When Method Matters: Monitoring Poverty in Bangladesh*

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I. Introduction

Debates about the methods of poverty measurement are common; views differ on how individual welfare should be measured, how poverty lines should be set, and what poverty measures should be used. Recent controversies over Bangladesh's progress in reducing poverty illustrate well some of the main issues. There have been a number of claims, based on household surveys, that poverty fell in the 1980s. However, questions have been raised about the comparability of those surveys, the methodologies used in analyzing the data, and their consistency with other poverty data such as real wages for unskilled labor.

This article reviews the methodological issues and provides new estimates of a range of poverty measures for urban and rural areas for the period 1983–92. Methodological choices in poverty measurement will depend on the purposes of measurement and the data available. Here we assume that the aim is to make consistent comparisons of absolute levels of consumption over time and space. We argue that some past methods that have been popular in Bangladesh (and elsewhere) are unlikely to do this well and can be improved on by using available data. While our main aim is to throw light on the methodological issues, we will also look into some implications for understanding the proximate causes of changes in poverty measures.

Past studies for Bangladesh are reviewed in Section II; we argue that some of the methods used are preferable to others. In Section III we give our own estimates and discuss their robustness and consistency with data on real wages. Section IV examines proximate causes of the changes in poverty measures observed over this period and implications for future progress in reducing poverty.

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II. Measurement Controversies

Bangladesh provides a good case study in the methodological issues of poverty measurement. We shall not attempt a complete review of past estimates for Bangladesh; rather, we focus on possible limitations of past methodologies, to the extent that they have bearing on the present study. The principal survey instrument for making poverty comparisons over time in Bangladesh is the Household Expenditure Survey (HES) conducted by the Bangladesh Bureau of Statistics. There have been five such surveys since 1980, in 1981/82, 1983/84, 1985/86, 1988/89, and 1991/92.

Past Estimates

Given the numerous choices of data and methods that go into poverty monitoring (as in almost all empirical research), it would be reassuring if different studies gave similar results. Table 1 shows five sets of estimates of the head-count index of poverty—the percentage of the population deemed to be below the poverty line—for various years in the 1980s. One of these is produced by the government of Bangladesh.[1]

TABLE 1

RECENT ESTIMATES OF THE HEAD-COUNT INDEX OF POVERTY FOR BANGLADESH IN THE 1980S

	ESTIMATED PERCENTAGE OF THE POPULATION BELOW THE POVERTY LINE				
	1. Rahman and Haque	2. Ahmed et al.	3. BBS	4. Hossain and Sen	5. Sen and Islam
Urban:					
1981/82	50.7	65.3	66.0	N.A.	48.4
1983/84	39.5	N.A.	66.0	N.A.	42.6
1985/86	29.1	66.8	56.0	N.A.	30.6
1988/89	N.A.	N.A.	44.0	N.A.	33.4
Rural:					
1981/82	79.1	71.8	73.8	65.3	N.A.
1983/84	49.8	N.A.	57.0	50.0	N.A.
1985/86	47.1	51.6	51.0	41.3	N.A.
1988/89	N.A.	N.A.	48.0	43.8	N.A.

SOURCES.—Atiq Rahman and Trina Haque, "Poverty and Inequality in Bangladesh in the Eighties: An Analysis of Some Recent Evidence," Research Report no. 91 (Bangladesh Institute of Development Studies, Dhaka, 1988); Akhter U. Ahmed, Haider A. Khan, and Rajan K. Sampath, "Poverty in Bangladesh: Measurement, Decomposition and Intertemporal Comparison," *Journal of Development Studies* 27 (1991): 48–63; Bangladesh Bureau of Statistics (BBS), *Report of the Household Expenditure Survey, 1988–89* (Dhaka: BBS, 1991); Mahabub Hossain and Binayak Sen, "Rural Poverty in Bangladesh: Trends and Determinants," *Asian Development Review* 10 (1992): 1–34; Binayak Sen and Quazi Towfiqul Islam, "Monitoring Adjustment and Urban Poverty in Bangladesh: Issues, Dimensions, Tendencies," in *Monitoring Adjustment and Poverty in Bangladesh,* Report on the Framework Project, CIRDAP Study Series no. 160 (Dhaka: Centre for Integrated Rural Development for Asia and the Pacific, 1993).

Each is based on the same primary data source—consumption expenditures reported from the HES for each year—and approximately the same food-energy requirement—around 2,100–2,200 calories per person per day. Yet they differ considerably; across studies for 1985/86 the estimates of the proportion of the urban population that is poor vary from 29% to 67%, and for rural areas from 41% to 52%. These discrepancies reflect a number of differences in methodology, which we discuss below. A common feature of two of the four studies of rural poverty is that they suggest a falling poverty incidence during the 1980s, with all four indicating a particularly sharp fall in the early 1980s. Three studies also indicate falling poverty incidence in urban areas during the early 1980s.

The comparisons between urban and rural poverty are also of interest. As elsewhere, poverty indicators have generally suggested that rural poverty is the greater problem in Bangladesh.[2] However, two of the studies suggest a reversal around the mid-1980s in the historical poverty ordering of the two sectors; all three indicate a higher poverty incidence in rural areas in 1981/82, but Akhter Ahmed et al.'s study and that by the Bangladesh Bureau of Statistics (BBS) suggest a higher incidence in urban areas in 1985/86.

Some observers have disputed the claims that the incidence of poverty in Bangladesh fell during the 1980s.[3] Other—albeit partial—indicators of poverty do not suggest sustained progress in the 1980s. For example, the real wage rate of agricultural labor rose in the early 1980s, peaking in about 1985, but appears to have fallen since then,[4] though there is also controversy around this point, which we will try to clear up later. Also overall economic growth—and growth in key sectors for the poor (notably agriculture)—has been uneven in the 1980s.[5] During the period 1981/82 to 1985/86, the rate of growth in real consumption per capita implied by the HES is 10% per year, while the national accounts suggest a much lower rate, about 0.5% per year;[6] both may be wrong—but the discrepancy is worrying. A number of observers have also been surprised at claims that the poverty incidence in urban areas of Bangladesh overtook rural areas in the mid-1980s. In addition to the substantive importance, these controversies make a good starting point for probing into the methodology of applied poverty measurement.

Comparability of the Surveys

The comparability of household surveys over time should always be of concern in poverty monitoring, though the effects of changes in survey design are still poorly understood. Past studies for Bangladesh have largely ignored potentially important differences in HES methodology. There was a significant break in survey design between the 1981/82 and 1983/84 surveys. The main difference was the switch from

a single interview reporting 7-day recall of food consumption, to the use of daily diaries recording food consumption over the last 24 hours, spread over 14 days, with repeated visits by interviewers (more intensively to households without a literate member). The number of food items identified in the questionnaire also increased—roughly doubling after 1981/82. The new questionnaires from 1983/84 onward are likely to have captured more items in the self-consumption category (including consumption from common property resources), which is more important for poor households than for others.[7] The new survey is thus likely to yield higher and more accurate estimates of consumption.[8] The comparisons of the 1981/82 and 1983/84 surveys that show a (substantial) decrease in poverty incidence could well be due in large part to these differences in survey methodology. We shall start our own investigation with 1983/84, ignoring the 1981/82 survey. Our discussions with BBS staff indicate that the survey methodology appears to have stabilized since 1983/84. Neither the initial nor final years used for comparison here (1983/84 and 1991/92) are in any way odd, climatically or otherwise; both were quite close to the trend of agricultural production (both total and per capita).[9]

The Food-Energy Intake Method of Setting Poverty Lines

Even perfectly comparable surveys do not assure consistent poverty comparisons. Two of the five studies reported in table 1—the estimates produced by the BBS and the study by Ahmed, Khan, and Sampath—are based on the food-energy intake (FEI) method of setting poverty lines; studies for a number of other countries have also followed versions of this approach.[10] By this method, the poverty line in each sector (urban and rural) and period is obtained by finding the expenditure (or income) level at which the expected value of caloric intake, conditional on expenditure, equals the predetermined food-energy requirement.

More precisely, let k denote food-energy intake (which is taken to be a random variable), for which the requirement level is k^r (taken to be fixed, though this can be readily relaxed), and let x denote consumption expenditure. As long as the expected value of food-energy intake conditional on total consumption expenditure, $E(k|x)$, is strictly increasing in x over an interval that includes k^r, there will exist a poverty line z such that $E(k|z) = k^r$. This method is quite easy to implement and does not need data on the prices prevailing in each sector or region.

