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MORE RELATIVELY-POOR PEOPLE IN A LESS ABSOLUTELY-POOR WORLD

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Relative deprivation, shame, and social exclusion can matter to the welfare of people everywhere. The paper argues that such social effects on welfare call for a reconsideration of how we assess global poverty. We argue for using a weakly-relative measure as the upper-bound complement to the lower-bound provided by a standard absolute measure. New estimates of poverty are presented. The absolute line is $1.25 a day at 2005 prices, while the relative line rises with the mean, at a gradient of 1:2 above $1.25 a day, consistently with national poverty lines. We find that the incidence of both absolute and weakly-relative poverty in the developing world has been falling since the 1990s, but more slowly for the relative measure. While the number of absolutely poor has fallen, the number of relatively poor has changed little since the 1990s, and is higher in 2008 than 1981.

JEL Codes: E31, I32, O10

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1. INTRODUCTION

One of the oldest debates on poverty concerns whether it is "absolute" or "relative." An absolute poverty line is intended to have constant real value over time and space. By contrast a relative line is typically set at a constant proportion—around one half is common—of the current mean or median. The choice of method matters to assessments of progress against poverty and has bearing on longstanding policy debates concerning the scope for reducing poverty through economic growth. Indeed, when the poverty line is fixed in real terms, any standard poverty measure will automatically fall under an inequality-neutral growth process, whereby all incomes grow at the same rate. (This stylized growth

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process is arguably more than hypothetical since growth has tended to be inequality-neutral on average in developing countries; see Ravallion, 2001, and Ferreira and Ravallion, 2009.) Yet the same growth process will have no effect on the poverty measure when the line is set at a constant proportion of the mean or median.[1] Economic growth tends to reduce absolute poverty but leaves relative poverty unchanged.

The choice of method has varied across countries according to their level of economic development, as have the real values of the national poverty lines. Low and middle-income countries have tended to favor absolute lines while most high-income countries (notably in Western Europe) have preferred relative lines.[2] Alongside this difference, one tends to find that richer countries use higher poverty lines (Ravallion, 2012c). This is true even amongst those countries that favor absolute lines. Absolute lines are typically anchored to nutritional requirements for good health and normal activities. However, the use of such lines within developing countries does not mean that different developing countries use the same line. Even if there are no differences in the normative nutritional requirements, there are infinitely many food bundles that can attain any given nutritional intake. Across countries it seems that poverty is indeed relative. We can call this the "*relativist gradient*" in national poverty lines.

There are also recent signs that the idea of what "poverty" means in some developing countries is changing. Rising average living standards appear to be coming with a re-evaluation of what level of living is tolerable to not be considered "poor." Though the process of revising poverty lines is fraught with political perils and resistance, some growing developing countries have revised the real value of their lines upwards. For example, China's official poverty line of about $0.90 per person per day came to be seen as largely irrelevant to modern-day China. In response, in 2011, the government doubled the official line to about $1.80 a day. Another example is India, where the official poverty line was recently increased from about $1.00 a day to $1.20. Other countries that have recently revised their national poverty up in real terms include Colombia, Mexico, Peru, and Vietnam.

What does the relativist gradient in national lines imply for the choice between an absolute and relative approach to global poverty comparisons? There are two ways we can interpret the relativist gradient, with quite different implications for which type of poverty measure one would prefer. One can think of a poverty line as the money metric of an underlying concept of welfare. If $W(C)$ is individual welfare at "own consumption" C, and W_z is the poverty line in the welfare space, then the poverty line in consumption space, Z, is defined implicitly by $W(Z) = W_z$. While not observed, W_z can be thought of as an underlying *social norm*, which is likely to vary from one setting to another; the poverty measure in any given setting will only be accepted if it accords reasonably well with prevailing ideas of what

[1]Note that this property does not depend on whether the line is anchored to the mean or the median, given that the ratio of the median to the mean is constant in an inequality-neutral growth process. However, the choice between the mean and median can matter in other respects; see de Mesnard (2007) for further discussion.

[2]Ravallion (2012c) describes how poverty lines have been set across the world. Examples of relative lines include Smeeding *et al*. (1990), Atkinson (1998), Eurostat (2005), Nolan (2007), and OECD (2008, ch. 5).

"poverty" means in that setting. This can be formalized in the idea of a social subjective poverty line, which postulates that in any given society there is a level of consumption below which people typically think they are poor, but above which they do not (Ravallion, 2012a). We can expect norms to differ between a rich society and a poor one, and evolve over time in growing economies. If $W_z(M)$ is the norm for a country at mean consumption M, and this is an increasing function, then it is plain that the consumption poverty line, Z, will also be an increasing function of M. However, using a lower real poverty line in poorer countries would then imply a different welfare standard, such that equally well-off people are treated differently depending on where or when they live. Objections to such inconsistencies have motivated the past emphasis on measuring absolute poverty in the world using a common real poverty line, such as the World Bank's international line for developing countries of $1.25 a day at 2005 purchasing power parity (PPP) (Ravallion *et al.*, 2009).

However, a second, very different, explanation can be offered as to why richer countries have higher poverty lines. The absolute approach sees welfare as depending on own consumption (though typically with allowances for differing needs, depending on, say, household size or demographic composition). By this view, the setting in which a person lives is irrelevant to whether that person is deemed to be poor or not, once one knows the person's own consumption. By contrast, a relative line is implied by the presence of certain social determinants of welfare, which naturally vary with the context (Ravallion, 2008). Relative lines are seen to reflect welfare effects of relative deprivation—that comparing two people at the same real income the one living in the richer country will feel worse off—and costs of social inclusion, namely the extra expenditures deemed necessary for participation in a rich society as compared to a poor one, including the spending needed to avoid shame in public. For example, to capture the idea of relative deprivation, the welfare function can be rewritten as $W(C, C/M)$, which is increasing in both arguments. By this second interpretation, the desire to judge poverty globally by a common *welfare* standard demands higher consumption poverty lines in richer countries. Using the relative deprivation welfare function above, the poverty line is now defined implicitly by $W(Z, Z/M) = W_z$, which gives Z as an increasing function of M for given W_z. The social effect on welfare entails that an absolute line in the welfare space requires a varying relative line in terms of consumption.[3]

So we can identify two quite different explanations for the relativist gradient. By the social norms interpretation, individual welfare depends solely on own consumption and the relativist gradient is seen to stem from a tendency for richer countries to use higher welfare norms in deciding who is poor. In contrast, the social effects interpretation postulates instead that individual welfare depends (negatively) on how rich the country is, at given own consumption. Then the welfare-consistent monetary poverty line tends to rise with average consumption.

This theoretical distinction between "social norms of welfare" and "social effects on welfare" holds very different implications for global poverty measurement. The social norms interpretation points us toward absolute measures, while

[3]An influential early version of this argument is Sen (1983). For further discussion, see Ravallion (2012a).

the social effects interpretation points us toward some concept of relative poverty. The problem is that we do not know which of these two interpretations is right. And we may never resolve the matter from conventional empirical evidence. There have been many claims about the existence of various social effects on subjective welfare responses, though problems remain in credibly identifying such effects, as discussed further in Ravallion (2012a).This uncertainty makes it compelling to consider both absolute and relative approaches when measuring global poverty.

