percent to 43 percent), and a further 20 points in the 18 years from 1990 to 2008.

Comparing tables 20.4, 20.5, and 20.6, the qualitative comparisons over time are generally robust to the choice of poverty line. Indeed, for any given pair of reference years in tables 20.4–20.6 the direction of change in the aggregate headcount index is the same across all poverty lines.

China's success against absolute poverty has clearly played a major role in this overall progress. Tables 20.4–20.6 repeat the calculations excluding China. Strikingly, the number of people

FIGURE 20.2 Headcount Indexes for Developing World, 1981–2008
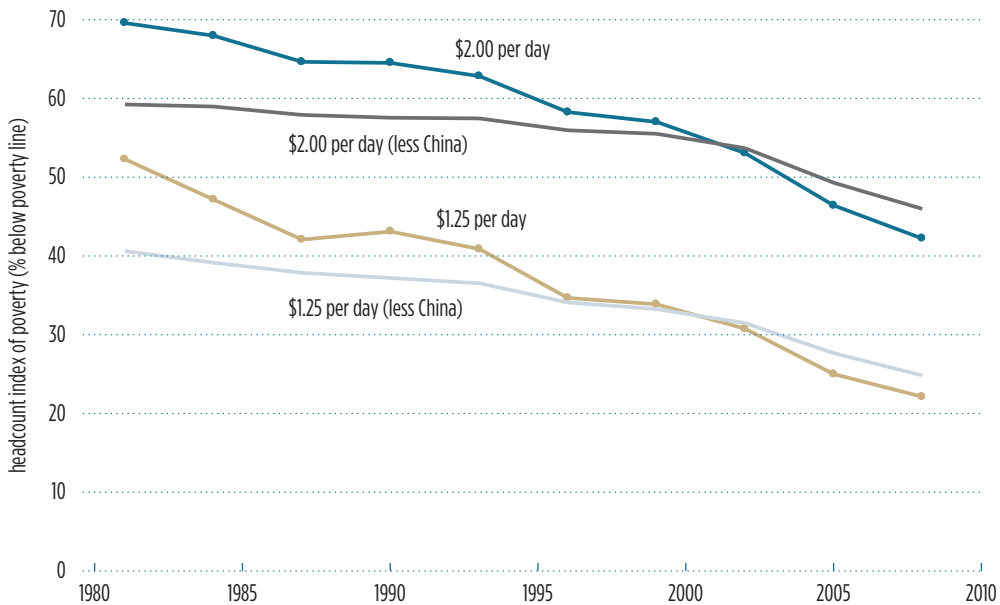

Notes: Poverty lines in 2005 prices.

outside China living below $1.25 per day is no lower in 2008 than in 1981, although it rose, then fell, with a marked decline since 1999, from 1.3 to 1.1 billion.

Figure 20.2 plots the poverty rates over time with and without China. Excluding China, the $1.25 per day poverty rate falls from 40 percent to 25 percent over 1981–2008, with a rate of decline that is half the trend including China. The regression estimate of the trend falls to –0.53 percent per year (standard error of 0.05 percent, R^2 = 0.94). Based on our new estimates, the projected value for 2015 is 23.5 percent (standard error of 1.05 percent), which is well over half the 1990 value of 37 percent (table 20.4). So past trends do not suggest that the developing world as a whole outside China is on track to reach the MDG for poverty reduction.

Our new estimates suggest only slightly less progress in absolute terms in climbing above the $2.00 per day poverty line than the $1.25 line (though less in proportionate terms). The poverty rate by this higher standard fell from 70 percent in 1981 to 43 percent in 2008 (table 20.6). The trend is also about 1 percent per year (a regression coefficient on time of –0.97, standard error of 0.09). Excluding China, the trend is only 0.4 percent per year (a regression coefficient of –0.44, standard error of 0.07 percent). In proportionate terms, however, the rate of progress has clearly been lower for the higher poverty line.

The number of people living below $2.00 per day has fallen over the period as a whole, but only because of the progress since 1999 (table 20.6). The number of people living *between* $1.25 and $2.00 per day almost doubled from 648 million to 1.18 billion between 1981 and 2008. This marked "bunching up" of people just above the $1.25 line suggests that the poverty rate according to that line could rise sharply with aggregate economic contraction.