To illustrate, figure 1 gives estimates of the expected value of food-energy intake conditional on real food spending for rural and urban areas of Bangladesh in 1985/86. The regressions reported by Ahmed, Khan, and Sampath were adjusted using our estimates of the cost of a "basic-needs" food bundle so as to normalize for differences in food prices, which tend to be higher in urban areas.[11] We show

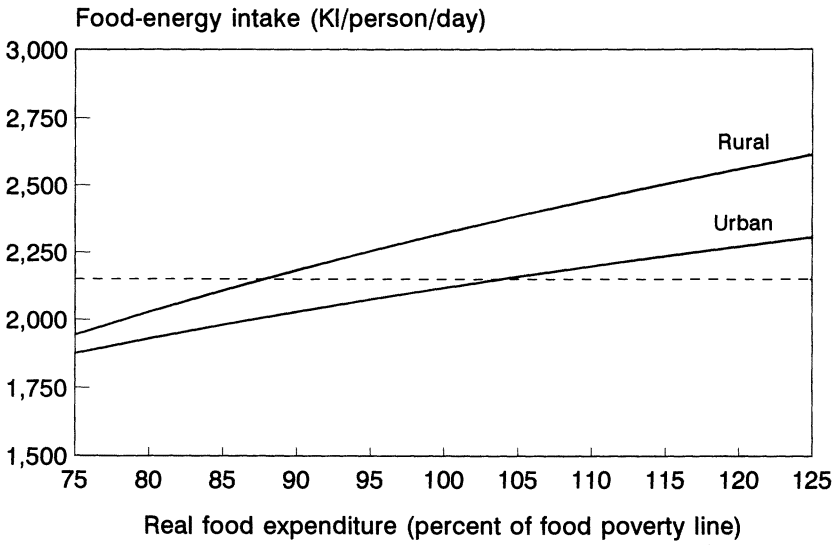

FIG. 1.—Food-energy intake and food expenditures, Bangladesh, 1985–86

that rural households have higher caloric intakes at a given real food expenditure; the rural diet is clearly more "calorie intensive"—more starchy food staples relative to protein, vegetables, sugar, and so on. The relationship is also quite flat in both sectors. Thus there is a large difference in the real food expenditure level at which average intake equals typical requirement levels. In figure 1 we indicate the implied real (food) poverty lines for 2,100 calories per person per day; the expected real expenditure at which an urban resident reaches this point is about 20% higher than it is for a rural resident. In the version by BBS, one finds instead the total (food plus nonfood) expenditure level in each sector at which expected caloric intake equals average requirements. The difference in the real value of the implied poverty lines is then likely to increase further, according to differences in nonfood spending behavior.

Why do we observe the shift in the calorie-expenditure relationship in figure 1?[12] A number of reasons can be suggested. One might argue that the relative price of food is higher in urban areas (assuming that food energy has a price elasticity less than unity, as is plausible). This is questionable, given the high nonfood prices of, for example, housing in urban areas.[13] Activity levels for many rural jobs (notably agricultural labor) are higher than for many urban jobs, although participation rates, demographics, and surplus labor may all work in the opposite direction. It is at least as plausible that some nonfood goods may simply be unavailable in poor rural areas, precisely because they

are so poor, and thus the market so thin, or because of high transport costs; the "virtual price" of those goods may then be so much higher in rural areas that there is a substitution in favor of food. Better knowledge about nutrition in urban areas may also lead to more balanced diets, with fewer calories and more micronutrients.

So, for various reasons, people in better-off regions are buying more expensive calories, reaching food-energy requirements at higher levels of total spending.[14] However, there is nothing in the FEI method to guarantee that the ways in which these other factors—such as relative prices, tastes, and activity levels—influence the poverty lines will lead one to rank distributions consistently with the chosen metric of household welfare.

More formally, the distribution of caloric intakes can readily vary between groups such that the regression function $E(k|x)$ also varies systematically with the characteristics of those groups, and there is no reason to assume that $E(k|x)$ ranks welfare levels correctly at a given value of x. One should then be wary of the poverty lines generated by the FEI method, in that people at the poverty line in different sectors or years could well have very different levels of living by almost any agreed measure. Indeed, depending on how these factors vary, it is quite possible to find that the "richer" sector (by the agreed metric of welfare) tends to spend so much more on each calorie that it is deemed to be the "poorer" sector. For example, a case study for Indonesia found a virtually zero rank correlation between regional poverty measures implied by FEI-based poverty lines and measures that attempted to hold constant purchasing power over basic consumption needs.[15]

Inconsistencies across subgroups in the real value of the poverty lines at a given period also cloud inferences over time. When the urban poverty line has a higher real value than the rural line, and there is migration from rural to urban areas, the national poverty rate can increase even though no one is worse off in command over commodities. For example, a person in a village living just above the rural poverty line but below the urban line who moves to the city and gains by an amount less than the difference in poverty lines will be counted as poor after the move.

Defenses of the FEI Method

Against the above arguments, a number of defenses might be made of the FEI method.

i) There is a sense in which the poverty lines based on this method can be said to be "consistent," namely, that, on average, people at the poverty line will have the same food-energy intakes relative to requirements. The issue is whether that constitutes a good basis for poverty comparisons. It might be if one deemed food-energy intake (relative to requirements) to be a valid welfare indicator on its own.

But there appears to be wide agreement that it is not, even among exponents of the FEI method of setting poverty lines. In fact, if one deemed calories to be sufficient, none of this extra work would be necessary—all one would do is measure caloric shortfalls relative to requirements, all of which are already used as data to implement this method of setting poverty lines. The FEI method acknowledges (at least implicitly) that total consumption of goods and services is a better welfare indicator than is food-energy intake per se.

ii) An argument sometimes made in favor of this method is that it reflects differences in preferences between subgroups.[16] Certainly differences in preferences will affect the poverty lines so derived. But it is not clear what status one should give those differences when making poverty comparisons. If one group—the urban sector, say—prefers to consume less food and more clothing at given prices and real incomes, should one then say they are poorer? Surely not.

iii) Or it might be argued that people in, say, urban areas are consuming more expensive calories because the cheaper foods found in rural areas are not available in urban areas—that they are rationed in their food choices. In a country such as Bangladesh this seems unlikely; we cannot think of any food item consumed in rural areas that could not easily be transported to urban areas if the market was there, and (from casual observations only) it appears that pretty much everything is available in urban areas. (Of course, transport costs should be factored in; this is uncontentious.)

iv) It is also argued that the FEI method is able to reflect other determinants of welfare, such as access to publicly provided goods. But again it is far from clear that the method will do so in a way that is consistent with defensible normative judgments in making interpersonal welfare comparisons. For example, access to better health care and schooling in urban areas than in rural areas may mean that one tends to consume a diet that is nutritionally better balanced—with relatively fewer calories and more micronutrients. But then the FEI method will entail a higher poverty line, and so more people will be deemed poor. This makes little sense.

v) It is possible to use a higher food-energy requirement for rural areas than for urban areas and this will go some way toward avoiding the urban bias in the FEI method. Requirements will depend on (inter alia) the normative judgments made as to what activity levels are deemed appropriate. In practice, prevailing methods of setting requirements based on the demographic composition and activity levels of the population may or may not entail higher requirements in rural areas.[17] And there can be no presumption that such refinements to the FEI method will achieve a consistent poverty ranking in terms of command over consumption needs.

vi) Possibly the practical advantages of the method are compel-

ling. The method does not require data on prices. This is an advantage in (the surprisingly common) cases in which the statistical agency does not collect comprehensive price data outside the main urban areas. However, in order to estimate food-energy intakes one needs data on the quantities of foods consumed. Typically, expenditures are also collected, so one can retrieve the "average price" or "unit-value" at the household level. Employing these unit-values can entail further problems (which we discuss later), but they probably still provide a better basis for valuation than the FEI method of setting poverty lines.

So we do not find any of these arguments compelling. The key point here is that one wants the method of poverty measurement to be consistent with the purpose of measurement. When that purpose is to monitor progress in reducing absolute consumption poverty—defined in terms of command over basic consumption needs—then the poverty lines used should have constant value in terms of that measure of welfare. One should not deem a person (living in a city) who chooses to buy fewer and more expensive calories as poorer than another person (in a village) when both can afford exactly the same standard of living. However, the FEI method does not pass this test. That is not a problem if one is setting a single poverty line (for the country as a whole at one date, say), or if one is not interested in making poverty comparisons across groups. But in other applications it can be a serious problem.

The Cost-of-Basic-Needs Method

The main alternative method of setting poverty lines found in practice is the cost-of-basic-needs (CBN) method; a version of this method was used by the remaining studies in table 1. The method dates from Seebohm Rowntree's study of poverty in York around 1900.[18] By this approach the poverty line is set as the cost in each sector and at each date of a normative "basic needs" bundle of goods. That bundle is typically chosen to be sufficient to reach the predetermined caloric requirement, with a composition that is consistent with the consumption behavior of the poor.[19]

This method has its problems too. The poverty lines it generates can be interpreted as Laspeyres cost-of-living numbers.[20] So utility-compensated substitution effects in consumption are ignored.[21] While the (implicit) bundle of goods in the FEI method almost certainly varies too much to be consistent with the same standard of living, the (explicit) bundle in the CBN method varies too little. Difficulties in setting nonfood "basic needs" and in valuing their cost at local prices are also a problem for this method, as we discuss below.

However, these problems are less worrisome in our view than those with the FEI method, and it is also easier to test the sensitivity of the results to alternative ways of dealing with the problems in the

CBN method. The most compelling argument in favor of the CBN method for making poverty comparisons is that it explicitly aims to control for differences in purchasing power over basic consumption needs, while the FEI method does not. The CBN method can at least claim to provide a first-order approximation of what we are trying to measure.

We use the CBN method here to update the estimates in table 1 to 1991/92, and to revise the series on a consistent basis. Our aim is not to derive a definitive series of poverty estimates for Bangladesh. Rather, it is to obtain a reasonably defensible alternative series to those in table 1, which can be implemented with the available data, and to test the robustness of the key qualitative results to our measurement assumptions. The following discussion describes the main differences found among past studies for Bangladesh that have used the CBN method, and our own choices.