How then might we devise a reasonable global measure of relative poverty, alongside prevailing absolute measures? Past relative poverty measures do not provide a compelling starting point. As already noted, setting the poverty line as a constant proportion of the current mean implies that poverty depends solely on relative distribution. However, this property requires implausible assumptions; depending on how the relative line is rationalized, one needs to assume either that people are concerned *solely* with relative deprivation or that the costs of social inclusion can fall to zero as the mean falls (Ravallion and Chen, 2011). (In the example above of a relative deprivation welfare function, $W(C, C/M)$, the poverty line Z, defined implicitly by $W(Z, Z/M) = W_z$, is only directly proportional to the mean if W is independent of C at given C/M.) Relaxing these assumptions, Ravallion and Chen (2011) propose a "weakly relative" class of measures whereby social effects on welfare entail that the welfare-consistent monetary poverty lines have an elasticity with respect to the mean that is less than unity. A process of distribution-neutral growth will reduce the incidence of weakly relative poverty.

An obvious place to look for identifying the parameters of a schedule of weakly relative poverty lines is the set of national lines found across countries. Naturally these vary; there are undoubtedly many idiosyncratic factors in how poverty lines are set. What is striking, however, is that national poverty lines amongst developing countries also show a systematic non-negative relationship with the average consumption of a country, as first noted by Ravallion *et al.* (1991). Weakly relative measures are consistent with the relativist gradient, as shown by Ravallion and Chen (2011). They are also consistent with micro evidence on subjective perceptions of welfare in developing countries (Ravallion and Lokshin, 2010; Ravallion, 2012a).

To reflect this uncertainty as to whether an absolute line in the welfare space implies an absolute or a relative line in terms of real income, this paper proposes a bounded (rather than point) estimator of global poverty. At the lower bound, there is presumed to be no social effect on welfare and the relativist gradient is attributed entirely to social norms, which are taken to be fixed to assure welfare-consistent poverty measures. At the upper bound, the relativist gradient is assumed to be due entirely to social effects, and then an absolute welfare comparison calls for a weakly relative poverty line.

The paper provides a new schedule of weakly relative lines anchored to the means from the same surveys used to measure poverty. This is more consistent with past practice in measuring relative poverty than the method used in Ravallion and Chen (2011). It also means that we are better able to use sub-national data; for example, we can allow for a relative line that is higher in urban areas than rural areas. Second, the paper implements both this approach and the absolute approach on a larger dataset, adding results from almost 200 surveys to bring our

database up to 850 surveys, spanning 1979–2011 and 125 countries. The paper presents summary results for the developing world as a whole and by region back to 1981, and up to 2008. Along with this paper, a substantially revised and updated version of the Bank's website *PovcalNet* has been produced, which provides public access to the primary data, to replicate our estimates, and to make estimates for selected countries and alternative poverty lines.

The following section describes both our absolute and relative lines, while Section 3 describes the database of household surveys and other data inputs. Section 4 then presents our absolute poverty measures while Section 5 presents the relative measures. Section 6 concludes.

2. Poverty Lines

Absolute Poverty

In setting an international absolute line 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 (World Bank, 1990; Ravallion *et al*., 1991). For this purpose, Ravallion, Chen and Sangraula (RCS) (2009) 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* done by the governments of the countries concerned. While the Ravallion *et al*. (1991) dataset on national poverty lines was drawn from sources for the 1980s, the new and larger compilation produced by RCS are all post-1990, such that in no case do the proximate sources overlap.

RCS converted these national poverty lines to a common currency using the household consumption PPPs derived from the 2005 round of the *International Comparison Program* (ICP) (World Bank, 2008a, 2008b). We use the same PPPs to convert the international line back to local currency for measuring poverty. The 2005 ICP is the most complete and thorough assessment to date of how the cost of living varies across countries. The ICP collected primary data on the prices for 600–1000 (depending on the region) goods and services grouped under 155 "basic headings" deemed to be comparable across 146 countries. The prices were obtained from a large sample of outlets in each country. The price surveys were done by the government statistics offices in each country, under the supervision of regional authorities.

While these are clear improvements, the 2005 PPPs still have some limitations.[4] The ICP price surveys for some counties were largely confined to urban areas.[5] Based on ICP sampling information we treat the 2005 consumption PPPs as urban PPPs for Argentina, Brazil, Bolivia, Cambodia, Chile, China, Colombia, Ecuador, Pakistan, Peru, Thailand, and Uruguay. We then use existing differentials in urban–rural poverty lines at country level for these countries (from Ravallion *et al*., 2007) to correct the national PPP.

[4]For a fuller discussion of these issues, see Deaton and Heston (2010) and Ravallion (2010, 2012b).

[5]The greatest bias is probably in the ICP survey for China, which was confined to 11 cities. Although the survey included some surrounding rural areas of these cities, it clearly cannot be considered representative of rural China; evidence on this point is provided by Chen and Ravallion (2008), who discuss our corrective.

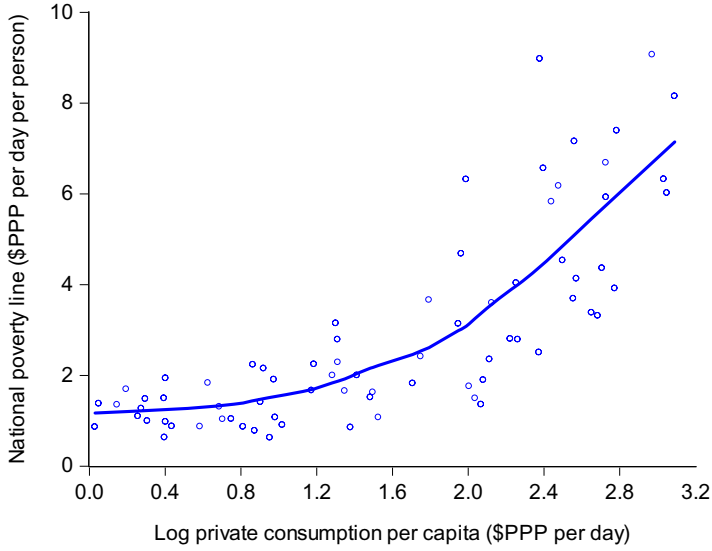

Figure 1. National Poverty Lines Plotted Against Mean Consumption

As was argued in Ravallion *et al*. (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; the results do not suggest that the implied reweighting has much impact on the consumption PPP, as we show in Chen and Ravallion (2010).

Figure 1 plots the poverty lines for developing countries compiled by RCS against log household consumption per capita from national accounts, also at 2005 PPP; there are 75 countries with complete data.[6] The figure also gives a non-parametric regression of the national poverty lines against log mean consumption. Comparing expected values conditional on mean consumption (as estimated by the non-parametric regression in Figure 1), the range is from $1.25 to $7 per day. The mean line for the poorest 15 countries in terms of consumption per capita is $1.25 while the mean for the richest 15 (all high-income countries not in Figure 1) is $25 a day.

We see in Figure 1 that the relationship is quite flat at low per capita consumption levels, consistent with the idea of absolute poverty. On the basis of the pattern evident in Figure 1, RCS proposed an international absolute poverty line of $1.25 a day for 2005, which is the mean of the lines found in the poorest 15 countries in terms of consumption per capita.[7] 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

[6]Ravallion (2012c) provides the corresponding graph for a larger dataset including high-income countries.

[7]The countries are Malawi, Mali, Ethiopia, Sierra Leone, Niger, Uganda, Gambia, Rwanda, Guinea-Bissau, Tanzania, Tajikistan, Mozambique, Chad, Nepal, and Ghana. Consumption per capita for this group ranges from $1.03 to $1.87 per day with a mean of $1.40 per day.

consumption per capita). Focusing on the poorest 15 countries is also consistent with econometric tests reported below in calibrating the weakly relative poverty lines. Of course, there is still a variance in the national poverty lines at any given level of mean consumption, including amongst the poorest countries. The poverty lines found amongst the poorest 15 countries vary from $0.70 to $1.90 per day and RCS estimate the robust standard error of the $1.25 line to be $0.10 per day.

