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Reinventing the Kuznets Curve: Propoor Growth

Dissatisfaction with the fruits of economic growth—most likely based on a misinterpretation of data on growth and poverty reduction and on the use of problematic consumption purchasing power parity 1993 exchange rates—led the international research community to look for alternatives to ''traditional'' growth-based models of development. The study of growth was not junked, however; it became a search for models of development in which growth was propoor.

But what is ''propoor growth''? How does one measure it? How is it different from stating that propoor growth is that which results in an increase in equality and that antipoor growth is that which results in an increase in inequality?

In a fundamental sense, the result that all the growth reflected in GDP had not been reflected in an adequate decline in absolute poverty ratios brought back fears of the debate that had raged in the 1970s. At that time, Fishlow (1972) had suggested that the growth in Brazil had really not trickled down to the poor, that the growth had been of the inequality-enhancing type, and that the gains of growth had been frittered away in increases in inequality. In short, the growth had not been propoor. It was an example of growth without poverty reduction, not unlike similar claims today. The reality was confirmed to be otherwise (see Pfeffermann and Webb 1983).

But the concern with growth being irrelevant for poverty reduction is (thankfully) not the concern today. Precious few economists, and even fewer politicians, are arguing that countries should not pursue growth. But all are arguing for a growth process that enhances poverty reduction.

Mathematically, the only manner in which, ceteris paribus, a given amount of growth will lead to a larger than expected reduction in poverty is if inequality declines. This is no different from stating that ''growth with equity'' or the Kuznets curve is invalid. It very well might be, but it should be recognized that today's ''propoor'' growth is identical to both yesterday's ''growth with equity'' and the day before yesterday's debate on whether the Kuznets curve exists.

It cannot be argued that the Kuznets curve prediction will be true, and that there can be ''propoor'' growth. Nor can it be simultaneously argued that country inequality has not changed or that ''growth is good for the poor'' (Deininger and Squire 1996; Roemer and Gugerty 1997; Timmer 1997; Gallup, Radelet, and Warner 1998; Dollar and Kraay 2000) or that there is need for propoor growth or a better ''quality'' of growth. Propoor growth is growth that lowers inequality. So why the change to a new nomenclature?

There is a further important problem with the concept of propoor growth. What if it is the case that higher growth for poor people can only be obtained if inequality increases? This is not just a theoretical possibility, and the growth consequences of inequality have been explored by many, with inconclusive results. There is the further correct and somewhat intractable problem of simultaneity—does high growth lead to worsening inequality, or does low inequality lead to high growth? Or is it the other way around? Ultimately, concern is (or should be) with poor people's incomes, and whether such an increase comes about through increasing inequality should not be a concern of those who are concerned about improving the lives of poor people.

Ignoring the general equilibrium considerations, the isolated question can still be asked: Given a certain average level of growth, did poor people share equally in the fruits of growth? But if this is the goal, then it is much more involved to answer the question ''How much poverty reduction is consistent with a given amount of growth?'' than to answer the question ''Did inequality change?'' As it turns out, the answer to the first question involves the correct interpretation of several statistical questions (the shape of the distribution, and particularly its shape around the point where the poverty line is positioned), whereas the answer to the second question is a straightforward documentation of what happened to different quintile shares.

The problems with employing the involved ''propoor'' growth calculations can be illustrated as follows. Assume that one had perfect data on growth and poverty reduction for all the countries in the world. For country A, it is observed that there is a 10 percent growth in income, and a 10 percent reduction in the head count ratio (HCR). For another country, B, identical in all respects (except inequality), it is observed that a 10 percent income growth leads to only an 8 percent reduction in poverty.

Is growth in country B not propoor? No. It is likely that if the poverty lines were the same, then the difference arose because of initial conditions; that is, country B was more unequal *around the poverty line*. In which case, the growth process is not flawed, nor antipoor; rather, the initial conditions were disadvantageous.

Now assume a different, let us say higher, poverty line, and exactly the same ''reality.'' In this instance, it might well be that country B shows a poverty reduction of 10 percent and country A one of 8 percent. Now what should one conclude about the growth process? Again, nothing, except to note that the extent of poverty reduction expected with a given amount of growth is a function of the distribution of income *around the poverty line.* In other words, inequality per se may not have much to do with the relationship between growth and poverty reduction.

Apart from correctly identifying and estimating propoor growth, this chapter also suggests using a straightforward procedure (and one not used to date) for estimating whether growth during any time period was propoor or not.[1] This procedure identifies a fixed *proportion* of poor people at a point in time within each country for any given poverty line.

This proportion obviously varies for different countries; for example, according to the $1.50 poverty line, the poverty rate was 45 percent in Indonesia in 1980, 36 percent in India, and 82 percent in China. If growth was neutral, then the bottom 36 percent of Indians should show approximately the same growth as the top 64 percent of Indians. Analogously, the top 55 percent of Indonesians should experience the same growth as the bottom 45 percent for growth in Indonesia to be neutral. Propoor growth is identified as such when the growth in incomes of poor people exceeds the growth in incomes of nonpoor people.

It was not possible to conduct this simple test by earlier researchers because intertemporal data for consumption percentiles were not available. The simple accounting procedure method makes available such data, and allows for this simple test to be conducted.

The Search for Propoor Growth

By definition, there are only two sources of change in the HCR of poor people—either through growth or through a change in the distribution of consumption. It is realized that positive propoor income distribution changes are difficult to bring about, politically and/or through economic processes. So economic growth is the only method, and to increase the

1. Again, this simple calculation does not, and cannot, answer the mutatis mutandis question of what would have happened to aggregate (and poor) growth due to the simultaneous relationship between inequality change and growth.

''bang for the buck'' of growth, it is important for it to be of the propoor variety.

The identification, and advocacy, of propoor growth has itself become a growth industry, and several articles oriented toward the notion of propoor growth have been published.[2] It would not be an exaggeration to state that much like the expansion of research into the area of poverty in the 1970s, this is a parallel movement—a second coming of sorts. The first coming—in the mid-1970s—involved a research and policy enterprise aimed at determining who poor people were, how many of them there were, and what policy initiatives were needed to reduce poverty.