A relatively uncontroversial issue in the Bangladesh literature using the CBN method has been the food items included in the "minimum consumption bundle"; the bundle we have used is given in table 2; with minor variations this is the same as originally used by M. Alamgir, among others.[22] This corresponds to an average per capita daily intake of 2,112 calories and 58 grams of protein, in accordance with the Food and Agriculture Organization recommended standard for South Asian countries, based on the notion of balanced nutrition according to the age, sex, and occupational composition of the population.[23] However, views may reasonably differ on the appropriate caloric requirement, reflecting, for example, different views of what constitutes an acceptable activity level—itself a normative judgment.[24]

A more significant source of discrepancy among earlier poverty estimates is probably the choice of prices used to convert the normative minimum food consumption bundle into monetary poverty lines. Urban retail prices for food items in the consumption bundle have been used in past work—with the exception of the work of Mahabub Hossain and Binayak Sen—with an assumed fixed discount rate to obtain a rural retail price level.[25] A movement in urban prices out of line with rural prices may then generate potentially large errors in the estimated poverty measures. The use of the CPI for updating the base year poverty line may generate errors in the poverty trends since the construction of the CPI (based on 113 goods) includes many items that clearly fall outside the typical consumption bundle of the poor in Bangladesh. An alternative source of price information is the set of implicit unit-values for food in the HES. The implicit prices are derived by dividing reported expenditures by quantities for each food item. These give the actual expenditures on a unit of consumption paid in each sector and date, and so they reflect the underlying differences in prices. However, that is not all they reflect. Differences in the quality

TABLE 2

RURAL AND URBAN CONSUMER UNIT VALUES

ITEMS INCLUDED IN THE MINIMUM CONSUMPTION BUNDLE	PER CAPITA NORMATIVE DAILY REQUIREMENT		MEAN RURAL CONSUMER UNIT VALUES CALCULATED FROM HES (Tk/Kg)				MEAN URBAN CONSUMER UNIT VALUES CALCULATED FROM HES (Tk/Kg)			
	Calories	Grams	1983/84	1985/86	1988/89	1991/92	1983/84	1985/86	1988/89	1991/92
Rice	1,386	397	7.52	8.00	10.01	11.40	8.07	8.84	10.99	12.27
Wheat	139	40	5.42	6.11	7.63	9.36	5.55	6.84	8.21	10.22
Pulses (masur and khesari)	153	40	7.48	13.11	16.12	19.97	10.74	15.98	18.82	26.26
Milk (cow)	39	58	6.66	8.92	9.95	11.66	6.93	9.80	12.15	16.28
Oil (mustard)	180	20	37.08	41.71	40.30	52.94	38.30	40.62	39.54	53.62
Meat (beef)	14	12	23.88	34.97	36.44	46.58	27.94	37.66	38.50	51.54
Fish (fresh water)	51	48	18.31	22.74	23.21	29.23	20.65	27.88	28.83	37.11
Potato	26	27	3.27	4.17	6.69	5.76	3.35	4.23	7.17	6.43
Other vegetables (leafy and non-leafy)	36	150	3.04	3.34	4.33	5.17	3.25	4.38	8.53	6.62
Sugar (gur)	82	20	9.71	11.57	14.73	17.50	14.27	22.25	23.56	19.29
Fruits (banana)	6	20	5.42	7.40	9.21	12.00	12.52	7.58	12.21	12.20
Total (calorie/g)	2,112	832	...	...	...	...	...	...	...	...
Poverty line expenditure on food (Tk/person/day)	...	...	6.64	7.80	9.15	10.92	7.45	8.95	10.95	12.54
Rural CPI for nonfood	...	...	100.00	122.44	150.40	203.54	...	...	...	...
Urban CPI for nonfood (industrial workers)	...	...	...	...	...	...	100.00	128.58	160.30	203.19

of the consumptions within each category in the survey data can entail shifts in unit-values even if prices for given qualities are not different. Thus there are pros and cons to each of these methods. We shall use the implicit food prices in the HES to determine the cost of the normative minimum diet in each sector and year to obtain the food component of the poverty line. We will, however, consider the possible biases inherent in this method. Like most household surveys, the HES does not provide quantities consumed of nonfood goods (only expenditures); so the implicit prices cannot be derived. We thus have no option but to update the cost of the nonfood component for 1983/84 over time using the nonfood component of the CPI as calculated using base-year weights.[26]

Setting the nonfood component of the poverty line is a further potential source of contention, since there is no agreed anchor analogous to the role played by food-energy requirements in setting the food component of the poverty line. And some common practices—such as using the mean food share of the poor in each subgroup or period—are questionable, in that they can imply far more generous allowances for nonfood goods in richer subgroups or periods.[27] Against this one may want to allow for differences in the price of food relative to nonfood goods across sectors or regions. Unfortunately, without believable spatial price data on nonfood goods (allowing for the heterogeneity in quality of housing, e.g.) it is difficult to make such adjustments convincingly.[28] For example, the rural poverty estimates by Hossain and Sen set the allowance for nonfood goods at 30% of that for food, while Sen and Islam's urban series used a markup of 40%; it is not clear how much of this difference can be attributed to differences in real levels of living between the two sectors and tastes (differences that one would not want to introduce into the method) versus differences in relative prices (which one would want to incorporate). Atiq Rahman and Trina Haque used a constant markup across the two sectors, setting the nonfood allowance at 25% of the food poverty line. This is defensible if one believes that relative price differences between the two sectors are negligible (or preferences are homothetic, which is unlikely),[29] although 25% appears to be a rather meager allowance for nonfood goods even for rural areas.[30] An appropriately specified demand model could be used to help resolve this issue,[31] but this requires access to the unit-record (household-level) data, which so far has not been possible for Bangladesh. For this study we decided to set the nonfood allowance at 35% of the food poverty line in 1983/84, splitting the difference between the Hossain-Sen rural allowance and the Sen-Islam urban allowance.[32] We will test robustness to this choice.

From the foregoing discussion it is evident that the main ingredients of a poverty measure—the caloric requirement, the food bundle to achieve that requirement, and the allowance for nonfood goods—entail

normative judgments. That cannot be avoided, although some methods appear to be more consistent and defensible than others in the judgments made. However, once the relativities of poverty lines over time and space are agreed on (though, as we have noted, this is itself a contentious step), these normative judgments can be collapsed to the choice of the absolute level of the poverty line at a given place and date. The sensitivity of the resulting poverty comparisons to those judgments can then be tested by applying recent results in the application of stochastic dominance tests to distributional comparisons.[33] This allows us to isolate to what extent (if any) these normative judgments alter key qualitative conclusions. That is the approach we follow here.

Poverty Measures

There has also been a degree of controversy over how the information on poverty lines and the distribution of consumption expenditures should be aggregated in the form of a poverty measure. Unlike some of the issues discussed above, this issue has received a great deal of attention.[34] The three poverty measures used in this study attempt to capture three aspects of poverty: its incidence, its depth, and its severity. The specific measures follow.

i) The *head-count index* (H), given by the percentage of the population living in households with a consumption per capita that is less than the poverty line. This can be interpreted as a measure of the "incidence" of poverty. The measure has the advantage that it is easy to interpret, but it tells us nothing about the depth or severity of poverty.[35]

ii) The *poverty-gap index* (PG), defined by the mean distance below the poverty line as a proportion of that line (where the mean is formed over the entire population, counting the nonpoor as having zero poverty gap).[36] One can interpret this as a measure of poverty "depth." Its disadvantage is that it is unaffected by changes in inequality among the poor.

iii) The *squared poverty-gap index* (SPG) of James Foster, J. Greer, and Erik Thorbecke, defined as the mean of the squared proportionate poverty gaps (again the mean is formed over the entire population, counting the nonpoor as having zero poverty gap).[37] Thus the poverty gaps are weighted in aggregation, with greater weight given to larger gaps, and where the weights are simply the poverty gaps themselves. This simple change to the conventional poverty-gap index allows the index to reflect changes in the "severity" of poverty, in that it will be sensitive to inequality among the poor.

All three measures (like almost all measures found in practice) are functions of both the mean consumption (μ) of each subgroup normalized by the poverty line (z), and the Lorenz curve for the distribution of consumption. So we can write the poverty measures in the

generic form $P(\mu/z, \mathbf{L})$, where $\mathbf{L}$ denotes all the parameters of the Lorenz curve. The variable μ/z is simply the purchasing power of mean consumption in terms of the poverty bundle of goods; for brevity we will call it "mean real consumption," but it should not be forgotten that it is "real" in terms of this specific bundle of goods. The effects of changes in μ/z on poverty, holding the Lorenz curve constant, and of certain changes in the Lorenz curve can be predicted by looking at the statistical properties of the initial distribution.[38]

III. Alternative Poverty Measures for Bangladesh, 1983–92

Our Estimates

Table 3 gives our alternative estimates based on the version of the CBN method described above. Comparing the end points, 1983/84 and 1991/92, every poverty measure in both urban and rural sectors fell (table 3). But progress was uneven during the period. Indeed, all three of our measures show an increase in poverty nationally after 1985/86, in contrast to the BBS results based on the FEI method. Most of the increase was due to rising poverty in the rural sector; that sector saw steadily worsening poverty measures from 1985/86 on. This holds for all three measures. The sizable increase in the squared poverty-gap index in rural areas that started in the mid-1980s suggests that the poorest of the poor, as well as those near the poverty line (as indicated by the less dramatic rise in the head-count index), were also suffering falling living standards. The overall drop in poverty incidence between

TABLE 3

POVERTY MEASURES FOR BANGLADESH

	Head-Count Index (%)	Poverty-Gap Index (%)	Squared Poverty-Gap Index (× 100)
Urban:			
1983/84	40.9	11.4	4.4
1985/86	30.8	7.3	2.5
1988/89	35.9	8.7	2.8
1991/92	33.6	8.4	2.8
Rural:			
1983/84	53.8	15.0	5.9
1985/86	45.9	10.9	3.6
1988/89	49.7	13.1	4.8
1991/92	52.9	14.6	5.6
National:			
1983/84	52.3	14.5	5.7
1985/86	43.9	10.4	3.5
1988/89	47.8	12.5	4.6
1991/92	49.7	13.6	5.1

NOTE.—The rural population shares are 88.7% (1983/84), 87.2% (1985/86), 86.6% (1988/89), and 83.4% (1991/92).

the end points was not sufficient to prevent rising numbers of poor; the national head-count ratio fell at 0.6% per year compounded over the entire period, implying that the total number of poor increased at about 1.5%–2% per year.