After converting the international poverty line of $1.25 at PPP to local currency in 2005 prices, we convert it to the prices prevailing at each survey date for each of the 850 surveys, using the best available country-specific Consumer Price Index (CPI).[8] The weights in this index may or may not accord well with 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 extra effort to assure that the price indices we use adequately reflected those increases at country level. This was done in consultation with the Bank's poverty experts for each country. In some cases, such as India, we are already using CPIs that are anchored reasonably well to consumption behavior of the poor, so nothing needed to be done. However, for 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 survey 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 Labor Organization[9] (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 indices we have used for these 10 countries are understating price increases for the poor over the period 2005–08, though the countries concerned only represent 3 percent of total population in the developing world and so the problem is minor.

Relative Poverty

Following Atkinson and Bourguignon (2001), Chen and Ravallion (2001), and Ravallion and Chen (2011) we use the relationship between national poverty lines and mean consumption in identifying a schedule of relative poverty lines. Based on Figure 1, the overall elasticity of the poverty line to mean consumption

[8]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. For China and India we also use sector-specific CPIs.

[9]http://laborsta.ilo.org/data_topic_E.html

is about 0.7. (The regression coefficient of the log poverty line on log consumption per capita is 0.653 (S.E. = 0.048).) The elasticity is positive but significantly less than unity. If one was to set the constant of proportionality in a strongly relative poverty line based on these data using the regression coefficient on the poverty line on mean consumption, it would be 0.382 (S.E. = 0.021).[10]

However, it is clear from looking at Figure 1 that neither a constant elasticity nor a (homogeneous) constant slope functional form fits these data well. The slope (and hence elasticity) is essentially zero amongst the poorest 20 or so countries, where absolute poverty clearly dominates. The data on national poverty lines are more suggestive of a model in which the elasticity starts from roughly zero but rises to something close to unity.

Quite generally one can think of the relative poverty line as a non-decreasing function of the country and date specific mean, M_{it} for country i at date t.[11] Write this function as $Z(M_{it})$. We define a "weakly-relative poverty measure" as one for which the function $Z(M_{it})$ has an elasticity less than unity. It follows that if all consumption levels grow at the same rate (leaving relative inequality unchanged) then any standard poverty measure will automatically fall (Ravallion and Chen, 2011). (This is in contrast to strongly relative measures in which the poverty line is a constant proportion of the mean, implying that the measure of poverty depends solely on relative distribution.) Motivated by Figure 1, we also require that the elasticity rises with mean consumption from zero at low levels toward (but never reaching) unity.[12]

There are three parameters to the Ravallion and Chen schedule of weakly relative poverty lines, namely the absolute line (Z^*), the minimum cost of social inclusion (α), and the relativist gradient (k); more precisely:[13]

$$Z(M_{it}) = \max(Z^*, \alpha + kM_{it}). \tag{1}$$

This is illustrated in Figure 2, which also shows the corresponding schedule of strongly relative lines. As long as the minimum cost of social inclusion is positive, the elasticity of the poverty line to the mean will not exceed unity (only reaching unity as the mean goes to infinity). Given these three parameters one can find the critical value of the mean at which the relativist gradient emerges, namely $M^* = (Z^* - \alpha)/k$.

There are two ways one can rationalize the poverty lines in (1). The first is a generalization of the approach proposed in Atkinson and Bourguignon (2001). In their formulation a person is deemed to be "not poor" if she is neither absolutely

[10]The intercept was suppressed to assure that the calculation was consistent with a strongly relative line.

[11]We assume that the mean is the relevant parameter rather than the median. However, counter-arguments can be made and there has been some debate on this choice (Easton, 2002; Saunders and Smeeding, 2002; de Mesnard, 2007). The median is more robust to measurement errors at the extremes, although poverty lines set as a constant proportion of the median can have perverse properties when the Lorenz curve shifts (de Mesnard, 2007).

[12]An earlier contribution by Foster (1998) proposed a weakly relative line given by the weighted geometric mean of an absolute and a (strongly) relative line. While this is weakly relative, it has a constant elasticity, whereas the data suggest that the elasticity rises from zero (for the poorest country) toward unity (the richest).

[13]The Atkinson–Bourguignon (2001) poverty lines are obtained as the limiting case in which $\alpha = 0$. This was also assumed by Chen and Ravallion (2001).

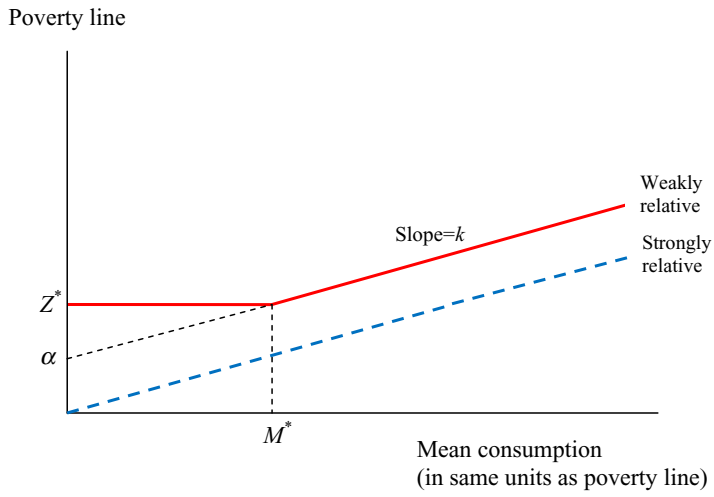

Figure 2. Relative Poverty Lines

poor nor relatively poor, with the latter taken to be determined by a relative poverty line that is set at a constant proportion of the mean. Our generalization is to allow for a positive lower bound to the relative line, to reflect the minimum cost of social inclusion. The second interpretation says that the poverty line is made up of two components, namely a fixed component and a relative component. The fixed component can include the cost of social inclusion but this does not vary with the mean until it reaches M^*, after which the cost rises with the mean.

We consider two methods of setting the three parameters in (1):

- *Method 1:* Ravallion and Chen (2011) calibrated their schedule of weakly-relative lines to the relationship between national lines and private consumption per capita from national accounts (Figure 1). A visual inspection of Figure 1 suggests that a positive slope starts to emerge at a log of monthly consumption of around 4, corresponding to about $2 a day, and that the gradient is about one-in-three. This led Ravallion and Chen (2011) to set an absolute line of $1.25 a day, a minimum cost of social inclusion of $0.60 a day, and 1/3 for the relativist gradient. Ravallion and Chen also confirmed these parameter choices econometrically, using a suitably constrained version of Hansen's (2000) method for estimating a piece-wise linear ("threshold") model. (The variation on Hansen's model is that, in our case, the slope of the lower linear segment is constrained to be zero and there is no potential discontinuity at the threshold.) This gave $\hat{Z}^* = \$1.23$ (t = 0.193) and $\hat{k} = 0.325$ (S.E. = 0.0256).
- *Method 2:* A criticism of the Method 1 schedule of relative lines is that they are anchored to private consumption from the national accounts, rather than the means from the surveys used to measure poverty, as appears to be standard practice in measuring relative poverty. Anchoring to the survey means also has the advantage that one can set separate relative poverty lines for urban and rural areas or sub-national regions. If one sets the

constant of proportionality in a strongly relative line based on the regression on survey means it would be 0.560 (S.E. = 0.044).[14] Recall that the corresponding number using national accounts' consumption was 0.382. The higher value using survey means reflects the fact that national accounts consumption includes things that are not typically included in survey-based measures. Under-reporting/non-response in surveys or over-estimation of consumption in national accounts, could also be playing a role.[15]

Following the same procedure but using survey means we are led to use $k = 1/2$, which is consistent with past practice in setting strongly relative poverty lines. As before, we set the absolute line at \$1.25 a day. The minimum cost of social inclusion must be in the interval (0, \$1.25). We set it halfway, i.e., $\alpha = \$1.25/2$. Thus we use the following schedule of poverty lines for country i at date t (in \$ per day at the 2005 PPP for household consumption):

$$(2) \qquad Z(M_{it}) \equiv \max[\$1.25, (\$1.25 + M_{it})/2] = \$1.25/2 + \max[\$1.25/2, M_{it}/2].$$

These choices conform well with the empirical relationship between national poverty lines and the survey means. Using the aforementioned constrained threshold estimator with surveys means instead of national accounts gave $\hat{Z}^* = \$1.17$ (S.E. = 0.17) and $\hat{k} = 0.472$ (S.E. = 0.07); n = 70. Our chosen parameter values are not significantly different from these estimated coefficients.