To test whether the claim that poverty has fallen is robust to the choice of international poverty line, figure 20.3 plots the cumulative distribution function (CDF) up to a maximum

FIGURE 20.3 Cumulative Distribution Functions Up to U.S. Poverty Line
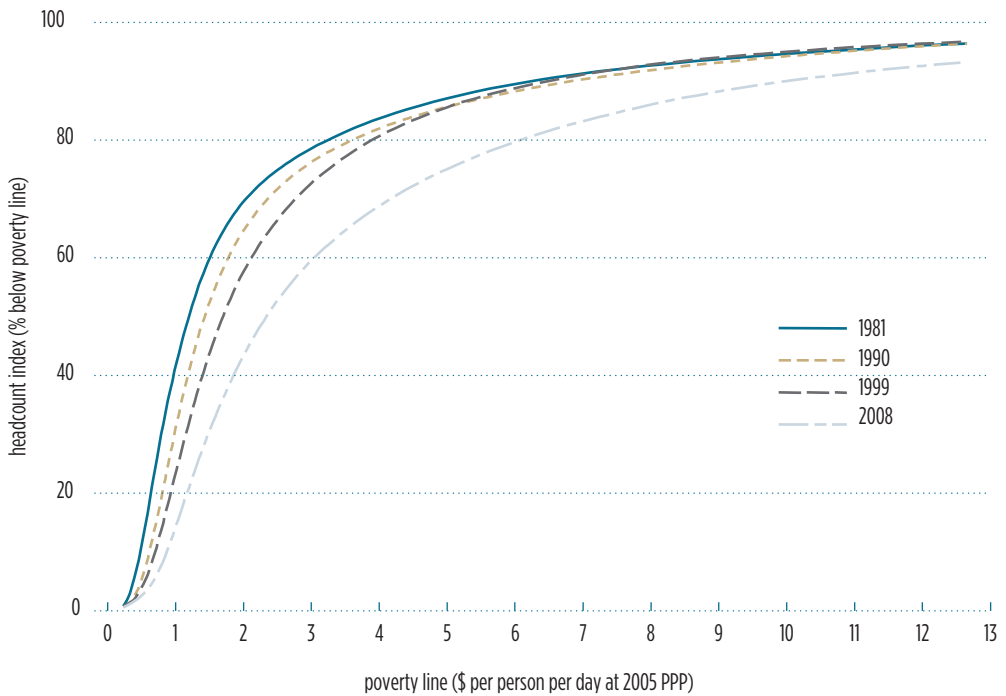
poverty line of $13.00 per person per day, which is the official line for the United States in 2005 (for a family of four). As can be seen from figure 20.1, this is higher than the highest poverty line found in any developing country (though still lower than national poverty lines in a number of other developed countries; see Ravallion 2012). To avoid cluttering, in figure 20.3 we give four CDFs at nine-year intervals. The claim that poverty fell between in either 1981, 1990, or 1999 and 2008 is robust. This also holds for a broad class of additive poverty measures, including those that penalize inequality among the poor (Atkinson 1987). The claim that poverty fell over time from 1981 to 1990 to 1999 is only robust up to about $5.00 per day.

Regional Differences

Tables 20.4–20.6 also provide regional breakdowns. The regional rankings are not robust to the choice of the poverty line. Two changes are notable. First, at the lower lines (under $2.00 per day) Sub-Saharan Africa has the highest incidence of poverty, but this switches to South Asia at the $2.00 per day line. Second, the Middle East and North Africa's poverty rate exceeds Latin America and the Caribbean's at the $2.00 line, but the ranking reverses at the lower lines.

The notable changes in regional poverty rankings over time are evident in tables 20.4–20.6. Figure 20.4 plots the $1.25 per day poverty rate for the three regions that account for the bulk of the poor—East Asia, South Asia, and Sub-Saharan Africa. There, we see a marked reversal of fortunes. Looking back to 1981, East Asia was the region with the highest incidence of poverty, with 77 percent of the population living below $1.25 per day. South Asia had the next highest poverty rate, followed by