All three poverty measures indicate greater poverty in rural areas than urban areas. It appears that, for Bangladesh, the BBS's and Ahmed, Khan, and Sampath's findings of higher poverty rates in urban compared with rural areas (table 1) are due to the aforementioned urban and rural differences in the real value of the poverty lines generated by the FEI method.[39] In terms of command over basic consumption needs, rural areas experience greater incidence, depth, and severity of poverty. It also appears that the shifting real value of the BBS poverty lines (underlying the results reproduced in table 1) has caused a reversal in the direction of change in measured poverty between 1985/86 and 1988/89; the BBS method shows a decrease in both sectors while our results show an increase.

There are some marked quantitative differences between our results and those in table 1. Suppose, however, that we discount estimates based on the FEI method (namely, 2 and 3 in table 1) and exclude the 1981/82 survey on comparability grounds. Then we are left with agreement on the direction of change in poverty across the studies in table 1 and our estimates in table 3 in those cases for which a comparison is possible. In particular, there is agreement that the incidence of poverty fell in both urban and rural areas between 1983/84 and 1985/86, and that it rose in both sectors between 1985/86 and 1988/89. At least for such qualitative comparisons, the differences in method appear to matter little. In the rest of this section we will attempt to assess how robust these results are to changes in measurement assumptions.

Robustness to Biases in Using Unit-Values as Prices

As noted in Section II, unit-values (expenditure per unit quantity for each of the survey's food categories) reflect quality choices as well as prices. It is reasonable to assume that quality is a normal good, so the existence of quality biases implies that the real value of the poverty line will be an increasing function of the real mean. However, as long as the income effect on demand for quality is not too high—specifically, that the expenditure-share weighted average elasticity of unit-value to total expenditure is less than unity—the poverty measure will still be a strictly decreasing function of the real mean. Assuming that mean real expenditure is higher in urban areas, it is clear that this source of bias would lead us to overestimate urban poverty measures relative to rural measures, but we will get the ranking right. We will also tend to underestimate the impact on poverty of changes in the real value of mean consumption, as at least some of the change will

be dissipated in shifts in the real value of the poverty line associated with changes in food quality. We would thus suspect a dampening of fluctuations in absolute poverty measures over time, but not a reversal in orderings.

Robustness of the Urban-Rural Poverty Comparison to Differences in Relative Prices

Because the same normative consumption bundle is used in both urban and rural areas, the CBN method that we have used does not adjust the poverty lines for differences in relative prices. Would such adjustments alter our key qualitative conclusions? As table 2 shows, the relative unit-values of the food items are different in urban and rural areas. The rural food poverty line in 1991/92 is 87% of the urban line, but the ratio differs from 72% (for milk) to 99% (for oil). Among food goods, our use of a fixed food bundle means that we have overestimated the true urban-rural cost-of-living difference, since urban households will be able to exploit the relative price differences through substitution without being worse off. This means that we have overestimated urban poverty relative to rural poverty. Our qualitative conclusion that poverty is higher in rural areas does not change.

The picture is less clear when we consider nonfood goods. We have used the same proportionate markup for nonfood goods in both sectors. This is not obviously wrong. While it is plain that many goods are more expensive in urban areas (notably food and housing), it is not known whether the cost of food needs relative to nonfood needs of the poor is different. If the relative price of nonfood goods is higher in urban areas then we will have underestimated urban poverty relative to rural poverty. Since we do not have nonfood prices, this is untestable. But what we can do is ask, How much of an error in our estimate of the relative cost of nonfood goods to the urban poor would be needed to reverse our qualitative conclusion that poverty is higher in rural areas? For 1991/92 we calculated the urban poverty line that would be needed to equalize the urban head-count index with the rural index for that year of 52.9%. (This was done by line search, stopping when the percentage deemed poor was equal to the first decimal place.) We found that the urban allowance for nonfood goods would have to be 85% of the food poverty line before it ceased to be true that poverty incidence in rural areas is higher than it is in urban areas. As long as the relative price of nonfood goods in urban areas is less than double that in rural areas the sector ranking for 1991/92 will be preserved. For the other two poverty measures, the critical allowance for nonfood goods needed to equalize poverty measures across sectors was 75% for PG and 73% for SPG. The poverty ranking for these measures is thus slightly less robust than for the head-count index. However, it

remains true that a considerably higher relative price of nonfood goods in urban areas would be needed to reverse our poverty ordering of the two sectors.

Of course, since this issue arises precisely because we do not have spatial data on nonfood prices, it is difficult to go much further. We cannot rule out the possibility that we have underestimated the relative price of nonfood basic needs for the poor in urban areas, though the underestimation would have to be very substantial to reverse our qualitative conclusion.

Robustness to Choice of Poverty Line and Measure

As we have emphasized, there is, inevitably, a degree of arbitrariness in setting any poverty line and in choosing a poverty measure, and it is important to ask how robust the above results are to those choices. Figure 2 gives the head-count indexes in 1983/84 and 1991/92 for a wide range of potential poverty lines, expressed as a percentage of the benchmark poverty line we have used in table 3. By varying the poverty line one traces a poverty incidence curve (PIC), which is simply the empirical cumulative distribution function. Results from the application of stochastic dominance theory to poverty comparisons can be used here.[40] One can readily show that if the PIC for distribution A lies above that for B up to some maximum poverty line, then the claim that poverty is higher in A is robust to the choice of poverty line up to that maximum. It is also robust to the choice of poverty measure

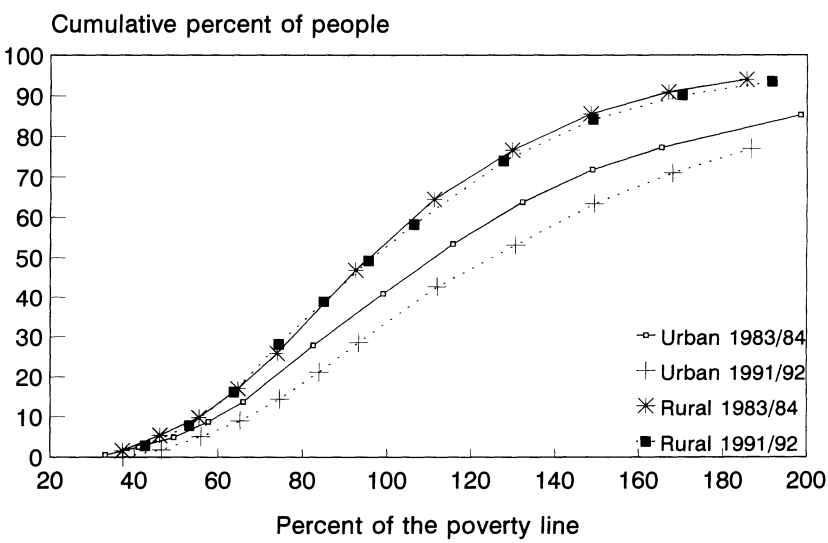

FIG. 2.—Poverty incidence curves for urban and rural Bangladesh, 1983/84 and 1991/92.

within a broad class, including both the poverty-gap index and squared poverty-gap index, as well as a wide range of other measures.[41] Figure 2 shows that the reduction in urban poverty over the period is robust, as is the conclusion that poverty is higher in rural areas than in urban areas. On the other hand, the comparison of rural poverty in 1983/84 with 1991/92 is quite ambiguous; some poverty lines and measures give different results than others, though at no point is there more than a small (under two percentage points) shift either way in the rural PIC over the period.

To test dominance within subperiods we divide the period into two: 1983/84 to 1985/86, and 1985/86 to 1991/92, for which figures 3 and 4 give the corresponding PICs. For the first subperiod we find that the conclusion that poverty fell is robust to the choice of poverty line and poverty measure, as is the conclusion that poverty is higher in rural areas during each period. The conclusion that poverty increased in both sectors from 1985/86 to 1991/92 is also robust to the choice of line and measure, and again this is true of the conclusion that poverty is greater in rural areas.