The second enterprise,[3] since the mid-1990s, states five premises. First, though growth is necessary for poverty reduction, it is nowhere close to sufficient. Second, the reason poverty has been stagnant is not that there has not been any growth, but that the growth has been distinctly of the prorich variety. Third, this prorich growth pattern has exacerbated inequalities, and this pattern needs to be corrected through income distribution policies. Fourth, it is realized that bringing about income redistribution may be politically difficult. Fifth, hence, there is an intensified search (and research) for policies that will provide ''better quality'' growth[4] that is manifestly propoor.[5]

Moreover, most of this research homes in on the tautology that countries with more equal distribution of income allow poor people to obtain a larger share of any given amount of growth. Hence, propoor growth means growth that is accompanied by a redistribution of income. ''Faced with this picture of global poverty and inequality, . . . attaining the international development goals will require actions to spur economic growth and reduce income inequality'' (World Bank, *World Development Report 2000/2001: Attacking Poverty*, 6).

The Growth-Poverty Connection

The key to understanding whether the growth process is operating in a neutral manner is whether poor people participate evenly in the growth

2. See World Bank, *World Development Report 1990: Poverty and Development* and *World Development Report 2000/2001: Attacking Poverty*; Ravallion and Datt (1991); Ravallion and Lipton (1993); Kakwani (1997); Warr (2000); and the scores of references in these documents.

3. Most of these articles are motivated by the (erroneous) finding of ''growth, growth everywhere, and not a drop in poverty.''

4. An excellent exposition of this view is contained in Thomas (2000).

5. One indication of this trend is provided by the proliferation of articles that contain ''propoor growth'' in the title. The pattern of research in this area is almost identical to the previous pattern of research on the caloric determinants of poverty in the early 1980s. It is similarly, conceptually and empirically, flawed.

process; and ''evenly'' is defined as the elasticity of the incomes of poor people with respect to average growth. If poverty is now defined not by the level of poor people's incomes but rather by the *proportion* of population with incomes below a specific level P (the poverty line), the answer becomes more complex, not least because there is now a nonlinear cumulative distribution function relating the proportion of population that is poor, HCR, to the income (Y) involved. HCR now is censored above at 100 and below at 0; that is, it ranges between no poor people (HCR = 0 percent) to the entire population being poor (HCR = 100 percent).

With HCR as the variable in question, how can one determine if the growth process has been even or neutral (''equivalent'' to an elasticity equal to 1 in the incomes-of-poor-people model), propoor (equivalent to an elasticity greater than 1), or prorich (equivalent to an elasticity of less than 1)? Because we are talking about income poverty, the relationship should be ''exhaustive''; that is, the entire growth in income should be accounted for. By definition, changes in HCR are equal to the sum of changes caused by rising incomes—holding the distribution of income, $I = F(Y)$, constant—and the changes caused by the changing distribution of income, holding the level of income constant. In terms of first differences in logs, one obtains

$$d \log HCR = a^{*} d \log y + b^{*} d \log I \tag{10.1}$$

where, by definition, $(a + b) = 1$.[6]

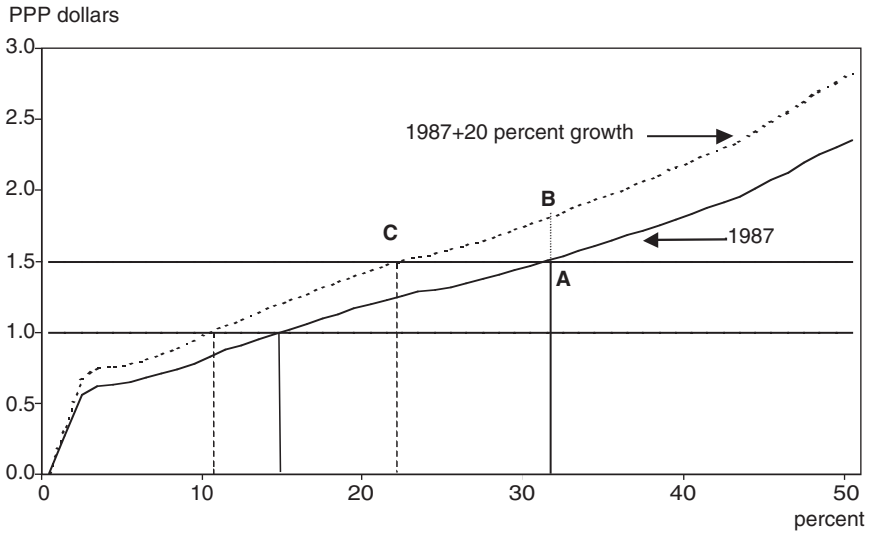
This equation has been estimated by several researchers, and though intuitive, it yields the wrong answers. It is argued, incorrectly, that the ratio of a to $(a + b)$ is indicative of whether the nature of growth is propoor. This is elaborated on below.

Propoor Elasticity

The problem is caused by the fact that both coefficients a and b in the above equation are a *function* of poverty line P. The problems this can cause for estimation are explained in heuristic terms as follows. Assume the maximum income of poor people in a society is \$0.50 per capita per day, and P is double this amount, \$1. Now if all incomes go up by 10 percent, there will obviously be no decline in HCR from 100 percent; the maximum income goes up to \$0.55, still far below P. So the elasticity of HCR with respect to income growth (a in equation 10.1) is zero.

6. Ravallion and Datt introduce an error here; they suggest that there is a third ''residual'' term in equation 10.1, when conceptually there is not one. Kakwani (1997) correctly argues that there is no residual. The problem with both interpretations is that they are defining the left-hand side in log first-difference terms, rather than arithmetic first-difference terms; see below.

Figure 10.1 World cumulative distribution of per capita consumption, 1987 (1993 PPP dollars)



PPP = purchasing power parity

Note: The solid line indicates the actual cumulative distribution for world consumption in 1987; the dotted line indicates what the distribution would have been with an additional 20 percent of consumption growth at each percentile level.