By comparison with either schedule of weakly relative lines, the corresponding strongly relative lines are far too low to be credible in poor countries. Using Method 1, the mean strongly relative line for the poorest 15 countries is \$0.47 a day, which is not much more than one third of the \$1.25 a day line, while for Method 2 it is \$0.64 a day—only half of the \$1.25 a day line. Indeed, both are less than *any* national line in the data. (And using the median instead of the mean would give even lower lines.)

3. Household Survey Data and Poverty Measures

We have estimated all the poverty measures ourselves from the primary (unit record or tabulated) sample survey data rather than relying on pre-existing poverty measures. And all our previous estimates have been updated to ensure 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 micro data (the most common) to specially designed grouped tabulations from the raw data, constructed following our guidelines.

Our 850 surveys come from 125 countries. Taking the most recent survey for each country, 2.1 million households were interviewed in the surveys used for 2008.

[14]Again, the intercept was suppressed to assure that the calculation was consistent with a strongly relative poverty line. A practical disadvantage of this method is that we lose five data points.

[15]For further discussion of the discrepancies between these sources, see Ravallion (2000, 2003) and Deaton (2005).

The surveys were mostly done by governmental statistics offices as part of their routine operations. Not all available surveys were included. A survey was dropped if there were known to be serious comparability problems with the rest of the dataset. 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 that we cannot deal with. 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. When there is a choice, we use consumption in preference to income, on the grounds that consumption is likely to be the better measure of current welfare on both theoretical and practical grounds.[16] 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. 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. Our data are national for almost all countries. The exceptions are China, India, and Indonesia, for which we do an urban–rural split. (Given that Method 2 allows different lines for urban and rural areas we plan to do urban–rural splits for more countries in future applications.)

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

We can write our relative poverty measure for county i at date t in the following form:

$$P_{it}^{R} \equiv P[M_{it}/Z(M_{it}), L_{it}]. \tag{3}$$

Here M_{it} is the mean for date t and L_{it} is a vector of parameters fully characterizing the Lorenz curve (roughly interpretable as "inequality"). Our corresponding absolute measure is then:

$$P_{it}^{A} \equiv P[M_{it}/Z^{*}, L_{it}]. \tag{4}$$

[16]For further discussion, see Ravallion (1994) and Deaton and Zaidi (2002).

TABLE 1
PERCENTAGE OF THE POPULATION REPRESENTED BY HOUSEHOLD SURVEYS

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

In both cases, the aggregate poverty measure for any date and region is the population-weighted mean of the country-specific measures.[17]

Notice that the gap between the relative and absolute measures can be expected to change over time with changes in the mean and in distribution. Past research has indicated that the absolute poverty rate for developing countries tends to fall with economic growth; for recent evidence see Ravallion (2012d). It is an empirical issue whether our weakly relative measure will fall more slowly than the absolute measure during any process of (positive) growth in average consumption. Ravallion and Chen (2011) discuss this issue further and identify theoretical conditions under which relative poverty will change more slowly with economic growth than absolute poverty. As we will see, that prediction is confirmed by our empirical results.

We start the series in 1981 and make estimates at three yearly intervals up to 2008. Of the 125 countries, 20 have only one survey; 15 have two; 12 have three; while 78 have four or more, of which 31 have 10 or more surveys. If there is only one survey for a country, we estimate measures for each reference year by applying the growth rate in real private consumption per person from the NAS to the survey mean,[18] assuming that the Lorenz curve for that country does not change. We also use the annual NAS data for interpolation purposes, given the irregular spacing of the surveys, following the method outlined in Chen and Ravallion (2010).

In the aggregate, 90 percent of the population of the developing world is represented by surveys within two years of 2008.[19] Survey coverage varies by region and over time. Table 1 gives the coverage rate by region and for each reference year; for this purpose, a country is defined as being covered if there was a survey (in our database) within two years of the reference date (a five-year

[17]The population weights (for urban and rural poverty measures, as well as across countries) are also from the World Bank's Development Data Platform.

[18]For a few countries for which private consumption per capita is missing from the DDP, we use GDP.

[19]Some countries have graduated from the set of developing countries; we apply the same definition over time to avoid selection bias. In this paper our definition is anchored to 2005.

window). The coverage rate in 2008 varies from 47 percent of the population of the Middle East and North Africa (MENA) 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, given 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 onwards). Unsurprisingly, we have weak coverage in Eastern Europe and Central Asia (EECA) for the 1980s; many of these countries did not officially exist then. More worrying is the weak coverage for Sub-Saharan Africa (SSA) in the 1980s; indeed, our estimates for the early 1980s rely heavily on projections based on distributions around 1990. The weak coverage for EECA, MENA, and SSA in the 1980s is evident in Table 1. Our estimates for these regions in the 1980s are heavily dependent on the extrapolations from NAS data.[20]

4. Measures of Absolute Poverty

Table 2 gives our absolute poverty rates—the percentage of the population living below $1.25—at three-yearly intervals during 1981–2008. Table 3 gives the corresponding results for $2.00 a day, which is the median poverty line amongst developing countries as a whole (RCS).[21]

Over the 28 year period, we find that the percentage of the population of the developing world living below $1.25 per day was halved, falling from 52 to 22 percent. The number of poor fell by 600 million, from 1.9 billion to 1.3 billion over 1981–2005 (Table 2). The trend rate of decline in the $1.25 a day poverty line 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, with $R^2 = 0.97$.) 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 achieving the first Millennium Development Goal (MDG) of halving the 1990 poverty rate well before 2015. 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 in that year.

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

[20]Note that there is a "hole" in coverage for South Asia in 1999. This reflects the well-known comparability problem due to India's National Sample Survey (NSS) for 1999/2000 (further discussion and references can be found in Datt and Ravallion, 2002). 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 5-yearly 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. Including all available survey rounds for India adds to the variability in the series but does not change the trend.

[21]Further details on these estimates and results for other poverty lines and for the poverty gap index can be found in Chen and Ravallion (2012).

TABLE 2

ABSOLUTE POVERTY MEASURES FOR $1.25 A DAY BY REGION, 1981–2008

	% of Population Below $1.25 a Day in 2005 PPP									
Region	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
	Number of People (in millions) Below $1.25 a Day in 2005 PPP									
Region	1981	1984	1987	1990	1993	1996	1999	2002	2005	2008
East Asia and Pacific	1096.5	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	1937.8	1857.7	1768.2	1908.6	1910.3	1704.0	1743.4	1639.3	1389.6	1289.0
Total excl. China	1102.8	1137.8	1182.5	1225.5	1277.6	1261.2	1297.0	1276.2	1177.7	1116.0

Note: Regions with survey coverage less than 50% are emboldened.