Consistency with Wage Data

Other poverty data may provide a useful check. The rural poor in Bangladesh depend heavily on supplying agricultural labor and so the real agricultural wage rate is an important determinant of their welfare.[42] It has been claimed that real wages have been on a generally

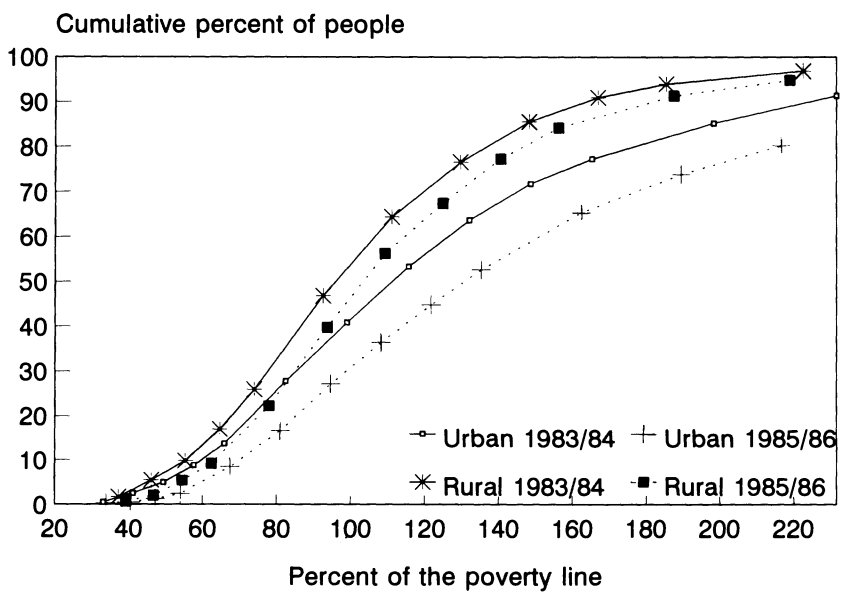

FIG. 3.—Poverty incidence curves for 1983/84 and 1985/86

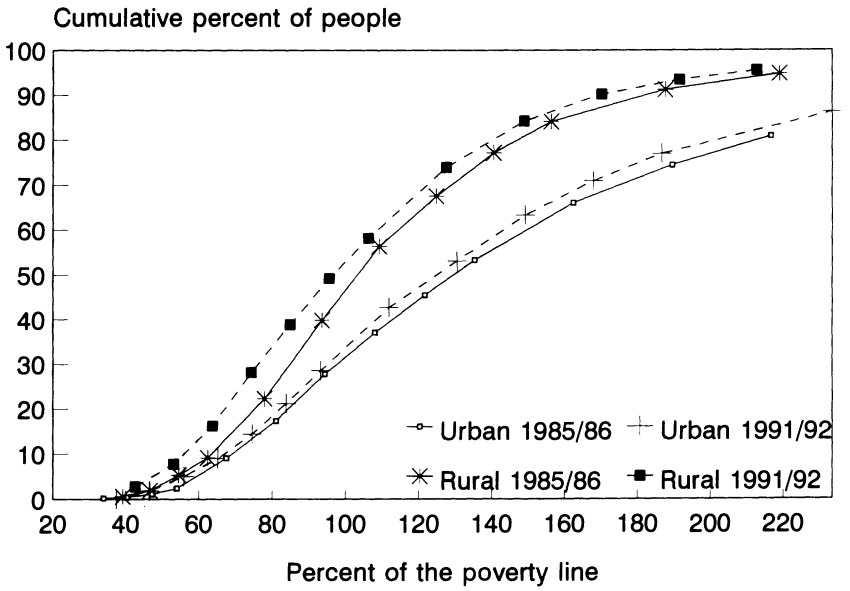

FIG. 4.—Poverty incidence curves for 1985/86 and 1991/92

rising trend since the beginning of the 1980s, continuing to at least the early 1990s.[43] If true, this would suggest either that our result of rising rural poverty since the mid-1980s is questionable or that other determinants of poverty have militated against the rising real wage effect.

However, there is conflicting evidence on what has been happening to wages for agricultural labor in Bangladesh. There are two sources within BBS for data on agricultural wages, the Agricultural Statistical Wing (ASW) and the National Income Wing (NIW).[44] The ASW data had not been collected for a number of years since 1989.[45] The extent of discrepancy between the two sources for years in which both were collected is striking, particularly since 1985; figure 5 gives estimates of real wages from both sources, as well as an independent (but less regular) series from village surveys by the Bangladesh Institute of Development Studies (BIDS).[46] The increase in the real wage indicated by the NIW series over the latter half of the 1980s is not confirmed by the ASW data. The discrepancy between the two sources has been increasing over time. In the early 1980s they were roughly equal; by July 1993, the NIW wage estimate was 50% higher than the ASW estimate.[47] The BIDS estimates are in closer accord with the ASW numbers.

The question arises why the NIW data are so out of step with these other sources. The ASW agricultural wage survey was intended to be representative of rural Bangladesh as a whole. It covers all 23 districts, using weekly surveys of employers at thana-level rural cen-

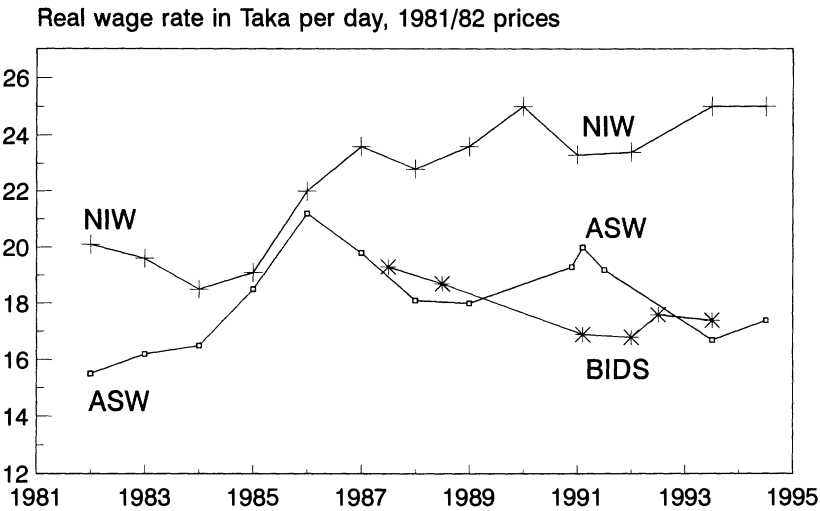

FIG. 5.—Real agricultural wages in Bangladesh. Sources: National Income Wing (NIW) and Agricultural Statistics Wing (ASW) of Bangladesh Bureau of Statistics, and Bangladesh Institute of Development Studies (BIDS).

ters, and the survey appears to be based on a representative sample for estimating the average agricultural wage in Bangladesh.[48] By contrast, the NIW series is far more limited in both coverage and scope. The NIW data were initially collected for six regional centers, namely, Dhaka, Chittagong, Rajshahi, Rangpur, Khulna, and Sylhet. Since 1987/88 the national average is based on four centers only (with the exclusion of Rangpur and Sylhet). The NIW data are just for one thana-level center in each of four divisions and the selection of the thana is restricted to a rural area adjacent to the (urban) divisional center. For example, Demra (a well-developed thana adjacent to the capital) is chosen as the reference point for the collection of NIW weekly wage data for the Dhaka division. Also, the number of respondents interviewed is quite small in the case of the NIW data; only two respondents per thana are interviewed. Compared to that, the ASW survey currently administers a much more elaborately structured questionnaire to three randomly selected wage-employers per union in each of the 464 thanas of the country.[49] The difference between the two data sources could well reflect in part a higher rate of economic growth in urban and near-urban rural areas compared with growth in more typical rural areas.

The above observations lead us to conclude that the ASW data can be considered a more reliable guide to average wages for agricultural labor in Bangladesh. The ASW data indicate an increase in the real wage up to the mid-1980s, but a decline thereafter. Thus both sets

of data and our reanalysis of the household survey data suggest that the signs of progress in the first half of the 1980s were not sustained.

IV. Some Implications

Proximate Causes of the Changes over Time

Assessments of the causative factors underlying measured changes in poverty can also depend greatly on measurement methods. For example, if the poverty line is changing in real value as some function of the mean of the distribution then this will bias estimates of how much impact growth and contraction in average living standards will have on absolute poverty; indeed, when the elasticity of the poverty line to the mean reaches one, the poverty measure will depend only on how relative inequalities change; everyone could be better-off but nothing will happen to measured poverty. By aiming to arrive at poverty measures that are consistent across time and space in how they treat a given standard of living, we also hope to be able to throw a more powerful light on the proximate causes of changes in living standards of the poor.

Table 4 gives further statistics that can help in understanding the results in table 3 and in figures 2 and 3. The following observations can be made.

i) The fourth column of table 4 gives our estimate of the basic-needs purchasing power of mean consumption, that is, mean consumption as a percentage of the poverty line. There was a gain in the purchasing power of mean consumption between 1983/84 and 1985/86, and a decline after that date. The changes in μ/z track quite closely the changes in poverty measures in table 3; typically, when the mean rose (fell), poverty fell (rose). For the other estimates in table 1, the impact of changes in the mean on poverty is more obscure; even when the differing estimates agree on direction, the response varies greatly

TABLE 4

SUMMARY STATISTICS ON GROWTH AND INEQUALITY

	Poverty Line (Tk/Person/Month)	Mean Consumption (Tk/Person/Month)	Mean/Poverty Line (%)	Gini Index (%)
Urban:				
1983/84	301.72	396.53	131	29.8
1985/86	368.62	581.13	158	31.4
1988/89	453.65	695.19	153	32.6
1991/92	534.99	817.12	153	31.9
Rural:				
1983/84	268.92	284.84	106	24.6
1985/86	319.06	373.93	117	24.6
1988/89	379.08	435.39	115	26.5
1991/92	469.13	509.67	109	25.5

(e.g., the 10% growth in the rural μ/z from 1983/84 to 1985/86 produced between a 5.5% and 17.4% drop in the rural head-count index across the estimates in table 1). This diversity reflects the differences in measurement methods, and, as we have argued, some of those methods are hard to defend.

ii) There was a marked sectoral imbalance in the rate of growth in the real value of mean consumption. While μ/z increased by about 16% in urban areas between 1983/84 and 1991/92, it rose by only 3% in rural areas.

iii) The last column of table 4 gives the Gini indexes by year and sector. There was an increase in relative inequalities within both sectors up to 1988/89, with some improvement after that.