FIGURE 20.4 Differing Fortunes for Poor People in Three Regions, 1981–2008
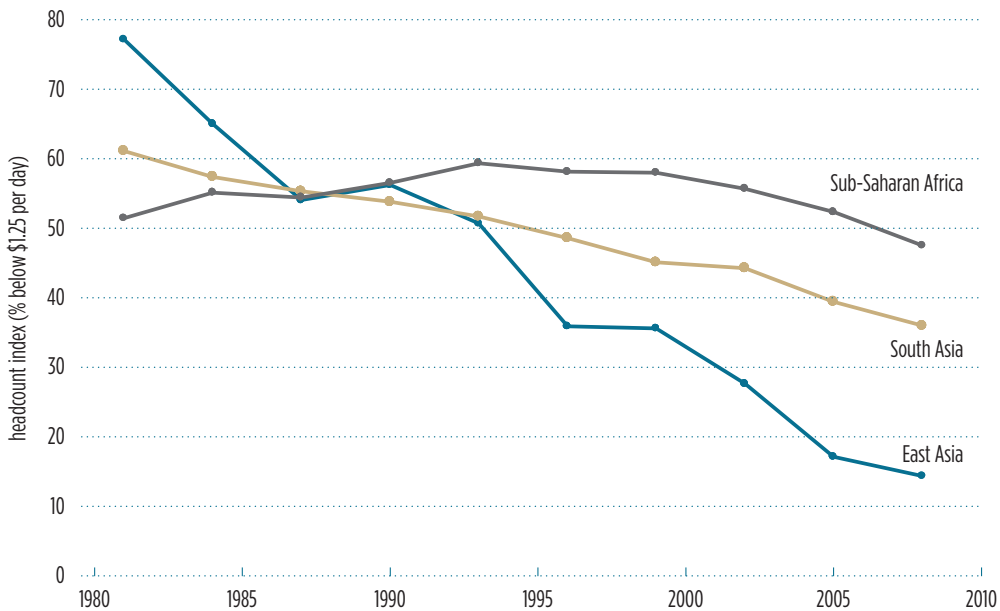
Sub-Saharan Africa, Latin America and the Caribbean, the Middle East and North Africa, and Eastern Europe and Central Asia. By the early 1990s, Sub-Saharan Africa had swapped places with East Asia, and by 2008 East Asia's poverty rate had fallen to 14 percent, while Sub-Saharan Africa's was 48 percent.

Thus the composition of world poverty has changed noticeably over time. The number of poor has fallen sharply in East Asia, but risen elsewhere. For East Asia, the first MDG of halving the 1990 poverty rate by 2015 was already reached by 2002. Again, China's progress against absolute poverty was a key factor. Looking back to 1981, China's incidence of poverty (measured by the percentage below $1.25 per day) was roughly twice that for the rest of the developing world. By about 2000, China's poverty rate had fallen below average, and over 600 million fewer people were living under $1.25 per day in 2008 than in 1981. Progress was uneven over time, with setbacks in some periods (the late 1980s) and more rapid progress in others (the early 1980s and mid-1990s). In a 2007 article, Ravallion and Chen (2007) identify a number of factors (including policies) that account for this uneven progress against poverty over time (and space) in China.

Over 1981–2008, the $1.25 poverty rate in South Asia fell from 61 percent to 36 percent. This was not sufficient to bring down the number of poor over the period as a whole, but the poverty count in South Asia has been falling since 1999 (table 20.5). If the trend over the period as a whole in South Asia were to continue until 2015, the poverty rate would fall to 31.2 percent (standard error of 0.84 percent), which is more than half its 1990 value. So South Asia is not on track to attain the poverty MDG without a higher trend rate of poverty reduction. (This is also true if one focuses on the period since 1990.)

The extent of the "bunching up" that has occurred between the $1.25 and $2.00 per day poverty lines is particularly striking in both East and South Asia, where a total of about 900 million people are living *between* these two lines, roughly equally split between the two sides of Asia.

We find a declining poverty rate in Latin America and the Caribbean by both lines, but not sufficient to reduce the count of the number of poor over the 1981–2008 period as a whole, though with more encouraging signs of progress since 1999.

The Middle East and North Africa region has experienced a fairly steady decline in the poverty rate, though (again) not sufficient to avoid a rising count in the number of poor in that region. However, our estimates for this region are affected by weak coverage in the 1980s and also recently, given the previously noted lags in the public availability of survey data.

We find a generally rising incidence and number of poor in Eastern Europe and Central Asia until 1999, but falling poverty measures since then. The paucity of survey data for this region in the 1980s should be noted. Thus our estimates are heavily based on extrapolations, which do not allow for any changes in distribution. One would expect that distribution was better from the point of view of the poor in Eastern Europe and Central Asia in the 1980s, in which case poverty would have been even lower than we estimate—and the increase over time even larger.