TABLE 3

ABSOLUTE POVERTY MEASURES FOR $2 A DAY BY REGION, 1981–2008

	% of Population Below $2.00 a Day in 2005 PPP									
Region	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
	Number of People (in millions) Below $2.00 a Day in 2005 PPP									
Region	1981	1984	1987	1990	1993	1996	1999	2002	2005	2008
East Asia and Pacific	1312.9	1316.3	1279.0	1333.8	1300.7	1139.9	1137.6	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	1010.4	1047.3	**1068.8**	1119.7	1113.1	1124.6
Sub-Saharan Africa	**287.6**	**323.8**	**350.4**	**389.2**	434.0	466.0	503.3	533.3	559.1	562.3
Total	2585.3	2680.0	2710.2	2864.1	2941.5	2864.8	2937.9	2848.4	2595.8	2471.4
Total excl. China	1613.2	1716.7	1803.1	1903.3	2015.2	2072.7	2168.2	2193.5	2114.2	2076.8

Note: Regions with survey coverage less than 50% are emboldened.

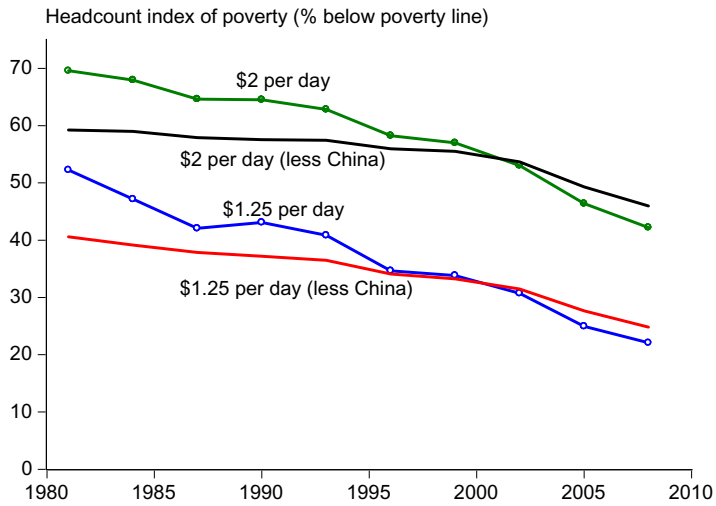

Figure 3. Headcount Indices for the Developing World, 1981–2008

Note: Poverty lines in 2005 PPP.

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 to 43 percent), and a further 20 points in the 18 years from 1990 to 2008.

China's success against absolute poverty has clearly played a major role in this overall progress. Tables 2 and 3 repeat the calculations excluding China. Strikingly, the number of people outside China living below $1.25 a day is no lower in 2008 than 1981, although it rose then fell, with a marked decline since 1999, from 1.3 to 1.1 billion.

Figure 3 plots the poverty rates over time with and without China. Excluding China, the $1.25 a day poverty rate falls from 40 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 = 1.05 percent), which is well over half the 1990 value of 37 percent (Table 2). Therefore past trends do not suggest that the developing world as a whole outside China is on track to reaching the MDG for poverty reduction.

Our new estimates suggest only slightly less progress in absolute terms for the $2 per day line than $1.25 (though less in proportionate terms). The poverty rate by this higher standard has fallen from 70 percent in 1981 to 43 percent in 2008 (Table 3). The trend is also about 1 percent per year (a regression coefficient on time of –0.97; standard error = 0.09); excluding China, the trend is only 0.4 percent per year (a regression coefficient of –0.44; standard error = 0.07 percent). Clearly, in proportionate terms, however, the rate of progress has been lower for the higher poverty line.

The number of people living below $2 per day has fallen over 1981–2008, but only because of the progress since 1999 (Table 3). The number of people living

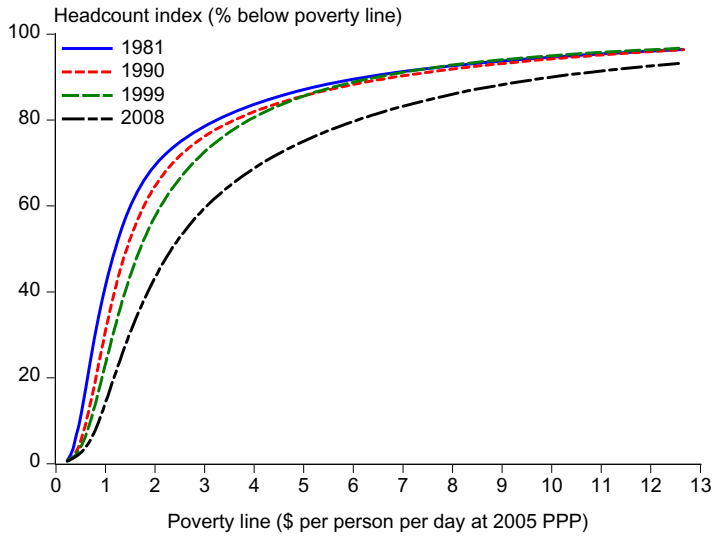

Figure 4. Cumulative Distribution Functions up to U.S. Poverty Line

between $1.25 and $2 a day has almost doubled from 648 million to 1.18 billion. 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. 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 the international poverty line, Figure 4 plots the cumulative distribution function (CDF) up to a maximum poverty line of $13 per person per day, which is the official line for the U.S. in 2005 (for a family of four). As can be seen from Figure 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, 2012c). To avoid cluttering we give four CDFs at nine-year intervals. The claim that poverty fell between 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 amongst the poor.[22] The claim that poverty fell over time from 1981 to 1990 to 1999 is only robust up to about $5 a day.

Regional Differences

Comparing Tables 2 and 3, the regional rankings are not robust to the choice of the poverty line. At the lower lines (under $2 per day) SSA has the highest

[22]On the use of dominance tests in this context, see Atkinson (1987).

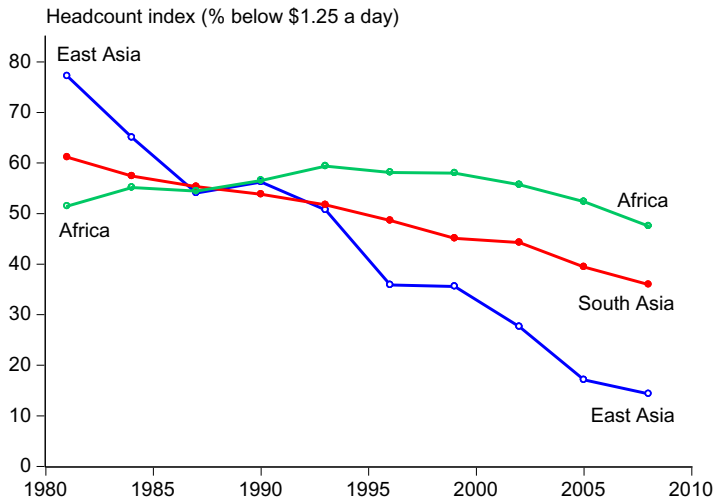

Figure 5. Differing Fortunes for Poor People in Three Regions

incidence of poverty, but this switches to South Asia at the $2 a day line. Also, MENA's poverty rate exceeds LAC's at the $2 line, but the ranking reverses at the lower lines.