A casual inspection of the summary statistics in table 4 thus suggests that the growth and contraction in real consumption per capita may well have been an important factor in the changes in poverty measures observed in table 3. But a second "proximate" cause of the slow progress in reducing poverty nationally can be suggested, namely, the rise in inequality in both sectors over much of the period. A comparison with table 1 suggests, however, that other methods can imply quite different conclusions. For example, despite a decline between 1985/86 and 1988/89 in the basic-needs purchasing power of the rural mean, and a rise in inequality, the BBS estimates based on the FEI method indicate a fall in poverty incidence.

Quantification of the relative importance of growth and distributional change to poverty measures over this period is possible using some simple counterfactual experiments.

Experiment 1. How much did the intrasectoral inequality in the benefits of growth in the 1980s contribute to the slow progress in poverty reduction? To address this question, we can simulate the poverty measures if the Lorenz curve had not changed over the period; thus we compare the actual poverty measure for the base data, $P[(\mu/z)_{83/4}, \mathbf{L}_{83/4}]$, with the simulated measure, $P[(\mu/z)_{91/2}, \mathbf{L}_{83/4}]$.[50] We give the results in table 5. If all consumption groups had shared equally in the growth that occurred in urban areas (leaving the Lorenz curve in that sector unchanged) then the head-count index of poverty would have dropped by 10.8 percentage points over the period, instead of 7.3. In the rural sector, the head-count index would have fallen by 2.4 points, instead of 0.9. Both the poverty-gap indexes would also have fallen further if not for the increase in inequality.

Experiment 2. How much further would poverty have increased if not for the growth that did occur? Here we need to simulate the poverty measures for 1991/92 that would have been observed if the mean had been that of 1983/84 (keeping the actual Lorenz curve of 1991/92), that is, to compare $P[(\mu/z)_{83/4}, \mathbf{L}_{83/4}]$ with the simulated measure, $P[(\mu/z)_{83/4}, \mathbf{L}_{91/2}]$. This simulation is also given in table 5. All

TABLE 5

SIMULATED POVERTY MEASURES

	Head-Count Index (%)	Poverty-Gap Index (%)	Squared Poverty-Gap Index (× 100)
Urban:			
1983/84 (actual)	40.9	11.4	4.4
1991/92 (actual)	33.6	8.4	2.8
1991/92 (with no change in inequality)	30.1	7.5	2.6
1991/92 (with no growth in μ/z)	44.5	12.7	4.9
Rural:			
1983/84 (actual)	53.8	15.0	5.9
1991/92 (actual)	52.9	14.6	5.6
1991/92 (with no change in inequality)	51.3	14.0	5.4
1991/92 (with no growth in μ/z)	55.4	15.6	6.1
1991/92 (with urban rate of growth in μ/z, 1984/84–1991/92)	41.0	10.3	3.6

poverty measures would have been higher by the end of the period if not for the (even modest) growth; in urban areas, an extra 3.6% of the population would have been poor without growth; in rural areas, an extra 1.6%.

Experiment 3. How much did the regional imbalance in the growth of mean real consumption contribute to the slow overall progress? Suppose that mean consumption relative to the poverty line in rural areas had grown at the same rate as the urban sector; by 1991/92 mean consumption in rural areas would have been Tk 577.5, about 13% higher than its actual value. Here we simulate the poverty measures for rural areas in 1991/92 using the actual Lorenz curve for that sector and year but replacing the actual mean with that implied by the urban rate of growth. The rural head-count index would have fallen a further 10 percentage points, entailing a 24% reduction over the period, instead of the 2% actually observed; PG would have fallen by 31% (instead of 3%); and SPG would have fallen by 39% (instead of 5%; table 5).

Rates of Poverty Reduction under Alternative Growth Paths

How responsive are Bangladesh's poverty measures likely to be to future growth in the basic needs purchasing power of mean consumption? The answer will depend of course on the extent to which the poor share in that growth, that is, on what contemporaneous changes in inequality occur during the growth process. Table 6 gives two sets of estimates of the elasticities of the three poverty measures to changes in mean consumption, descriptions of which follow.

1. *Inequitable growth* elasticities are those implied by the actual changes in the poverty measures and the mean relative to the poverty

TABLE 6

GROWTH ELASTICITIES UNDER ALTERNATIVE ASSUMPTIONS

	ELASTICITY OF POVERTY WITH RESPECT TO MEAN CONSUMPTION		
	Head-Count Index	Poverty-Gap Index	Squared Poverty-Gap Index
Urban:			
Inequitable growth	−1.1	−1.6	−2.2
Neutral growth	−2.1	−3.0	−3.9
Equitable growth:			
Sector neutral	−2.3	−3.6	−4.9
Rural biased	−2.2	−3.3	−4.4
Rural:			
Inequitable growth	−.6	−.9	−1.7
Neutral growth	−1.8	−2.6	−3.2
Equitable growth:			
Sector neutral	−1.8	−2.9	−3.7
Rural biased	−1.9	−3.1	−4.2

line, as observed over the period 1983/84 to 1991/92.[51] So these elasticities reflect the effects of rising inequality over the period in each sector.

2. *Neutral growth* elasticities are those that assume that relative inequalities do not change; table 7 gives these elasticities.[52] Since the poor experience the same rate of growth as other groups, these elasticities will be higher (in absolute value) than for case 1.

3. *Equitable growth* elasticities are anchored to the pattern of growth observed in Indonesia during the 1980s, whereby robust growth

TABLE 7

POINT ELASTICITIES OF THE POVERTY MEASURES IN TABLE 3

	ELASTICITY TO THE MEAN			ELASTICITY TO THE GINI INDEX		
	Head-Count Index	Poverty-Gap Index	Squared Poverty-Gap Index	Head-Count Index	Poverty-Gap Index	Squared Poverty-Gap Index
Urban:						
1983/84	−1.9	−2.6	−3.2	.6	2.1	3.6
1985/86	−2.2	−3.2	−4.0	1.3	3.4	5.4
1988/89	−1.9	−3.2	−4.3	1.0	3.2	5.4
1991/92	−2.1	−3.0	−3.9	1.1	3.1	5.1
Rural:						
1983/84	−1.8	−2.6	−3.1	.1	1.2	2.3
1985/86	−2.3	−3.2	−4.0	.4	1.7	3.0
1988/89	−1.9	−2.8	−3.4	.3	1.6	2.8
1991/92	−1.8	−2.6	−3.2	.2	1.3	2.5

in mean consumption was combined with a modest rate of decline in inequality. Two cases are considered: *sector neutral* assumes that the elasticity of the Gini index to the mean is −0.2 in both sectors, while *rural biased* assumes an elasticity of −0.1 in urban areas and −0.4 in rural areas; these assumptions held during the period 1984–87.[53]

It can be seen that the switch from the growth process of the latter half of the 1980s to a distribution-neutral growth process would entail a marked increase in the elasticities of the poverty measures to growth. The (absolute) elasticity of the rural head-count index to growth in the mean would rise from 0.6 to 1.8. A 2% rate of growth in mean consumption in that sector would bring the rural poverty rate down by 1.2% per year under the inequitable growth path. The rate of decline in the poverty rate would be 3.6% per year if that growth process was sufficiently broad to allow consumptions of the poor to grow at the same rate as those of others. The differences are not as marked in urban areas, and they are somewhat less pronounced for the poverty-gap indexes.

The head-count indexes will respond to distribution-neutral changes in the mean with an elasticity of about 2 in both sectors. The elasticities of the poverty-gap indexes are approximately 3–4. The elasticities to the mean tend to be slightly higher (in absolute value) in urban areas than in rural areas (for any given combination of year and measure), and they are higher for SPG than for PG, and lowest for H. Thus we find that Bangladesh's poverty measures are likely to be quite responsive to change in the mean, holding the Lorenz curve constant, and that this is even more true of the distribution-sensitive measure (which better reflects the circumstances of the poorest) than of the simple head-count index.

The switch to either "equitable growth" path would have little impact on the growth elasticity of the head-count index, given that Bangladesh's poverty rate is so high (in particular, that the mean is close to the poverty line). But that switch would give a boost to the growth elasticities of the poverty-gap indexes, particularly SPG, which rises to an elasticity of 4.9 in urban areas and 3.7 in rural areas even in the sector-neutral case (4.5 in the rural-biased case).

The higher the growth elasticity, the lower the actual rate of growth needed to reduce the number of poor. Table 8 gives the implied estimates of the minimum rate of growth in national income needed before the total number of poor in Bangladesh would begin to fall. The additional assumption made in deriving these estimates is that the share of national income that is consumed by households remains constant.[54] We find that the switch to either a neutral or equitable growth path will entail a sizable drop in the minimum rate of growth needed to prevent rising numbers of poor; at Bangladesh's projected population growth rate of 2% per year in the 1990s, the minimum growth rate in

TABLE 8

MINIMUM RATES OF GROWTH IN NATIONAL INCOME TO PREVENT RISING NUMBERS OF POOR

	POPULATION GROWTH RATE	
	2.5%	2.0%
Inequitable growth	6.1	4.9
Neutral growth	3.9	3.1
Equitable growth:		
Sector neutral	3.8	3.1
Rural biased	3.8	3.1

NOTE.—The national elasticities in each case are given by the poverty-share weighted means of the urban and rural elasticities in table 6; the weighted elasticities are −0.7, −1.8, −1.9, and −1.9 for each of the four growth processes, respectively.

GNP per capita needed to prevent rising numbers of poor switches from 5% per year under the inequitable growth path to about 3% under the neutral or equitable growth paths. With a national income growth rate of approximately 4% per year (typical of the 1980s) such a switch would make the difference between rising and falling numbers of poor.