The incidence of poverty by the $1.25 line in Sub-Saharan Africa in 2008 is the lowest it has been over the whole period—2008 is the first time the $1.25 poverty rate fell below 50 percent (table 20.5). The rate increased until the mid-1990s, but there has been an encouraging downward trend since then. The number of poor by our $1.25 per day standard almost doubled in Sub-Saharan Africa over 1981–2008, from 205 million to almost 390 million. The share of the world's poor by this measure living in Africa rose from 11 percent in 1981 to 30 percent in 2008.

Poverty Gaps

The poverty gap (PG) indexes for $1.25 per day appear in table 20.7. The aggregate PG index for 2008 is 7 percent of the poverty line, representing about 0.3 percent of global GDP.[29]

Comparing tables 20.5 and 20.7, it can be seen that the regional rankings in terms of the poverty gap index are similar to those for the headcount index, and the changes over time follow similar patterns. The PG measures magnify the interregional differences in the headcount indexes.

TABLE 20.7 Poverty Gap Index for $1.25 Per Day, 1981–2008

Region	Poverty gap below $1.25 per day in 2005 PPP									
	1981	1984	1987	1990	1993	1996	1999	2002	2005	2008
East Asia and Pacific	34.9	23.8	18.7	19.1	16.4	10.5	10.7	8.0	4.2	3.4
China	39.3	25.6	18.5	20.7	17.7	10.7	11.1	8.7	4.0	3.2
Eastern Europe and Central Asia	0.5	0.4	0.4	0.6	0.8	1.1	1.0	0.6	0.4	0.2
Latin America and the Caribbean	4.4	5.0	5.0	5.4	5.1	5.1	5.6	5.7	4.3	3.3
Middle East and North Africa	1.9	1.5	1.3	1.1	0.9	0.9	1.0	0.8	0.7	0.6
South Asia	20.5	18.3	16.9	16.1	14.9	13.4	12.2	11.7	9.9	8.6
Sub-Saharan Africa	21.8	24.1	24.1	25.4	27.3	26.0	26.0	24.7	22.5	20.6
Total	**21.4**	**16.9**	**14.6**	**14.8**	**13.8**	**11.2**	**11.1**	**9.9**	**7.7**	**6.9**
Total, excl. China	14.8	13.8	13.3	12.8	12.5	11.4	11.1	10.3	8.9	7.9

Note: Regions with survey coverage less than 50 percent are highlighted.

The most striking feature of the results in table 20.7 is the depth of poverty in Africa, with a $1.25 per day poverty gap index of almost 21 percent—more than twice that of the next poorest region by this measure, South Asia. This is because the mean consumption or income of the poor is lower in Sub-Saharan Africa (as shown in Chen and Ravallion 2010).

Conclusions

Thanks to the efforts and support of national statistics offices and international agencies, and to improved technologies, the available data on the key ingredients in poverty measurement—representative samples of household consumption expenditures (or incomes) and data on prices—have improved greatly since global poverty monitoring began. The country coverage of credible household survey data suitable for measuring poverty has improved markedly, the frequency of data has increased, public access to these data has improved, and the lags in data availability have been reduced appreciably. And with the substantial global effort that went into the 2005 International Comparison Program, we are also in a better position to assure that the poverty lines used in different countries have similar purchasing power, so that two people living in different countries but with the same real standard of living are treated the same way. The results of the 2005 ICP imply a higher cost of living in developing countries than past ICP data have indicated; the "Penn effect," then, is still evident, but it has been overstated.

There are still many data issues that cloud knowledge about poverty in the world. While there are many more household surveys, their quality is uneven, and their comparability is sometimes questionable. Forming regional aggregates helps average out the errors, but may not eliminate them. Access to survey data has been uneven, with some countries and regions (notably the Middle East and North Africa) lagging appreciably in this respect. And while the 2005 ICP was an improvement, there are still a number of problems, of which the likely urban bias in the price surveys for some countries stands out, in our view.

In this chapter, we have combined the new data on prices from the 2005 ICP and 850 household surveys spanning 125 countries to update our previous estimates of global absolute poverty measures. This chapter has described our methods and presented the main results. Along with this chapter, a substantially revised and updated version of the Bank's website PovcalNet has been released. It provides public access to the primary data in order to replicate these estimates and to make estimates for selected countries and alternative poverty lines.