There have been notable changes in regional poverty rankings over time. Figure 5 plots the $1.25 a day poverty rate for the three regions that account for the bulk of the poor, East Asia, South Asia, and Sub-Saharan Africa. (These three account for 96 percent of those living below $1.25 a day in 2008.) We see a marked reversal of fortunes. Looking back to 1981, East Asia had the highest incidence of poverty, with 77 percent living below $1.25 per day. South Asia had the next highest poverty rate (followed by SSA, LAC, MENA, and lastly, EECA). By the early 1990s, SSA had swapped places with East Asia, and by 2008 East Asia's poverty rate had fallen to 14 percent, while SSA's was 48 percent.

Thus the composition of world poverty has changed 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, the Chinese poverty rate had fallen below average. There were over 600 million fewer people living under $1.25 per day in China in 2008 than 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); 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 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 2).

The extent of the "bunching up" that has occurred between $1.25 and $2 per day is particularly striking in both East and South Asia, where we find a total of about 900 million people living *between* these two lines, roughly equally split between the two sides of Asia.

We find a trend declining in the poverty rate in LAC 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 MENA 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 MENA have weak coverage in the 1980s and also recently, given the aforementioned lags in the public availability of survey data.

We find a generally rising incidence and number of poor in EECA until 1999, but falling poverty measures since then. The paucity of survey data for EECA 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 EECA 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 in the whole period—2008 is the first time the $1.25 poverty rate has fallen below 50 percent (Table 2). There was an increase until the mid 1990s, but there has been an encouraging downward trend since then. The number of poor by our $1.25 a day standard has almost doubled in SSA over 1981–2008, from 205 million to almost 390 million. The share of the world's poor by this measure living in Africa has risen from 11 percent in 1981 to 30 percent in 2008.

5. Measures of Relative Poverty

Recall that the relative poverty lines rise with the mean above some point, as determined by the alternative calibration methods described in Section 2. Table 4 gives the average poverty line by region and year for both methods.[23] Using Method 1, the overall mean poverty line rises from $2.00 a day in 1981 to $2.90 in 2008. The mean poverty lines are similar, though slightly higher for Method 2. In 2008, the mean lines vary from $1.60 in Sub-Saharan Africa to almost $7 a day in Eastern Europe and Central Asia (using Method 1, but they are similar for Method 2).

Figure 6 gives the series of implied weakly relative poverty measures for the developing world using both methods, alongside the corresponding series of absolute measures for $1.25 a day. We see that the overall measures of relative poverty are quite robust to the choice of method. Using the survey means (Method 2) gives slightly higher poverty counts in the 1990s and slightly lower counts at the end of the period. By either method we see an overall trend decline in the incidence of

[23]These average lines are purely for descriptive purposes; they have no analytic role since poverty lines are calculated at country-year level.

TABLE 4

AVERAGE RELATIVE POVERTY LINE BY REGION AND YEAR

Region	Mean Poverty Line $/person/day at 2005 PPP									
	1981	1984	1987	1990	1993	1996	1999	2002	2005	2008
Method 1										
East Asia and Pacific	1.33	1.34	1.35	1.39	1.43	1.57	1.66	1.82	2.03	2.34
China	1.25	1.25	1.25	1.25	1.25	1.35	1.48	1.64	1.85	2.20
Eastern Europe and Central Asia	4.05	4.21	4.35	4.21	3.78	3.79	3.98	4.54	5.61	6.99
Latin America and the Caribbean	4.32	4.25	4.07	4.00	4.28	4.41	4.68	4.76	5.09	5.79
Middle East and North Africa	2.42	2.56	2.40	2.41	2.47	2.50	2.59	2.80	3.05	3.37
South Asia	1.27	1.27	1.30	1.35	1.38	1.47	1.54	1.58	1.74	1.94
Sub-Saharan Africa	1.55	1.55	1.53	1.51	1.49	1.51	1.51	1.53	1.55	1.60
Total	2.00	2.01	2.00	2.00	1.99	2.08	2.17	2.30	2.54	2.90
Total excl. China	2.29	2.30	2.28	2.28	2.26	2.34	2.41	2.52	2.77	3.13
Method 2										
East Asia and Pacific	1.36	1.38	1.41	1.45	1.54	1.73	1.80	2.06	2.39	2.72
China	1.26	1.29	1.33	1.34	1.42	1.61	1.71	2.01	2.40	2.81
Eastern Europe and Central Asia	4.19	4.36	4.49	4.27	4.76	4.37	3.96	4.39	5.22	6.71
Latin America and the Caribbean	4.51	4.17	4.36	4.42	4.47	4.68	4.70	4.66	5.17	5.93
Middle East and North Africa	2.84	3.04	2.84	2.85	2.98	2.98	3.06	3.35	3.02	3.24
South Asia	1.30	1.32	1.35	1.37	1.38	1.41	1.46	1.48	1.54	1.58
Sub-Saharan Africa	1.71	1.66	1.65	1.60	1.54	1.56	1.58	1.61	1.63	1.78
Total	2.09	2.09	2.12	2.11	2.18	2.24	2.23	2.37	2.60	2.94
Total excl. China	2.41	2.39	2.41	2.38	2.46	2.46	2.41	2.50	2.66	2.98

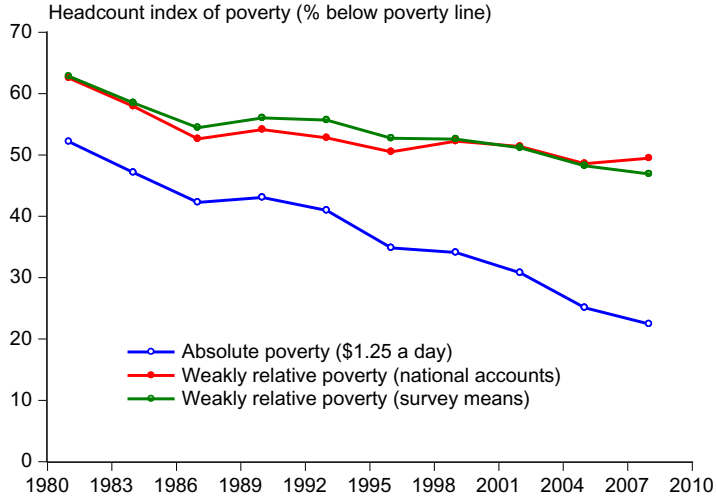

Figure 6. Incidence of Absolute and Weakly Relative Poverty in the Developing World

relative poverty, but a trend increase in the proportion of the population who are not absolutely poor but are relatively poor.

The slight upturn in 2008 using Method 1 is probably deceptive, as it appears to largely reflect a short-run gap in the growth rates implied by the national accounts consumption and those found in the surveys. Given the aforementioned advantages of Method 2, we will rely more on the schedule in equation (2).

Table 5 gives the estimates by region using Method 2, corresponding to Table 2. Table 6 gives detailed results using Method 1. We see that the proportion fell over time, from 63 percent in 1981 to 56 percent in 1990, 53 percent in 1999, and 47 percent in 2008. The speed of decline in the incidence of relative poverty has not been sufficient to reduce the number of poor by this measure, which rose from 2.3 billion to 2.5 billion in 1990, 2.7 billion in 1999, and stayed at 2.7 billion by 2008. Extrapolating the rate of progress forward using a linear projection for the relative poverty rate and the World Bank's population projections suggests that the number of relatively poor will not increase further, stabilizing at 2.7 billion over the next 10 years.[24] The projected rate of progress in reducing the percentage poor is only sufficient to compensate for expected population growth.

The number of people who are relatively poor but not absolutely poor rose markedly over the period 1981–2008, from 396 million to 1404 million (Figure 7). The reduction in the number of absolutely poor over the same period was 649 million. Assuming that all of these entered the ranks of the relatively poor, they account for 64 percent of the increase in the number of relatively poor but not absolutely poor.