V. Conclusions

Poverty measurement requires value judgments and behavioral assumptions to help interpret the available—and invariably imperfect—data. That will always be true. The more interesting question is how much bearing the choices made by the analyst have on the key conclusions drawn. This case study has illustrated that those choices will sometimes, but not always, matter to qualitative conclusions about progress in reducing poverty, and the sectoral structure of poverty. Credible poverty monitoring calls for considerable care in critically evaluating data and methods.

A survey of recent estimates of poverty measures for Bangladesh suggests some worrying discrepancies, even when the estimates are based on the same survey data set and use a very similar specification of food-energy requirements. Past studies have come to different conclusions about the directions of change in poverty over time, and about which of the sectors, the urban or the rural, is poorer. The only way of resolving the issue is to look closely at the data and at the normative and behavioral foundations of the methods used to analyze it, in the hope that defensible criteria can be found for rejecting some estimates in favor of others.

We find that all of the recent estimates are questionable from one point of view or another, though some of the problems are more worrisome than others. We have argued against the common practice of defining the poverty line as the consumption expenditure or income level at which the expected food-energy intake equals preset requirements in each sector, region, or time period. Although not ideal, we have argued in favor of an alternative method found in the literature in which the poverty line is an estimate of the cost of an explicit bundle of basic consumption needs. Applying a version of the latter method, we have proposed our own revised series, trying to preserve the better features of past work, while rejecting others. With better data on prices and better access to the underlying household-level data one could improve on our estimates; we are hopeful that will happen in the near future. However, from the data that are available, there is a good case for believing that our estimates are more consistent over time and space than some others found in the literature—"consistent" in the sense that two persons with the same command over basic consumption needs will be treated the same way. Such consistency is a value judgment, but a defensible one when a purpose of poverty measurement is to inform our understanding of how the economy and policy influence levels of living of the poor.

We find that the fall in poverty in the early 1980s reported by some observers appears to largely reflect changes in measurement methodology, including survey design. Differences over time and space in the real value of the poverty lines used in some studies also raise serious doubts about their conclusions. On removing what appear to be the main methodological problems in past estimates, we find that there was a reduction in poverty incidence, depth, and severity around the mid-1980s, but that it was not sustained after that. We also find that the claims by some past studies that in Bangladesh urban poverty incidence has overtaken rural poverty incidence are questionable. All our poverty measures are higher in rural areas, and this has not changed over the period. Measured consistently, it appears that progress has also been uneven across sectors; indeed, almost the entire modest drop in poverty over the whole period is attributable to gains to the urban poor.

What is at stake in aiming for sound measurement methods is more than the reliability of poverty assessments over time, though that is clearly important. Unreliable methods can also confound attempts to assess the causative factors at work, including policy changes. The methods we have used here can also help throw light on the proximate causes of changes in poverty measures, and possible implications for development policy.

It might be of some comfort if we could conclude that the slow and uneven progress in reducing poverty in Bangladesh was "simply"

a problem of too little growth; but what we have seen in Bangladesh is generally low growth combined with signs of rising inequality, suggesting that the pattern of growth has not been particularly equitable. If not for the rising inequality over the period, we would have seen lower poverty measures in 1991/92; the urban poverty rate would have been 10% lower than it actually was in 1991/92, while the rural rate would have been 3% lower. The sectoral imbalance in progress in reducing poverty is also worrisome. Inequality between urban and rural sectors has increased; while the urban mean real consumption was 24% higher than the rural rate in 1983/84, the urban mean was 40% higher in 1991/92. If the basic-needs purchasing power of average expenditures in the rural sector had been able to grow at the same rate as that in the urban sector, then we would have seen the rural poverty rate reduced by one quarter over this period, instead of the modest 2% drop actually observed.

Provided that future economic growth is not associated with a worsening of existing inequalities, Bangladesh's poverty measures can be expected to respond quite elastically. The outcome will then depend largely on just how much real growth is achieved. However, a continuation of the 1980s trend of rising inequality in both urban and rural areas will make it considerably more difficult to prevent rising absolute numbers of poor in Bangladesh. For example, at population growth rates around 2%–2.5% per year, national income would have to grow at about 3%–4% per year to prevent an increase in the number of poor if inequality neither increases nor decreases; that rate is consistent with recent performance. However, the recent pattern of rising inequality in both urban and rural areas would mean that a growth rate in national income of 5%–6% per year would be needed before the number of poor stops rising.

Notes

* The views expressed in this article are ours and should not be attributed to the World Bank. We have benefited from the comments of Hafez Ghanem, Emmanuel Jimenez, Haider Ali Khan, Michael Lipton, Pradeep Mitra, Peter Nicholas, Shekhar Shah, Dominique van de Walle, the journal's referees, and seminar participants at the World Bank and participants at a meeting of the Association for Economic and Development Studies on Bangladesh. Shahadat Hossain and Taher Uddin Ahmed at the Bangladesh Bureau of Statistics have also helped us on matters related to the data used here.

1. Bangladesh Bureau of Statistics (BBS), *Report on the Household Expenditure Survey, 1988–89* (Dhaka: Bangladesh Bureau of Statistics, 1991). Also see Taher Uddin Ahmed, "Poverty in Bangladesh," in *Proceedings of the Workshop of Dissemination of Current Statistics* (Dhaka: Bangladesh Bureau of Statistics, 1991).

2. For a survey of the evidence see Michael Lipton and Martin Ravallion, "Poverty and Policy," in *Handbook of Development Economics,* vol. 3, ed. Jere Behrman and T. N. Srinivasan (Amsterdam: North-Holland, 1995).

3. Abu Abdullah, "Introduction," *Bangladesh Development Studies* 18 (1990): iii–vii; Azizur Rahman Khan, "Poverty in Bangladesh: A Consequence of and a Constraint of Growth," *Bangladesh Development Studies* 18 (1990): 19–34; Siddiqur Osmani, "Structural Change and Poverty in Bangladesh: The Case of a False Turning Point," *Bangladesh Development Studies* 18 (1990): 55–74, and "Notes on Some Recent Estimates of Rural Poverty in Bangladesh," *Bangladesh Development Studies* 18 (1990): 75–87; Martin Ravallion, "The Challenging Arithmetic of Poverty in Bangladesh," *Bangladesh Development Studies* 18 (1990): 35–54.

4. Martin Ravallion, "Agricultural Wages in Bangladesh: What *Do* the Figures Really Show?" *Journal of Development Studies* 31 (December 1994): 334–45.

5. Mustafa K. Mujeri, Quazi Shahabuddin, and Salehuddin Ahmed, "Macroeconomic Performance, Structural Adjustments and Equity: A Framework for Analysis of Macro-Micro Transmission Mechanisms in Bangladesh," in *Monitoring Adjustment and Poverty in Bangladesh,* Report on the Framework Project, CIRDAP Study Series no. 160 (Dhaka, Bangladesh: Centre for Integrated Rural Development for Asia and the Pacific, 1993).

6. Ravallion, "The Challenging Arithmetic of Poverty."

7. Khan, "Poverty in Bangladesh."

8. There are other differences between the 1981/82 survey and the last four, including the change to a smaller sample size, although this is unlikely to matter in the present context.

9. Of the four HES survey years, only 1988/89 was unusual in this respect, because of severe flooding. The agricultural output data referred to are from various issues of the *Monthly Statistical Bulletin of Bangladesh.*

10. V. M. Dandekar and N. Rath, *Poverty in India* (Pune: Indian School of Political Economy, 1971); Azizur Rahman Khan, "Poverty and Inequality in Rural Bangladesh," in *Poverty and Landlessness in Rural Asia* (Geneva: International Labour Organisation [ILO], 1977); Siddiqur Osmani, *Economic Inequality and Group Welfare* (Oxford: Oxford University Press, 1982); J. Greer and Erik Thorbecke, "A Methodology for Measuring Food Poverty Applied to Kenya," *Journal of Development Economics* 24 (1986): 59–74; Satya Paul, "A Model of Constructing the Poverty Line," *Journal of Development Economics* 30 (1989): 129–44; Aly Ercelawn, "Absolute Poverty as Risk of Hunger: Norms, Incidence, and Intensity for Rural and Urban Pakistan" (Applied Economics Research Centre, University of Karachi, 1991, mimeographed); Sudhir Anand and Christopher Harris, "Issues in the Measurement of Undernutrition," in *Nutrition and Poverty,* ed. S. R. Osmani (Oxford: Oxford University Press, 1992).

11. Akhter U. Ahmed, Haider A. Khan, and Rajan K. Sampath, "Poverty in Bangladesh: Measurement, Decomposition and Intertemporal Comparison," *Journal of Development Studies* 27 (1991): 48–63. Later we discuss the food bundle we have used and how it is valued. Note that Ahmed, Khan, and Sampath give regressions of food energy intake against (log) nominal food expenditures. Using our estimates of the food poverty line (the local cost of an appropriate food bundle), one can use their regressions to derive the relationship between food energy intake and real food expenditures (this simply requires an adjustment to their intercept).

12. This is not peculiar to Bangladesh, and we suspect it is quite common. See, e.g., Martin Ravallion and Benu Bidani, "How Robust Is a Poverty Profile?" *World Bank Economic Review* 8 (1994): 75–102, on Indonesia.

13. To some extent this reflects differences in housing quality, but that is not the only factor; ground rents are clearly higher in urban areas. We do not

know of evidence for Bangladesh, but on hedonic-price differentials for housing in Java see Martin Ravallion and Dominique van de Walle, "Urban-Rural Cost-of-Living Differentials in a Developing Economy," *Journal of Urban Economics* 29 (1991): 113–27.