We find that the overall percentage of the population of the developing world living below $1.25 per day in 2008 was 22 percent, as compared with 52 percent in 1981. That means that 1.3 billion people in 2008 lived below $1.25 per day, as compared with 1.9 billion in 1981. There was less progress in reducing the number living below $2.00 per day. We estimate that 2.5 billion people in 2008 consumed less than $2.00 per day, as compared with 2.6 billion in 1981.

For the first time since this monitoring task began, the new estimates presented here indicate a decline in both the poverty rate and the number of poor in all six regions of the developing world. Even so, progress has been quite uneven across these regions. We have seen dramatic progress in East Asia. In the early 1980s, East Asia was the region with the *highest* incidence of poverty in the world, with 77 percent living below $1.25 per day in 1981. By 2008 this had fallen to 14 percent. In China alone, 662 million fewer people were living in poverty by the $1.25 standard in 2008 than in 1981.

However, in the developing world *outside* China, the $1.25 poverty rate fell from 41 percent to 25 percent over 1981–2008. However, this was not enough to bring down the total number of

poor, which was about 1.1 billion in both 1981 and 2008, although rising in the 1980s and 1990s and then falling appreciably since 1999. In South Asia, the $1.25 per day poverty rate fell between 1981 and 2008, from 61 percent to 36 percent. The proportion of poor is lower now in South Asia than any time since 1981. The number of poor had been generally rising in Latin America and the Caribbean until 2002. But we have seen sharply falling poverty counts (and percentage poor) in that region since then. The rising incidence and number of poor in Eastern Europe and Central Asia have also been reversed since 2000. In the Middle East and North Africa, 8.6 million people—or 2.7 percent of the population—were living on less than $1.25 per day in 2008, down from 16.5 million in 1981. However, the poor survey coverage for that region creates uncertainty about the estimated poverty rates. For the first time since 1981, we have seen less than half the population of Sub-Saharan Africa living below $1.25 per day. Forty-seven percent lived below this poverty line in 2008, as compared with 51 percent in 1981. The $1.25 per day poverty rate in that region has fallen almost 10 percentage points since 1999.

Although there is clearly some good news here, a great many people remain poor and vulnerable in all regions. At the current rate of progress, there will still be about 1 billion people living below $1.25 per day in 2015. Most of the 649 million fewer poor by the $1.25 per day standard over 1981–2008 are still poor by the standards of middle-income developing countries, and certainly by the standards of what poverty means in rich countries. There has been less long-run progress in getting over the $2.00 per day hurdle. The number of people living *between* $1.25 and $2.00 per day almost doubled between 1981 and 2008, from 648 million to 1.18 billion. The marked bunching up just above the $1.25 per day line points to the fact that a great many people remain vulnerable.

NOTES

1. A great many colleagues at the World Bank have helped us obtain the necessary data for this chapter and answered our many questions. An important acknowledgment goes to the staff of over 100 national statistics offices who collected the primary household and price survey data. Our thanks go to Prem Sangraula and Qinghua Zhao for their invaluable help in setting up the data sets we have used here. We have also benefited from the comments of numerous colleagues throughout the Bank. These are our views and should not be attributed to the World Bank or any affiliated organization.

2. Ravallion (2008) provides a theoretical justification for this view and discusses the validity of the welfare assumptions on which it is based. Ravallion and Chen (2011) propose a set of "weakly relative" poverty lines that can allow for relative deprivation and costs of social inclusion and provide estimates for developing countries.

3. The term *Penn effect* stems from the Penn World Table (PWT—see Summers and Heston 1991), which provided the price level indexes across countries that were used to establish this effect empirically.

4. The ICP started as a joint project of the United Nations and University of Pennsylvania, with support from the Ford Foundation and World Bank. Prior to 2000, the Penn World Table was the main source of the PPPs for consumption used in the World Bank's global poverty measures. In 2000 we switched to the PPPs estimated by the Bank's Development Data Group. There are methodological differences between the PWT and the Bank's PPPs, as discussed in Ackland, Dowrick, and Freyens (2006) and World Bank (2008, appendix G).