The incidence of relative poverty has fallen substantially in East Asia, from 81 percent in 1981 to 42 percent in 2008. It has risen in EECA over this period, though falling since the mid 1990s. There has been no clear trend in LAC over the whole period, though with declining relative poverty incidence in the 2000s. We see a slow but reasonably steady decline in the incidence of relative poverty in MENA and South Asia. The relative poverty rate was generally rising in SSA until 1999, but has been falling since.

East Asia is the only region that has seen a decline in the number of relatively poor. In other regions, the decline in the incidence of relative poverty has not been sufficient to reduce the counts of the number of poor by this measure. South Asia and Sub-Saharan Africa saw the largest increases in the number of relatively poor—about a 250 million increase in each region over the period as a whole.

Comparing Tables 2 and 5, we see some differences in the regional profile of poverty depending on whether one uses absolute or relative poverty. The two regions with the highest incidence of absolute poverty also have the highest relative poverty rate. In 2008, SSA had the highest incidence of both absolute and relative poverty. Latin America and the Caribbean had the third highest relative poverty incidence, but came fourth in absolute poverty. East Asia experienced a generally falling count of both the absolutely poor and the relatively poor (though with a more rapid pace of progress against absolute poverty). While MENA has seen

[24]For the linear projections we ignored the first (1981) observation in the series, which is a statistical outlier. Then the projected relative poverty rates are 46 percent this year, 44 percent 5 years from now, and 42 percent in 10 years. The Bank's current population projections in millions for the developing world, as defined in 2012, are 5912 in 2012, 6259 in 2017, and 6591 in 2022.

TABLE 5

WEAKLY POVERTY MEASURES FOR THE DEVELOPING WORLD, 1981–2008

Region	1981	1984	1987	1990	1993	1996	1999	2002	2005	2008
% of population below relative poverty line										
East Asia and Pacific	80.5	70.0	60.4	63.6	60.1	51.9	52.1	48.8	43.4	42.4
China	85.2	72.6	59.0	65.2	61.1	51.2	51.3	48.4	41.9	41.0
Eastern Europe and Central Asia	**22.0**	**21.4**	21.5	25.4	32.2	34.0	32.2	30.4	29.3	28.2
Latin America and the Caribbean	49.6	50.3	46.9	46.8	50.0	49.9	51.1	51.2	47.9	45.9
Middle East and North Africa	**42.0**	**41.2**	**40.7**	39.3	38.6	38.4	38.8	**37.9**	36.6	**35.0**
South Asia	64.0	61.6	60.9	60.3	58.9	58.0	**56.9**	56.8	55.1	53.5
Sub-Saharan Africa	**62.3**	**64.3**	**64.2**	**65.1**	66.9	66.6	66.5	65.3	63.6	61.1
Total	62.8	58.5	54.4	56.0	55.7	52.7	52.6	51.2	48.2	46.9
Total exl. China	54.6	53.4	52.8	52.9	53.8	53.2	53.0	52.0	50.2	48.6
Number of relative poor (in millions)										
East Asia and Pacific	1143.4	1044.1	946.2	1047.0	1031.8	925.2	959.2	924.4	841.7	840.4
China	847.0	753.1	639.8	739.9	720.0	623.1	642.7	620.0	546.5	542.6
Eastern Europe and Central Asia	**94.7**	**94.7**	97.5	118.0	150.8	159.7	151.3	143.1	138.0	133.6
Latin America and the Caribbean	180.7	195.4	193.6	204.3	230.0	241.1	259.1	270.9	263.4	261.5
Middle East and North Africa	**72.4**	**77.8**	**83.9**	88.5	93.3	98.7	105.6	**109.0**	111.1	**111.9**
South Asia	594.7	615.7	653.4	691.6	720.3	752.0	**781.6**	821.4	836.6	849.4
Sub-Saharan Africa	**248.1**	**278.6**	**302.8**	**333.6**	371.4	400.6	431.9	457.9	479.9	496.4
Total	2333.9	2306.1	2277.3	2483.0	2597.6	2577.1	2688.7	2726.6	2671.0	2692.9
Total exl. China	1486.9	1553.0	1637.5	1743.1	1877.6	1953.9	2046.1	2106.6	2124.5	2150.3

Note: Relative poverty lines based on Method 2. Regions with survey coverage less than 50% are emboldened.

TABLE 6

WEAKLY RELATIVE POVERTY MEASURES FOR THE DEVELOPING WORLD, 1981–2008, USING POVERTY LINES ANCHORED TO PRIVATE CONSUMPTION FROM NATIONAL ACCOUNTS (METHOD 1)

Region	1981	1984	1987	1990	1993	1996	1999	2002	2005	2008
% of population below the relative poverty line										
East Asia and Pacific	79.7	68.3	57.5	61.1	56.5	46.8	50.0	46.1	38.5	39.9
China	84.0	69.4	54.0	60.2	53.7	41.2	45.2	41.5	32.8	33.9
Eastern Europe and Central Asia	**34.2**	**33.6**	33.6	29.8	26.6	31.5	33.8	34.0	35.2	33.0
Latin America and the Caribbean	50.6	53.5	44.5	43.4	47.6	48.6	50.7	52.3	47.3	45.1
Middle East and North Africa	**34.2**	**33.6**	**32.5**	30.3	29.9	31.3	32.4	**33.8**	35.9	**37.3**
South Asia	61.8	58.5	57.6	59.6	59.1	61.2	**61.1**	62.5	64.2	68.4
Sub-Saharan Africa	**56.6**	**60.2**	**59.2**	**61.1**	63.7	63.0	62.9	60.7	57.6	53.3
Total	62.5	57.9	52.6	54.1	52.8	50.5	52.2	51.4	48.6	49.5
Total excl. China	54.7	53.8	52.1	52.0	52.5	53.6	54.5	54.5	53.4	54.1
Number of people (in millions) below the relative poverty line										
East Asia and Pacific	1132.2	1018.5	900.7	1006.6	970.3	833.6	920.9	873.2	746.3	791.8
China	835.1	719.9	585.7	683.2	632.7	501.9	565.6	531.1	427.4	449.3
Eastern Europe and Central Asia	**146.9**	**148.3**	152.8	138.4	124.7	147.8	158.9	160.0	165.7	156.5
Latin America and the Caribbean	184.4	207.9	183.4	189.3	218.9	235.1	257.0	276.4	260.0	257.0
Middle East and North Africa	**59.0**	**63.4**	**67.1**	68.3	72.3	80.3	88.3	**97.4**	109.0	**119.2**
South Asia	574.8	584.1	617.5	684.0	721.9	794.5	**838.3**	904.6	974.2	1085.1
Sub-Saharan Africa	**225.3**	**261.1**	**279.3**	**313.1**	353.7	378.5	408.4	425.1	434.9	432.7
Total	2322.7	2283.3	2200.7	2399.6	2461.9	2470.0	2671.8	2736.7	2689.8	2842.3
Total excl. China	1487.7	1563.4	1615.0	1716.5	1829.2	1968.1	2106.2	2205.6	2262.4	2393.0

Note: Regions with survey coverage less than 50% are emboldened.