Using a $1.50-a-day poverty line, we find that this additional consumption growth would have caused a decline in poverty from point A to point C, or about 10 percent. A $1-a-day line suggests a smaller decline.

Sources: Deininger and Squire (1996); World Income Inequality Database, available at http://www.wider.unu.edu/wiid; Asian Development Bank (2002).

Now assume that the mean (not maximum) income of poor people is $0.50, and that the standard deviation of their incomes is 0.1. Again, a 10 percent increase in income will not make any dent in HCR (i.e., the elasticity is zero). Now assume that *all* poor people have an income equal to $0.99. A 1.1 percent increase in income will now mean that HCR will move from 100 percent to 0 percent in one fell swoop—close to an infinite elasticity, or a equal to infinity.

These are unrealistic, but informative, examples. What they all point to is the importance of incorporating into the calculations the knowledge of where the mean income of poor people, and the nature of its distribution, is with respect to the poverty line, P. This is a nonlinear affair, which perhaps is one reason analysts have not attempted to compute it.

Figure 10.1 shows the cumulative distribution for the developing world for 1987, as well as the same distribution ''shocked'' with a 20 percent across-the-board increase. An increase in income of 20 percent will involve a movement from point A to point B; the difference in the head count

ratios is given by the movement from A to C. *The calculation of how much poverty reduction is expected is dependent on the amount of growth, the poverty line, and where the poverty line is at the point of impact or the point of departure*. These are not simple calculations, and they definitely do not yield anything even approximating the model that has traditionally been estimated. The propoor mathematics below illustrate this.

Propoor Mathematics

Mathematically, the above relationship between growth and poverty reduction can be shown as follows. HCR (or H) can be expressed as

$$H = F(P) \tag{10.2}$$

where $F(P)$ is the distribution function evaluated at the poverty line P. Differentiating with respect to P, one obtains

$$dH = f(P)\, dP \tag{10.3}$$

where $f(P)$ is the first derivative of $F(P)$ or the density at point P. Multiplying the numerator and denominator by P, one obtains

$$dH = P^{*}f(P)^{*}(dP/P) \tag{10.4}$$

where dH is the change in HCR in percentage points, not percent, when *incomes at the poverty line* change by (dP/P).

Equation 10.4 relates the arithmetic change in HCR and suggests that it is a nonlinear function of the log change in the poverty line, P, or equivalently, in the log (change) in the incomes of the poor at the poverty line. These changes are computed at the poverty line, and because incomes change, the magnitude of $P^{*}f(P)$ will change with growth and/or the poverty line.

Equation 10.4 is *not* the equation estimated by the authors of the propoor literature (e.g., Kakwani, Ravallion, and Datt). These authors estimate equation 10.1. That equation has log change of HCR on the left-hand side. Converting equation 10.4 to the same dependent variable as equation 10.1, one obtains

$$(dH/H) = (P/H)^{*}f(P)^{*}(dP/P) \tag{10.5}$$

Now the dependent variable in equation 10.4 matches with that in the ''original'' propoor model, but the rest of the equation does not. Note that there is no separate inequality term on the right-hand side in equation 10.5, which is theoretically derived. Equation 10.1 is an artificial, reduced-form equation, one that must hold in an identity sense, but one that does not follow from any theoretical model. The separate effects of income change and inequality change *cannot* be isolated by equation 10.5.

What equation 10.5 (and equation 10.4) yields is the expected change in poverty given a certain amount of growth *around the poverty line*. Whether growth is propoor or not is yielded in an ex-post fashion; that is, if the actual reduction in poverty was greater than the expected reduction, growth was propoor; if less, it was antipoor.

Rewriting equation 10.4,

$$dH = \gamma^* dY/Y \tag{10.6}$$

where γ is a function of the income distribution and the poverty line P in the *previous* (lagged) time period, $(t - 1)$, and dY/Y is the mean growth in incomes from $(t - 1)$ to time period t, around P. If income distribution does not change, then a given change in income—''adjusted'' or ''filtered'' by γ, also called the ''shape of the distribution elasticity'' (SDE)—will lead to an identical change in HCR. If this elasticity is low (e.g., 0.3), then a 10 percent growth in incomes will only lead to a 3 percent reduction in HCR, provided that the distribution stays constant.

It does not matter how equal the distribution is at an initial point for the predicted decline in poverty to be larger, or smaller. Sometimes, the interaction between a highly unequal distribution and a given poverty line can yield a high γ; sometimes, the interaction between a highly equal distribution and the poverty line can yield a low γ. It is the level of γ that translates a given amount of growth into an ''expected'' poverty reduction.

If interest is in whether growth was propoor or not, it can either be observed by noting the change in inequality (e.g., quintile shares), or by noting whether the actual decline in poverty was greater than the expected decline. Terming the propoor elasticity as the trickle-down elasticity (TDE), it is derived as the ratio between the actual and the ''predicted'' reduction in poverty, where the predicted reduction is based on no change in inequality; that is,

$$TDE = dH/dH^* = dH/[P^* f(P)^* dP/P] \tag{10.7}$$

If the absolute value of TDE is greater than 1, this indicates that the decline in poverty was greater than expected; that is, growth was propoor. If the absolute value of the ratio is less than 1, growth was antipoor.

Empirical Estimates of Propoor Growth

The wrong model (equation 10.1) has been estimated by several researchers to derive the propoor elasticity. The most prevalent result is that this elasticity varies from 1.5 to 3, with the mode around 2.[7]

7. See Collier and Dollar (2000), Kakwani (1997), Kakwani and Pernia (2000), Ravallion and Datt (1999), and Martin Ravallion, ''What Is Needed for a More Pro-Poor Growth Process,'' *Economic and Political Weekly*, March 25, 2000, 1089-93.

What meaning one should attach to this estimated elasticity is not clear, however. The model states that for each 10 percent increase in incomes, HCR is expected to decline by 20 percent (an elasticity of 2). This may seem large, and indicative of the growth process being massively propoor. But, of course, the elasticity, whatever its magnitude, is silent on the important question of whether the growth process is propoor. Left unanswered is the question of by how much *should* HCR have declined if the growth was neutral (i.e., unaccompanied by any change in inequality).