5. With the PPP revisions implied by the 2005 ICP round, China's GDP per capita at purchasing power parity for 2005 falls from $6,760 to $4,091 (World Bank 2008). This downward revision reflects the method used to update the PPP over time between ICP rounds, as well as the changes between rounds. Ravallion (forthcoming) argues that the updating method used by the World Bank's annual *World Development Indicators* has not properly allowed for changes in the structure of the economy in rapidly growing developing counties; in effect, the method has not allowed for the Balassa-Samuelson effect over time. This has led to unnecessarily large data revisions when the new ICP data become available.

6. The old estimate was based a bilateral comparison of 1986 prices between the United States and China as documented in Ruoen and Chen (1995).

7. The five geographic ICP regions in 2005 were Africa, Asia-Pacific, Commonwealth of Independent States (CIS), South America, and Western Asia. The Eurostat–Organisation for Economic Co-operation and Development (OECD) members constituted a sixth region.

8. The PPPs were based on a price survey of 98 of 116 countries. For the other 18 countries, the PPPs were estimated by ICP staff from a regression model. Those countries were Algeria, Costa Rica, Dominican Republic, El Salvador, Guatemala, Guyana, Haiti, Honduras, Jamaica, Nicaragua, Panama, Papua New Guinea, St. Lucia, Suriname, Timor-Leste, Trinidad and Tobago, Turkmenistan, and Uzbekistan.

9. On the advantages of this method over the alternative (Geary-Khamis) method, see Ackland, Dowrick, and Freyens (2006). In the 2005 ICP, the Africa region chose a different aggregation method (African Development Bank 2007). World Bank (2008) describes this method as having only minor differences with the GEKS method.

10. For a fuller discussion of these issues, see Deaton and Heston (2010) and Ravallion (2010).

11. The Asian Development Bank (2008) has taken a further step of implementing special price surveys for Asian countries to collect prices on explicitly lower qualities of selected items than those identified in the standard ICP. The use of lower-quality goods essentially lowers the poverty line. In terms of the impact on the poverty counts for Asia in 2005, the ADB's method is equivalent to using a poverty line of about $1.20 per day by our methods. This calculation is based on a log linear interpolation between the relevant poverty lines.

12. For food, clothing, and footwear, 72 percent of the 717 sampled price outlets in India were in urban areas and only 28 percent in rural areas. For other goods, the outlets were solely urban. The ICP took simple averages of these prices. It was assumed that goods other than food, clothing, and footwear had the same prices in rural and urban areas. Then the implicit urban and rural international poverty lines for India consistent with the 2005 ICP have weights of 0.72 and 0.28, respectively. The ratio of the urban official poverty line for India in 2004/05 to the rural line is 1.51. Because the 2005 consumption PPP for India is Rs 15.60 (World Bank 2008), the rupee values of the international line of $1.25 per day for urban and rural areas in 2005 can then be backed out, and are Rs 21.53 and Rs 14.24 a day, respectively.

13. See Bhalla (2002) and Karshenas (2003), though their methods differ. Others have used a similar method based on GDP rather than consumption (including Sala-i-Martin 2006 and Bourguignon and Morrisson 2002), though this appears to have been done more for computational convenience as it did not require estimation from microdata.

14. For example, national accounts private consumption includes imputed rents for owner-occupied housing, imputed services from financial intermediaries, and the expenditures of nonprofit organizations, but none of these are included in consumption aggregates from

standard household surveys. Surveys, on the other hand, are undoubtedly better at picking up consumption from activities in the informal sector.

15. Korinek, Mistiaen, and Ravallion (2006) examine the implications of selective compliance for measures of poverty and inequality. They find that correcting for selective compliance in the Current Population Survey for the United States leads to a higher inequality measure but has little effect on measures of poverty.

16. The use of a "per capita" normalization is standard in the literature on developing countries. This stems from the general presumption that there is rather little scope for economies of size in consumption for poor people. However, that assumption can be questioned—see Lanjouw and Ravallion (1995).

17. Consumption requires fewer imputations and assumptions, is likely to be reported more accurately, and is arguably a better measure of current economic welfare than income. For further discussion, see Ravallion (1994, 2003) and Deaton and Zaidi (2002). It has also been argued that consumption is a better welfare indicator in developed countries—see Slesnick (1998).

18. For a few cases, we do not have consumption distributions, but we still have survey-based estimates of mean consumption. Then we replace the income mean by the consumption mean, leaving the Lorenz curve the same (i.e., all incomes are scaled up by the ratio of the consumption mean to the income mean). There is, however, no obvious basis for adjusting the Lorenz curve.