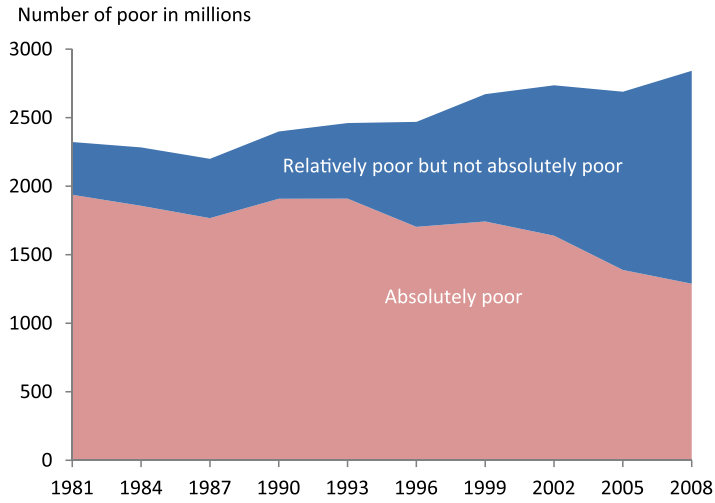

Figure 7. Number of Relatively Poor and Absolutely Poor

generally falling counts of absolutely poor, the number of relatively poor has been generally rising. That is also true of South Asia in the 2000s. Not surprisingly, EECA is the region with the largest gap between its relative poverty rate and its absolute poverty rate.

The differences in rates of progress against poverty we see when comparing Tables 2 and 5 reflect differences in how responsive the two measures are to economic growth. The relationship between poverty reduction and economic growth is complex, as it is known that both depend on initial distribution (including poverty) and that there are important interaction effects between growth and distribution in how they impact on poverty (Ravallion, 2012d). However, here we are focusing on a purely statistical aspect of the difference between absolute and relative measures. Intuitively, one expects that growth in the mean will be less effective in reducing relative poverty, given that the poverty line rises with the mean above a critical level. This is confirmed by Figure 8, giving the relationship between the proportionate rates of poverty reduction (annualized differences in logs) and the growth rates in the mean, and the non-parametric regressions. (The growth rates are annualized log differences expressed in percentage terms.)

A long-standing issue in development policy making is the trade-off between growth and redistribution in fighting poverty. (Recall that both measures are functions of the mean and the Lorenz curve, as given by equations (3) and (4).) It is of interest to ask how much the acceptable trade-off differs between an absolute measure and a relative measure. A simple "thought experiment" provides an answer. Consider government i with a national poverty line of $Z(M_{i0})$ at the base date 0. For expositional convenience, think of the Lorenz curve as being represented by one parameter, which can be interpreted as "inequality." Suppose that, from the perspective of fighting absolute poverty, the government is indifferent between letting inequality rise by an amount dL_i and an increase in the mean by dM_i. Fixing dM_i, we can then ask how much less inequality would be accepted if

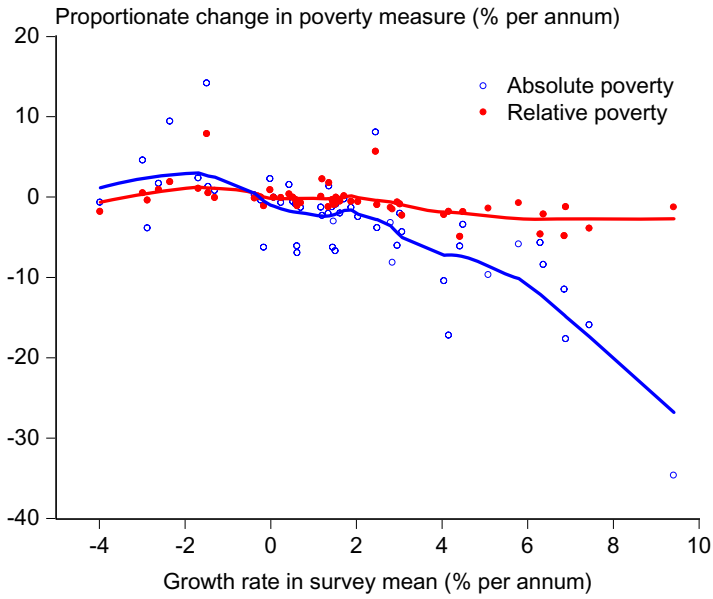

Figure 8. Growth and Poverty Reduction

the government switched to our relative measure, letting the poverty line adjust to $Z(M_{it})$ for $t > 0$ (rather than staying at $Z(M_{i0})$). The ratio of the acceptable increase in inequality for the relative measure to that for the absolute measure is then given by the ratio of the marginal rate of substitution (MRS) between the mean and inequality for the relative measure to the corresponding MRS for the absolute measure. Since all else is being held constant, this ratio is simply one minus the elasticity of the relative poverty line to the mean. For the absolute measure, the MRS is $P_{M/Z}/(ZP_L)$ (using subscripts to denote partial derivatives), while for the relative measure it is $(1 - MZ_M/Z)P_{M/Z}/(ZP_L)$. Given that all variables are the same initially, the partial derivatives are the same and so the ratio of the two MRSs collapses to $(1 - MZ_M/Z)$. That elasticity has a mean value of 0.67 (a median of 0.72). So, at the mean, only about one third of the increase in inequality that was acceptable when using an absolute measure would be tolerated if the country switched to our relative measure, all else held constant.

6. Conclusions

Welfare consistency is an appealing concept for guiding poverty measurement. This requires that two people who are agreed to have the same level of welfare are treated equally by the poverty measure no matter where or when they live. Social effects on welfare—adverse effects of relative deprivation or socially-specific costs of avoiding shame or social exclusion—may then demand that higher poverty lines (in terms of command over commodities) are used in richer societies. However, the fact that we tend to see such a "relativist gradient" in national poverty lines across countries could also reflect an underlying economic gradient in

social norms, with no role for social effects on welfare. Then welfare consistency may still call for absolute lines, such that global poverty is assessed against a common, global, welfare norm.

We have argued that this ambiguity makes it compelling to look at relative measures of global poverty, as a complement to absolute measures. Given that we cannot say which interpretation is right, it would be unwise to base global poverty comparisons on only one of the two measures. However, the prevailing approaches to measuring relative poverty—using a line that is set at a constant proportion of the current local mean—are subject to numerous objections. Instead we have proposed a "weakly relative poverty line" in which there is a positive lower bound to the relative poverty line, interpretable as the minimum cost of social inclusion. Thus the elasticity of the poverty line to the mean rises from zero for the poorest countries to approach unity for the richest. The absolute and (weakly) relative poverty lines can be interpreted as the lower and upper bounds (respectively) to a welfare-consistent poverty line.

We find evidence of a continuing decline in the incidence of absolute poverty in the developing world. The overall percentage of the population living below $1.25 a day in 2008 was 22 percent, as compared to 52 percent in 1981. We find that 1.3 billion people in 2008 lived below $1.25 a day, as compared to 1.9 billion in 1981. Progress has been uneven across regions, but (encouragingly) all regions have seen falling poverty counts in the 2000s.

The incidence of relative poverty has also fallen, from 63 percent in 1981 to 47 percent in 2008. But this was not sufficient to prevent rising numbers of relatively poor; indeed, the total number of relatively poor rose by about 360 million over 1981–2008, while the corresponding number of absolutely poor fell by almost 650 million. Projecting forward, it appears likely that the number of relatively poor will stabilize over the coming years, at 2.7 billion.

Poverty in the developing world has become more relative. Over 80 percent of the relatively poor in 1981 were absolutely poor, but by 2008 the proportion had fallen to under half. In other words, the range between our lower and upper bounds to a welfare-consistent poverty measure has risen markedly over time; in 1981, the range was 11 percentage points while by 2008 it was 25 percentage points.

So a substantial increase in the number of people who are relatively poor but no longer absolutely poor has come hand-in-hand with the developing world's success against absolute poverty. Economic growth has generally come with a lower absolute poverty rate but over time it has also meant that many developing countries have moved into the region in which relative considerations become more important. The relative measure of poverty is naturally less responsive to economic growth, and puts a higher relative weight on inequality.

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