The dependent variable is a percentage change in a ratio. If the initial value of HCR was 30, then a decline of 20 percent is equivalent to a decrease of only *6 percentage points.* Thus, a 10 percent increase in incomes in this example will lead to a 6-percentage-point reduction in poverty. But what should have happened? A reduction of 8 percent, or 10 percent, or perhaps 4 percent? We do not know, unless we know the value of γ. If γ equals 0.5, a 10 percent increase in incomes is expected to (consistent with neutral growth) lead to a 5-percentage-point reduction; if γ equals 1, the expected reduction (consistent with neutral growth) will be 10 percentage points.

In the above correct formulation (equation 10.6), the expected reduction in poverty is equal to the change in *adjusted income* (γ multiplied by income change). The value of γ varies with where the poverty line is with respect to the distribution. If income distribution stays the same, and incomes increase (e.g., in India, during the past 20 years) γ can decline, increase, or stay the same, even with the same poverty line! On average (and this is a more circumspect average than most), a given amount of neutral growth is consistent with half that amount in reduced poverty; for example, 10 percent neutral growth is typically associated with a decline in HCR of only 5 percentage points.

Because the discussion is exclusively about income (consumption) poverty, then, ceteris paribus, every adjusted income change *has* to translate into an equivalent amount of poverty change. If the coefficient deviates from unity, then this deviation represents the effect of changes in income distribution. This model, therefore, is the appropriate vehicle for examining not only whether income distributional changes are important, but also their magnitude (deviation from unity). Again, we are back at the Kuznets question, but with quite a few pyrotechnics.

Estimating Propoor Elasticity

Although it is conceptually simple, estimating equation 10.6 is not an easy task. It involves estimating the density function around the poverty line, and that for each survey year and each poverty line. What can be done, and the approach used here, is that the coefficient γ is estimated for *each* distribution for each year and for each of the different poverty

Table 10.1 Shape of the distribution elasticity (SDE)**, 1960-2000**

	Poverty line		
Measure	**$1.08**	**$1.50**	**$2.00**
Mean	**0.46**	**0.50**	**0.50**
Standard deviation	0.20	0.21	0.20
10th percentile	0.21	0.22	0.24
90th percentile	0.74	0.79	0.76

Note: The expected change in poverty, for small changes in mean incomes at the poverty line, is equal to the product of income change and the SDE, keeping the income distribution fixed. For example, using a $1.50-a-day poverty line, a 10 percent increase in income will, on average, be associated with a 5 percent decline in poverty, given an SDE of 0.50. Figures are derived from consumption and income distributions, 1960-2000.

Sources: Deininger and Squire (1996); World Income Inequality Database, available at http://www.wider.unu.edu/wiid; Asian Development Bank (2002).

lines used. The estimation is done by ''shocking'' the distribution by plus and minus 2.5 percent (for a total of 5 percent) for the distribution *at the particular poverty line* and by calculating the resulting change in HCR. This change, divided by 5, is an estimate of the arc elasticity, γ.[8]

The correct model of estimation, therefore, has change in HCR on the left-hand side, and the product of the *lagged* shape of the distribution effect (γ or SDE) and income growth on the right-hand side. The latter (product of lagged SDE and growth) is the ''correct measure'' of income growth in equations involving the change in HCR and income growth. In the traditional model, the difference in HCR is regressed only on growth.[9]

Table 10.1 reports on the estimated SDE coefficients for three different poverty lines—$1.08, $1.50, and $2, all in purchasing power parity 1993 prices. They all show a consistent pattern—the means are clustered around 0.5, and the 10th and 90th percentiles are about 0.25 and 0.75, respectively.

This robustness leads to the following two conclusions. First, a given amount of consumption growth, ceteris paribus, and no distribution change, will lead to a change of only about half that amount in HCR. Thus, the statement should not be that a 20 percent growth in consumption led to a decline of ''only'' 10 percentage points in HCR. If this happens, growth has certainly been neutral if not propoor. Second, this result holds at an average level, and is highly nonlinear, and judgments about whether

8. Deaton and Tarozzi (1999) present estimates of ''gamma'', γ, for state-level consumption distributions in India for the period 1993-94. In the literature, they are the only ones to present this elasticity. They do not translate this computation into a relationship between growth and poverty decline, and/or say whether the growth was neutral, propoor, etc.

9. This is the important difference, and nonequivalence, between the income coefficient of the traditionally estimated model and the new formulation. To reiterate, the model estimated by Kakwani, Ravallion, et al. simply has the growth term on the right-hand side; the correctly specified model has the growth term multiplied by the highly nonlinear coefficient gamma.

particular growth episodes have been propoor or antipoor must be filtered by knowledge of what the shape of the distribution function was for that time period.

Has Global Growth Been Propoor?

The correct propoor or not-propoor growth model (equation 10.6) can now be estimated for the developing world, and different countries, for any time period after 1950. Table 10.2 reports both the traditional model and the new model where consumption growth is filtered by the lagged shape of the distribution elasticity. The model is estimated for three sets of data: the developing world for 1950-2000, states of India for 1983-99, and all of India for 1950-2000. The rural and urban areas of each state in India are considered as separate economies. The reason results for the Indian data are reported is because a considerable amount of the propoor ''theory development'' has been caused by the (mis)interpretation of the Indian experience; that is, India's economy showed considerable economic growth and no change in poverty rates between 1987 and 1998.[10]

The dependent variable in the estimated models can either be the first difference in HCR (the preferred model) or the log percentage change in HCR (the coefficients in this model are not easy to interpret). The correct independent variable is ''predicted poverty reduction'' or '''effective growth,'' which is the observed growth in consumption multiplied by the *lagged* value of γ, the shape of distribution elasticity. The ''traditional'' method of estimating such a regression is to regress the percentage change in poverty (HCR) on the percentage change in consumption growth—that is, the specification of both the dependent and independent variables is different!