19. PovcalNet provides a wider range of measures drawn from the literature on poverty measurement. See http://econ.worldbank.org/povcalnet.

20. Note that the same poverty line is generally used for urban and rural areas. There are three exceptions—China, India, and Indonesia—where we estimate poverty measures separately for urban and rural areas and use sector-specific CPIs.

21. For a few countries in Sub-Saharan Africa for which private consumption per capita is missing from the DDP, we use GDP instead.

22. Thus $H93 = \left[\frac{(1995 - 1993)}{(1995 - 1989)}\right] \cdot H93(89) + \left[\frac{(1993 - 1989)}{(1995 - 1989)}\right] \cdot H93(95)$. In a small number of cases, this method did not give sensible results in that either M93(89) or M93(95) was outside the interval [M(89), M(95)], even though the national accounts growth rates were positive for both 1989–93 and 1993–95. In these cases, we scaled down the growth rates according to the survey means for 1989 and 1995.

23. Some countries have graduated from the set of developing countries; we apply the same definition over time to avoid selection bias. In this chapter, our definition is anchored to 2005.

24. China's survey data for the early 1980s are probably less reliable than those for later years, as discussed in Chen and Ravallion (2004), where we also describe our methods of adjusting for certain comparability problems in the Chinese data, including changes in valuation methods.

25. Further discussion and references can be found in Datt and Ravallion (2002).

26. If one uses the 1999/2000 survey for India, one obtains a sharp fall in that year and a subsequent rise in poverty incidence to 2005. However, this is clearly spurious, being driven by the fact that the 1999/2000 survey overestimates the level of consumption relative to other survey rounds.

27. See http://econ.worldbank.org/povcalnet.

28. Our preliminary estimate for 2010 using survey data representing about 80 percent of the population of the developing world indicates that the first MDG was in fact achieved that year.

29. This assumes that no one lives below our international poverty line in the member countries of the OECD. Under this assumption, the aggregate poverty gap as a percentage of global GDP is $PG \cdot \left(\dfrac{Z}{\overline{Y}}\right) \cdot \dfrac{N}{NW}$ where PG is the poverty gap index (in percent), Z is the poverty line, $\overline{Y}$ is global GDP per capita, N is the population of the developing world, and NW is world population.

REFERENCES

Ackland, Robert, Steve Dowrick, and Benoit Freyens. 2006. "Measuring Global Poverty: Why PPP Methods Matter." Australian National University, Canberra.

African Development Bank. 2007. *Comparative Consumption and Price Levels in African Countries*. Tunis: African Development Bank.

Asian Development Bank. 2008. *Comparing Poverty across Countries: The Role of Purchasing Power Parities*. Manila: Asian Development Bank.

Atkinson, Anthony B. 1987. "On the Measurement of Poverty." *Econometrica* 55: 749–64.

Balassa, Bela. 1964. "The Purchasing Power Parity Doctrine: A Reappraisal." *Journal of Political Economy* 72 (6): 584–96.

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

Bourguignon, François, and Christian Morrisson. 2002. "Inequality among World Citizens: 1820–1992." *American Economic Review* 92 (4): 727–44.

Chen, Shaohua, and Martin Ravallion. 2001. "How Did the World's Poor Fare in the 1990s?" *Review of Income and Wealth* 47 (3): 283–300.

———. 2004. "How Have the World's Poorest Fared since the Early 1980s?" *World Bank Research Observer* 19/2: 141–70.

———. 2008a. "China Is Poorer than We Thought, but No Less Successful in the Fight against Poverty." In *Debates on the Measurement of Poverty*, ed. Sudhir Anand, Paul Segal, and Joseph Stiglitz. New York: Oxford University Press.

———. 2008b. "The Developing World Is Poorer than We Thought, but No Less Successful in the Fight against Poverty." Policy Research Working Paper 4703, World Bank, Washington, DC.

———. 2010. "The Developing World Is Poorer than We Thought, but No Less Successful in the Fight against Poverty." *Quarterly Journal of Economics* 125 (4): 1577–1625.

Datt, Gaurav, and Martin Ravallion. 2002. "Has India's Post-Reform Economic Growth Left the Poor Behind." *Journal of Economic Perspectives* 16 (3): 89–108.