There are thus four possible regressions, and results for all four are presented. During the past 16 years, consumption growth has been neutral in India; the trickle-down elasticity is equal to -0.97, with a standard error of .07. Note that this elasticity, according to the incorrect model, is only -0.57, with a standard error of .13—that is, it incorrectly appears that income distribution changes became more unequal in India and indeed thus negated more than a quarter of the growth effect! The data for the states of India reveal a similar story, though the average trickle-down elasticity is now -0.85, not significantly different from unity.

Data for the developing world suggest an elasticity whose magnitude is considerably greater, -1.2 to -1.3, for the four poverty lines considered. In no instance, however, is the elasticity significantly different from

10. The vagaries of survey data are best illustrated by the Government of India's estimate of poverty in India at 42 percent in 1998 and 26 percent 12 months later in 1999! No one in the government is arguing that all that poverty reduction took place in 1 year.

Table 10.2 Estimates of the growth model, India and the developing world, 1950-2000

Poverty line (1993 purchasing power parity dollars per day)		Dependent variable: Arithmetic difference in head count ratio[b]		Dependent variable: Log change in head count ratio[b]	
		Correct model	Incorrect model	Correct model	Incorrect model
Developing world[a] (survey data, 1950-2000)					
1.08	Coefficient	−1.28	−0.76	−5.01	−3.16
	Standard error	0.22	0.06	0.96	0.50
	Number of countries	40.00	41.00	39.00	39.00
1.30	Coefficient	−1.21	−0.81	−3.38	−2.38
	Standard error	0.20	0.06	0.79	0.41
	Number of countries	46.00	48.00	46.00	46.00
1.50	Coefficient	−1.27	−0.50	−3.30	−2.42
	Standard error	0.23	0.24	1.13	0.56
	Number of countries	49.00	51.00	49.00	49.00
2.00	Coefficient	−1.28	−0.50	−3.56	−2.30
	Standard error	0.20	0.16	1.22	0.75
	Number of countries	55.00	55.00	54.00	54.00
States of India (survey data, 1983-99)					
	Coefficient	−0.85	−0.57	−3.39	−2.53
	Standard error	0.22	0.13	0.81	0.51
	Number of states	51.00	51.00	51.00	51.00
All of India (survey data, 1950-2000)					
	Coefficient	−0.97	−0.75	−2.53	−1.96
	Standard error	0.07	0.05	0.23	0.17

a. The developing world is defined to exclude the industrialized world and Eastern Europe.

b. The specification of the correct model involves the product of lagged gamma (the shape of the distribution elasticity) and consumption growth; the traditional, and incorrect, model simply has consumption growth, unfiltered by gamma, on the right-hand scale.

Note: See the text and Bhalla (2000a) for further details.

Sources: Indian National Sample Survey Consumption Expenditure Surveys for 1983-84, 1987-88, 1993-94, and 1999-2000.

unity. For all the four poverty lines, the incorrect specification (relating reduction in poverty to just the consumption growth—(i.e., growth not filtered by γ) is estimated at less than half that obtained by the correct model, and always significantly less than unity. It is this misspecification result that has possibly led to the popular conclusion that growth during the golden age of development (1980-2000) was not propoor.

The results for the incorrect and correct specification of the log-log model (log poverty change versus log change in income change or income change adjusted) also underline the importance of γ. As modeled by others, the incorrect elasticity is observed to be near 2—actually about 2.3, with the lowest poverty line yielding this elasticity to be 3.2. In each instance, however, the correct specification yields an elasticity that is significantly higher, and higher by about 50 percent—centered on 3.4, and equal to 5 for the $1.08 poverty line.

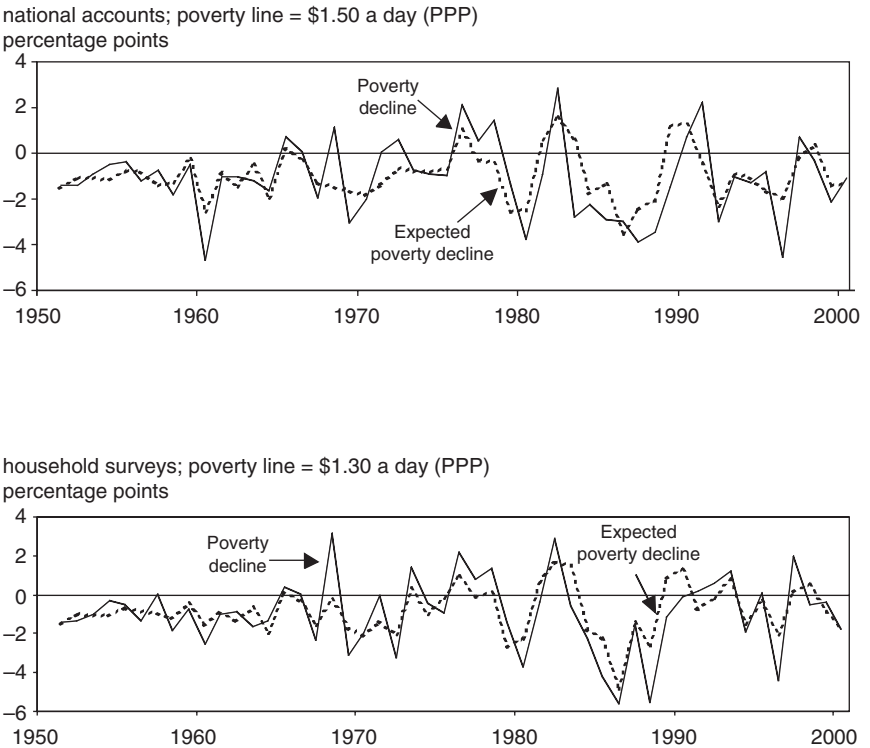
Figure 10.2 models actual and predicted poverty reduction for the developing world according to the $1.50 poverty line (national accounts) and the $1.30 poverty line (survey data). The fit in both cases is very good. All the results point to the crucial importance of incorporating the shape of the distribution elasticity into the estimation; all models suggest that the entire amount of poverty reduction that has been observed can be accounted for by growth. Indeed, for developing countries as a class, the estimated reduction in poverty has always been observed to be propoor, and by a 25 percent plus margin, though the excess margin is not significantly different from zero.

Using Consistent Data

The disillusionment with the processes of growth was in large part an unintended outcome of a revolution, a changed paradigm, in the measurement of poverty, a paradigm that carried no less a signature than that of the World Bank. A large part of this disillusionment is an illusion. The consistent use of national accounts data, with a 39 percent ''higher'' poverty line ($1.50 vs. $1.08), was shown to still result in considerably lower poverty than that indicated by World Bank estimates based on the consistent use of survey data. This removes the first source of illusion. The second source is the tendency to mix survey data on poverty with national accounts data on income.

This unwarranted mix is *the* source of popular disillusionment. The mixed-up observation (a large increase in consumption and little reduction, perhaps even an increase, in poverty) was shown above to be due to the mix-up of using Peter's poverty (from survey data) and Paul's income (from national accounts data). What is the relationship between growth and poverty reduction if a correct pairwise analysis is done with

Figure 10.2 Growth is sufficient: Actual and predicted poverty reduction in the developing world, 1950-2000



PPP = purchasing power parity

Note: The figures for expected poverty decline reflect both income growth and the shape of distribution elasticity; see table 10.1. The developing world is defined as the world, excluding the industrialized world and Eastern Europe.

Sources: Deininger and Squire (1996); World Income Inequality Database, available at www.wider.unu.edu/wiid; Asian Development Bank (2002); World Bank, *World Development Indicators*, CD-ROM.

survey data (i.e., both consumption and growth in consumption from surveys)?

Table 10.3 conducts this exercise for two large sets of data. The first is based on data for the 15 major states in India (the same data as were used for table 10.2). These data yield several spell pairs (i.e., the change in expenditure and the change in HCR). Similar kinds of spells are constructed using country data for the years after 1960, but most of the data are for the past two decades.

Table 10.3 Relationship between growth and poverty reduction: Evidence from India and international sources (percent)

Source	Neutral growth[a]		Propoor growth[b]	Prorich growth[c]	Total number of spells[d]
Developing countries (survey data, poverty line = $1.30)					
1960-80	27.4	64.4	1.4	6.9	73
1980-2000	36.0	50.0	5.0	8.0	222
Indian states (survey data)					
1983-99	30.9	49.7	10.7	8.7	383

a. Neutral growth is defined as an event where positive growth is accompanied with poverty reduction, or negative growth with an increase in poverty.

b. The clearest evidence of propoor growth is a spell when poverty declines in spite of negative growth.

c. Prorich growth is when growth is accompanied by an increase in poverty.

d. A "spell" is defined as any pair of survey observations in different years. For example, two surveys, in 1983 and 1987, would constitute one spell; three surveys—in 1983, 1987, and 1993—would be defined as two spells. A single observation, e.g., a one-off survey in 2000 with no preceding surveys, would not constitute a spell. The total number of spells, in India's case 383, is the sum of all state-level spells.

Sources: Deininger and Squire (1996); World Income Inequality Database, available at http://www.wider.unu.edu/wiid; Asian Development Bank (2002); World Bank, *World Development Indicators*, CD-ROM; Indian National Sample Survey Consumer Expenditure Surveys: 1983-84, 1987-88, 1993-94, 1999-2000.

Four sets of results are possible. The first two relate to neutral growth—growth and poverty reduction are negatively related (e.g., poverty goes up with decline in average consumption levels, and goes down with increase in per capita consumption). The third is propoor growth—poverty goes down with a decline in average consumption levels. The fourth is prorich growth—poverty goes up even though average consumption levels have gone up. Note that if growth and poverty were loosely related, one would expect almost 25 percent in each cell.

The reality is that growth and poverty are strongly related. In the case of the Indian state data, for close to 80 percent of the cases, the "traditional" result occurs—that is, when growth occurred, HCR went down; when consumption declined (negative growth), HCR went up. The bad result—prorich growth—is observed for only 9 percent of the cases for the past 20-plus years, and these bad cases are more than evenly matched by the super-good result of propoor growth (negative growth and poverty reduction).

For the developing-world data, there is an even stronger indication of propoor growth. Close to 90 percent of the cases have been neutral—that

is, there is a one-to-one relationship between growth and the incomes of poor people. Again, the cases of propoor growth are balanced by cases of prorich growth, and both have a very small magnitude.

Is the Initial Income Distribution Important?

It turns out that the case for a more equal distribution of income as a poverty reduction device is vastly overstated. As was observed above, intracountry distributions do not change that much, with Eastern Europe having been a significant exception. But it also went through a larger structural change. So for a country to move from an unequal to a substantially more equal distribution is close to an impossibility, especially given all the confirmation that was observed on the Kuznets curve.

Flaws in model specification have prevented the conclusion from emerging that growth has been sufficient to reduce poverty, and that, on balance, it has been neither prorich or propoor.

But does not inequality affect the value of SDE, and therefore affect the impact of growth on poverty reduction? It does, but the impact effect is very small. A separate regression of SDE on the (log) consumption share of the bottom 20 percent, using survey data, with a poverty line equal to $1.30 and observed poverty of at least 5 percent (to get a relationship not at the extremes), yields:

$$SDE = -.07 + 0.31*\log(\text{consumption share of first quintile})$$
$$\qquad\quad (.09) \quad (.061)$$

Number of observations = 184; R^2 = .41; robust standard errors

Inequality does have a significant effect; the higher the share of the bottom 20 percent, the higher the impact on the poor. The estimated coefficient suggests that each 10 percent increase in the share of the bottom 20 percent leads to an approximately 3.1 percent increase in SDE. This magnitude is small, as is illustrated by the following example. Assume that there is a 10 percent increase in consumption and no change in distribution. If SDE is assumed to be 0.5 (see table 10.1), the expected decline in poverty is 5 percentage points.