Deaton, Angus. 2005. "Measuring Poverty in a Growing World (or Measuring Growth in a Poor World)." *Review of Economics and Statistics* 87: 353–78.

Deaton, Angus, and Olivier Dupriez. 2008. "Poverty PPPs around the World: An Update and Progress Report." Development Data Group, World Bank, Washington, DC.

Deaton, Angus, and Alan Heston. 2010. "Understanding PPPs and PPP-Based National Accounts." *American Economic Journal: Macroeconomics* 2 (4): 1–35.

Deaton, Angus, and Salman Zaidi. 2002. "Guidelines for Constructing Consumption Aggregates for Welfare Analysis." Living Standards Measurement Study Working Paper 135, World Bank, Washington, DC.

Karshenas, Massoud. 2003. "Global Poverty: National Accounts Based versus Survey Based Estimates." *Development and Change* 34 (4): 683–712.

Korinek, Anton, Johan Mistiaen, and Martin Ravallion. 2006. "Survey Nonresponse and the Distribution of Income." *Journal of Economic Inequality* 4 (2): 33–55.

Lanjouw, Peter, and Martin Ravallion. 1995. "Poverty and Household Size." *Economic Journal* 105: 1415–35.

Ravallion, Martin. 1994. *Poverty Comparisons*. Chur, Switzerland: Harwood Academic Press.

———. 2000. "Should Poverty Measures Be Anchored to the National Accounts?" *Economic and Political Weekly* 34 (August 26): 3245–52.

———. 2003. "Measuring Aggregate Economic Welfare in Developing Countries: How Well Do National Accounts and Surveys Agree?" *Review of Economics and Statistics* 85: 645–52.

———. 2008. "On the Welfarist Rationale for Relative Poverty Lines." In *The Oxford Handbook of Arguments for a Better World: Essays in Honor of Amartya Sen,* Vol. 1, *Ethics, Welfare and Measurement*, ed. Kaushik Basu and Ravi Kanbur. New York: Oxford University Press.

———. 2010. "Understanding PPPs and PPP-Based National Accounts: A Comment." *American Economic Journal: Macroeconomics* 2 (4): 46–52.

———. 2012. "Poverty Lines across the World." In *Oxford Handbook of the Economics of Poverty*, ed. Philip N. Jefferson. New York: Oxford University Press.

———. Forthcoming. "Price Levels and Economic Growth: Making Sense of Revisions to Data on Real Incomes." *Review of Income and Wealth.*

Ravallion, Martin, and Shaohua Chen. 2007. "China's (Uneven) Progress against Poverty." *Journal of Development Economics* 82 (1): 1–42.

———. 2011. "Weakly Relative Poverty." *Review of Economics and Statistics* 93 (4): 1251–61.

Ravallion, Martin, Shaohua Chen, and Prem Sangraula. 2007. "New Evidence on the Urbanization of Global Poverty." *Population and Development Review* 33 (4): 667–702.

———. 2008. "Dollar a Day Revisited." Policy Research Working Paper 4620, World Bank, Washington, DC.

Ravallion, Martin, Gaurav Datt, and Dominique van de Walle. 1991. "Quantifying Absolute Poverty in the Developing World." *Review of Income and Wealth* 37: 345–61.

Ruoen, Ren, and Kai Chen. 1995. "China's GDP in US Dollars Based on Purchasing Power Parity." Policy Research Working Paper 1415, World Bank, Washington, DC.

Sala-i-Martin, Xavier. 2006. "The World Distribution of Income: Falling Poverty and ... Convergence. Period." *Quarterly Journal of Economics* 121 (2): 351–97.

Samuelson, Paul. 1964. "Theoretical Notes on Trade Problems." *Review of Economics and Statistics* 46 (2): 145–54.

Slesnick, Daniel. 1998. "Empirical Approaches to Measuring Welfare." *Journal of Economic Literature* 36: 2108–65.

Summers, Robert, and Alan Heston. 1991. "The Penn World Table (Mark 5): An Extended Set of International Comparisons, 1950–1988." *Quarterly Journal of Economics* 106: 327–68.

World Bank. 1990. *World Development Report 1990–1991: Poverty*. New York: Oxford University Press.

———. 2008. *Global Purchasing Power Parities and Real Expenditures: 2005 International Comparison Program*. http://siteresources.worldbank.org/ICPINT/Resources/icp-final.pdf.