Now assume that the distribution of income improves by 10 percent, a large change (e.g., the share of the bottom 20 percent goes up from 7 to 7.7 percent). In this scenario, SDE will not be 0.5 but 3 percent higher, or 0.515. The resulting change in poverty would be a reduction of 5.15 rather than the 5 percent observed with a flat distribution. If income distribution worsens by 20 percent (a very large change), this will reduce SDE by 6 percent, from 0.5 to 0.47. Thus, a 10 percent income change will now result in a decline of HCR of 4.7 percent instead of the 5 percent expected in the no-income-distribution change.

These results put a big question mark on the conclusion that a redistribution of income is necessary to help poor people. If the correct growth elasticity is twice as large as is commonly estimated, and if it has helped to reduce poverty as much as could be ''expected,'' then clearly the need for explicit redistribution policies is not there. Further, income distribution has not been an inhibiting factor, contrary to this assertion by the World Bank: ''The sensitivity of poverty to growth depends a great deal on initial inequality in poor people's access to opportunities to share in this growth'' (*World Development Report 2000/2001*, 55)—and its echo from Stewart: ''The sensitivity of poverty to growth depends on a country's income distribution'' (2000, 3).

What remains is the tautological conclusion that a more even distribution of income is better for poor people. This is true, of course—but the magnitude ''depends.'' It is correct to assert this conclusion with the ceteris paribus condition. If all other things are not equal (as is invariably the case), it can very well be observed that an economy that is more equal observes a lower SDE with respect to a particular poverty line. And even if a higher SDE is present, the difference between this higher SDE and, for the same mean level of income, a distribution with a lower SDE—well, the differences are just not large.

A corollary of these results is that all the hyperbole about the importance of income inequality in affecting the change in poverty is just that—hype. In a section titled ''Why are similar rates of growth associated with different rates of poverty reduction?'' *World Development Report 2000/2001* argues that

> the general relationship between economic growth and poverty reduction is clear. But there are also significant differences across countries and over time in how much poverty reduction occurs at a given rate of economic growth . . . there can be large variation in poverty reduction for the same growth rate in per capita consumption. . . . What explains these large differences? For a given rate of growth, the extent of poverty reduction depends on how the distribution of income changes with growth and on initial inequalities in income, assets, and access to opportunities that allow poor people to share in growth. (p. 52)

This argument is also echoed by the International Monetary Fund:

> Some analysts have raised concerns that the positive link between growth and poverty reduction, evidenced in the past, may have weakened in the 1990s. Critics contend that, although the reforms in the early 1990s raised economic growth markedly, benefits in terms of poverty reduction were relatively muted. (*World Economic Outlook*, November 2001, 35)

A Simple Method for Estimating Propoor Growth

The availability of simple accounting procedure data for mean expenditures for different percentiles over various years allows a simple test of

the hypothesis of propoor growth. This method does not involve any pyrotechnics about the availability of SDE or the position of the poverty line, or about changes in inequality. The method follows definitions; each country is divided into two groups, poor and nonpoor people. By keeping the proportion poor, and proportion nonpoor, fixed to a level at a particular time (e.g., 1980) the growth of the mean expenditures of the poor group are compared with the mean expenditures of the nonpoor group. If the ratio is greater than 1, then the process can be deemed propoor; if it is less than 1, the process can be deemed antipoor.

Table 10.4 computes this elasticity for different regions of the world.[11] Taking the developing world as one group, it is observed that the growth process during the past 20 years of globalization has been highly propoor; the elasticity is considerably greater than 1 and equal to 1.8; that is, poor people increased their consumption at almost twice the rate experienced by nonpoor people. For the world, the elasticity is a very high level of 2.3—i.e., for every 10 percent rise in consumption by the nonpoor, the consumption by the poor increased by 23 percent. This is the ''purest'' test of whether growth was propoor or not—observe how the incomes of poor people have fared with respect to nonpoor people. The results unambiguously suggest that the globalization period favored the world's poor.

Forecast of Poverty in 2015

Collier and Dollar (2000) undertook an exercise to measure the efficacy of foreign aid and forecast poverty in 2015. They reached the following, possibly wrong conclusion: ''Poverty in the developing world will decline by about one-half by 2015 if current growth trends and policies persist'' (p. 1). Apart from the fact that different answers are obtained for a point in time depending on whether surveys or national accounts data are used, the ''true elasticity'' of poverty reduction with respect to economic growth is also more than twice as high as the one they assume (table 10.2). Thus, given their assumptions of growth and so on, their target for poverty reduction will be reached twice as soon!

Table 10.5 contains forecasts for population and per capita consumption growth (these forecasts match and are somewhat lower than those contained in the latest IMF *World Economic Outlook*). The distribution of consumption is assumed to be constant, under the assumption that some worsening has already taken place in the past 20 years (it is likely that now the right

11. Two different elasticities are reported. The first is a simple ratio of the growth of consumption by the poor relative to the growth of consumption by the nonpoor, and the second is obtained via a log-log regression of the poor and nonpoor consumption. Unless otherwise specified, the latter elasticity is discussed in the text.

Table 10.4 Changes in income and consumption, 1980-2000

	Percent change in per capita levels						
	Income (NA)	**Consumption** (NA)	**Consumption** (survey)	**Consumption** (poor)	**Consumption** (nonpoor)	**Propoor elasticity 1**	**Propoor elasticity 2**
East Asia	204.5	182.6	180.8	238.4	160.1	1.49	1.17
South Asia	81.9	68.0	34.7	60.7	69.0	0.88	0.89
China and India	218.2	179.1	157.6	188.9	173.4	1.09	0.98
Sub-Saharan Africa	−17.6	−10.5	−17.8	−10.7	−10.5	1.02	0.77
MENA	−1.1	11.1	1.8	−23.0	11.2	−2.05	−2.70
Latin America	0	−1.5	−22.4	−13.6	−1.5	9.07	0.54
Developing world	51.4	45.4	25.2	103.3	38.8	2.66	1.82
Developing world excl. China and India	8.4	10.8	−6.3	10.8	10.8	1.00	0.64
Eastern Europe	−26.0	−14.0	−29.5				
Nonindustrialized world	31.9	33.1	18.8	101.1	27.0	3.74	2.37
World	23.5	26.8	17.5	97.8	24.1	4.06	2.29

NA = national accounts
MENA = Middle East and North Africa

Notes:

1. Columns 2 and 3 report the simple growth rate computed between the level of per capita income and consumption, PPP 1993 prices, for the two years 1980 and 2000. Column 4 reports an analogous computation for survey measured consumption between the two years.

2. Columns 5 and 6 report the consumption growth (NA data) of the fraction of poor and nonpoor observed in 1980. No such computation is reported for Eastern Europe since in this region, there were less than 2 percent poor in 1980.

3. Two elasticities of propoor growth are reported; the first is a simple ratio of columns 4 and 5; the second is obtained from a simple log-log regression between the consumption of the fraction of 1980 poor and nonpoor for the period 1980-2000.

Sources: World Bank, *World Development Indicators*, CD-ROMs, 1998, 2001; Maddison (2001); Penn World Tables, various years; Deininger and Squire (1996); World Income Inequality Database, available at http://www.wider.unu.edu/wiid; Asian Development Bank (2002); Milanovic and Yitzhaki (2001).

Table 10.5 Forecast of poverty ($2 poverty line), **2015**

Region	Population (millions)	Per capita consumption (1993 PPP dollars)	Head count ratio, 2000 (percent)	Annualized projected growth rate, 2000-15[a] (percent)	Average SDE, 2000-15	Implied poverty decline, 2000-15[b] (percentage points)	Head count ratio, 2015 (forecast) (percent)
East Asia	1,894	5.68	16.1	3.5	0.34	17.9	0.0
South Asia	1,355	3.78	21.1	2.5	0.47	17.6	3.5
Sub-Saharan Africa	661	2.89	66.8	1.5	0.50	11.3	55.6
Middle East and North Africa	374	7.84	14.0	1.5	0.25	5.6	8.4
Latin America	518	11.47	10.4	1.0	0.20	3.0	7.4
Eastern Europe	408	9.58	3.1	2.0	0.35	10.5	0.0
Developing world	**4,928**	**5.54**	**23.3**	**2.5**	**0.38**	**14.2**	**10.1**

PPP = purchasing power parity
SDE = shape of the distribution elasticity

a. Annualized projected growth rates closely match IMF forecasts that were published in IMF, *World Economic Outlook*, November 2001.

b. The implied poverty decline for 2000-15 is obtained from the product of annual growth and the average projected SDE for this period. For instance, a 2.5 percent annual income growth in South Asia translates, given an SDE of 0.47, to a 17.6-percentage-point reduction in poverty over 15 years.

Sources: Deininger and Squire (1996); World Income Inequality Database, available at www.wider.unu.edu/wiid; Asian Development Bank (2002); World Bank, *World Development Indicators*, CD-ROM.

leg of the Kuznets curve should come into operation—i.e., intracountry income distribution should improve between now and 2015—but this is not assumed for purposes of the forecast).

SDE is assumed to be that pertaining to the 10th percentile level in 2000. The poverty line chosen is $2 a day. The results: the HCR of world poverty in 2015 is likely to be only 10 percent—that is, substantially below the target set by the World Bank and other financial institutions, *and lower according to a poverty line that is almost twice (85 percent) as high as the poverty line in use today, $1.08 per capita per day.*

How accurate is the above forecast likely to be? In terms of the growth assumptions, our average of 2.5 percent a year is in line with experience during the past two decades and is substantially lower than the 3.6 percent average contained in the IMF forecast. Nor does it seem that the regional composition of the growth is ''out of line''; East Asia is assumed to grow at 3.5 percent a year, and South Asia at 2.5 percent; if anything, these forecasts are likely to be at the lower end of the eventual reality. By the laws of compounding, average consumption in East Asia is expected to be higher by 73 percent, and that in South Asia by 47 percent. As is well documented in the next chapter, a very reasonable assumption is that each 1 percent of growth translates into a *half-percentage-point* decline in HCR. So given initial levels of poverty in Asia around 20 percent, an increase in per capita consumption upwards of 30-40 percent should virtually eliminate $2 poverty in these regions by 2015.

One calculation that is consistent with the above result (the simple accounting procedure may not always be right but it is to be hoped is always consistent) is the following: Average consumption of the less than $2 Asian[12] poor in 2000 was $1.52. The consumption level of each of the first six percentiles was as follows: $0.72, $0.91, $1.02, $1.12, $1.21, and $1.27. The average growth rate assumed in the forecast for Asia is 3.1 percent a year, or a 58 percent increase during 15 years. This means that the 6th percentile would be consuming 1.27 multiplied by 1.58, equal to approximately $2 in 2015—and therefore become nonpoor. Thus this method predicts 5 percent poor in 2015—a level close to the 3 to 4 percent poverty forecast yielded by a different method described above.

But this calculation assumes that income distribution stays the same. There is room in the forecast for some deterioration to take place, and still have Asian poverty in the low to mid single digits. The only basis for rejecting the forecast of less than 5 percent poor people in Asia in 2015 is to reject the growth assumptions—and not too many economists, policymakers, or even left-wing intellectuals are prepared to do so at present.

12. Asia here includes the countries of South Asia, East Asia, and Central Asia.

Zero $2 poverty is likely in all parts of the world in 2015, except in sub-Saharan Africa. This region's share of the world's poor people is expected to rise from 36 percent today to almost 90 percent in 2015. This phenomenon, if it occurs, is likely to have deep social and political significance, and on that ground alone, it is to be hoped that it can be ruled out.

Policy is endogenous, and policymakers are likely to act to prevent this catastrophe from happening. Educational advances and a greater opening up are likely to ensure that the sub-Saharan African growth rate during the next 15 years is likely to be higher than the assumed 1.5 percent a year. If this growth is closer to a more realistic 2 percent, absolute poverty in sub-Saharan Africa, in 2015, is likely to be less than 40 percent. Not zero, but beginning to be more manageable.