14. This is not a theoretical property of the method, and empirical exceptions exist. For example, Gaurav Datt, "Poverty in India, 1950–1991" (Policy Research Department, World Bank, Washington, D.C., 1995, mimeographed), finds that the poverty lines for urban and rural India generated by the food-energy method appear to have constant real value in terms of commodities consumed by the poor.

15. Ravallion and Bidani.

16. Greer and Thorbecke.

17. Some of the activities in the urban informal sector may actually entail higher energy requirements compared with activities in rural areas. Casual observation suggests that activities such as rickshaw pulling and brick breaking, which represent a major source of the urban poor's employment, would entail similarly high energy expenditures compared with agricultural labor.

18. Anthony B. Atkinson, *The Economics of Inequality* (Oxford: Oxford University Press, 1975).

19. Some applications of this method have set the composition of that bundle to achieve nutritional requirements at minimum cost given prevailing prices. This could easily entail a diet that is alien to the tastes of poor people. We do not follow or recommend that approach. Rather, we recognize explicitly that the reference bundle of goods is a normative standard, which can be chosen to be consistent with the actual consumption choices of any reference group of households.

20. Dividing throughout by some reference poverty line one obtains a Laspeyres price index.

21. Though certain non-utility-based concepts of "welfare" would not deem this to be a problem; for further discussion see Ravallion and Bidani.

22. M. Alamgir, "Some Analysis of Distribution of Income, Consumption, Saving and Poverty in Bangladesh," *Bangladesh Development Studies* 2 (1974): 737–818; Qazi Kholiquzzaman Ahmad and Mahabub Hossain, "An Evaluation of Selected Policies and Programmes for Alleviation of Rural Poverty in Bangladesh" (Bangladesh Institute of Development Studies, Dhaka, 1984, mimeographed); M. Muqtada, "Poverty and Inequality: Trends and Causes," in *Bangladesh—Selected Issues in Employment and Development*, ed. Rizwanul Islam and M. Muqtada (New Delhi: ILO-ARTEP, 1986), pp. 75–92; Atiq Rahman and Trina Haque, "Poverty and Inequality in Bangladesh in the Eighties: An Analysis of Some Recent Evidence," Research Report no. 91 (Bangladesh Institute of Development Studies, Dhaka, 1988); Mahabub Hossain and Binayak Sen, "Rural Poverty in Bangladesh: Trends and Determinants," *Asian Development Review* 10 (1992): 1–34; Binayak Sen and Quazi Towfiqul Islam, "Monitoring Adjustment and Urban Poverty in Bangladesh: Issues, Dimensions, Tendencies," in *Monitoring Adjustment and Poverty in Bangladesh* (n. 5 above). The precise composition of the bundle has differed, sometimes to accommodate differences in price data, though often the choices made were not particularly appropriate for the poor; for examples, see Hossain and Sen. The precise requirement has also varied slightly, within the range of 2,100–2,200 calories.

23. Some observers consider this standard to be on the high side for Bangladesh. See Khan, "Poverty and Inequality" (n. 10 above).

24. Anand and Harris (n. 10 above); Lipton and Ravallion (n. 2 above).

25. Hossain and Sen; Rahman and Haque.

26. Alternatively one can fix the food share over time (such as in the Orshansky method, used for updating the official poverty lines for the United States; see Isabel Sawhill, "Poverty in the U.S.: Why Is It So Persistent?" *Journal of Economic Literature* 26 [1988]: 1073–1119). This does not require data on nonfood prices. The problem, however, is that the price of food relative to nonfood goods may change over time, creating drift in the real value of the poverty line, and hence inconsistencies in the poverty comparisons drawn. This may be important in Bangladesh over this period, since the relative price of food staples was generally falling.

27. Martin Ravallion, *Poverty Comparisons,* Fundamentals of Pure and Applied Economics, vol. 56 (Chur, Switzerland: Harwood Academic, 1994).

28. The only attempt we know of is the article by Ravallion and van de Walle (n. 13 above), which used hedonic regressions to estimate a spatial price index for housing appropriate to the poor in Java. This requires good data on dwelling characteristics.

29. Of course food prices are typically higher in urban areas than in rural areas (shown in table 2), but many nonfood prices (such as housing, although this accounts for only a small share of expenditure by the poor) are higher in urban areas. And it is the difference in relative prices that matters here.

30. Hossain and Sen.

31. Ravallion, *Poverty Comparisons.*

32. With the falling relative price of food, the allowance for nonfood needs increases over the period, rising to 42% in 1991/92.

33. Anthony B. Atkinson, "On the Measurement of Poverty," *Econometrica* 55 (1987): 749–64; James Foster and A. F. Shorrocks, "Poverty Orderings," *Econometrica* 56 (1988): 173–77; Ravallion, *Poverty Comparisons.*

34. For a survey of this literature, see James Foster, "On Economic Poverty: A Survey of Aggregate Measures," *Advances in Econometrics* 3 (1984): 215–51.

35. The limitations of the head-count index as a measure of poverty are now widely appreciated, particularly following Amartya Sen, "Poverty: An Ordinal Approach to Measurement," *Econometrica* 46 (1976): 437–46, and *Poverty and Famines: An Essay on Entitlement and Deprivation* (Oxford: Oxford University Press, 1981), and an extensive elaboration is not called for here. For a recent survey of the issues and references see Ravallion, *Poverty Comparisons.*

36. See James Foster, J. Greer, and Erik Thorbecke, "A Class of Decomposable Poverty Measures," *Econometrica* 52 (1984): 761–66, for a definition of the poverty-gap index, which has advantages over the income-gap ratio, obtained when the mean is only formed over those who are poor; for further discussion see Ravallion, *Poverty Comparisons.*

37. Foster, Greer, and Thorbecke.

38. Nanak Kakwani, "Poverty and Economic Growth with Applications to Côte D'Ivoire," *Review of Income and Wealth* 39 (1993): 121–39. Also see S. M. Ravi Kanbur, "Measurement and Alleviation of Poverty," *IMF Staff Papers* 34 (1987): 60–85.

39. Ahmed, Khan, and Sampath (n. 11 above).

40. Atkinson, "On the Measurement of Poverty."

41. For further discussion see Ravallion, *Poverty Comparisons* (n. 27 above).

42. On the poverty profile by landholding class in Bangladesh see Martin Ravallion and Binayak Sen, "Impacts on Rural Poverty of Land-Contingent Targeting: Some Further Results for Bangladesh," *World Development* 22 (1994): 823–38. The importance of the real wage rate to the rural poor in

Bangladesh has been a prominent link in analyses of the causes of the 1974 famine. See Sen, *Poverty and Famines;* Martin Ravallion, *Markets and Famines* (Oxford: Oxford University Press, 1987). Although there is no comparable time-series evidence for Bangladesh, the strong link between rural poverty measures and the real agricultural wage rate in India is borne out by the results of Martin Ravallion and Gaurav Datt, "Growth, Wages and Poverty: Time Series Evidence for India," Policy Research Working Paper (World Bank, Washington, D.C., 1994).

43. See Richard Palmer-Jones, "An Error Corrected? And What the Figures Really Show," *Journal of Development Studies* 31 (1994): 346–51.

44. It is not always obvious which source is being used in applied work; Palmer-Jones, e.g., simply splices the two without distinction. Publications of the BBS have not been particularly transparent either. In the successive statistical yearbooks (1980, 1986), usually only "BBS" is mentioned as the source of the ASW data, which appears under the heading "region-wise wage of agricultural labor." Data from the NIW, which are also published in the yearbook under the title "daily wage rates of selected groups of workers," also give only "BBS" as the source. So it is difficult, at least at first glance, to tell which source is used. The 1992 yearbook has added to the confusion by attributing both to "price section, BBS," a section within NIW.

45. Note that the ASW series is not available for several time points: January–November 1990; January–December 1992; January–June 1993. Data were not collected for these periods. Availability of ASW data in the published form is even less: the 1993 statistical yearbook provides district-wise data up to 1987/88; the recently published 1992 yearbook of agricultural statistics presents data for 1986–89, 1990 (December), and 1991.

46. For details on the sources and deflators used in constructing fig. 5, see Martin Ravallion and Binayak Sen, "New Evidence on Agricultural Wages in Bangladesh" (Policy Research Department, World Bank, Washington D.C., 1994, mimeographed).

47. A composite series was constructed by Palmer-Jones. The composite series splices the NIW series onto the ASW numbers at 1985; doing so gives the impression of a substantial gain in real wages, as shown in fig. 5 if one tracks the ASW series up to 1985 and then switches to the NIW numbers after that.

48. The survey was at thana level before July 1993, but at the finer union level from then on.

49. Before July 1993, ASW covered all 23 greater (old) districts and all 464 thanas, using weekly surveys of four or five preselected employers at thana-level rural centers.

50. This was estimated using parameterized Lorenz curves. We tested both the beta and generalized quadratic specifications; both gave valid Lorenz curves on these data, though the beta specification gave a better fit. The explicit formulas for all three poverty measures as functions of the parameters of both Lorenz curves can be found in Gaurav Datt and Martin Ravallion, "Growth and Redistribution Components of Changes in Poverty Measures: A Decomposition with Applications to Brazil and India in the 1980s," *Journal of Development Economics* 38 (1992): 275–95. A user-friendly program for PCs, POVCAL, that implements these simulations is available from Martin Ravallion. See Shaohua Chen, Gaurav Datt, and Martin Ravallion, "POVCAL: A User-Friendly Computer Program for Poverty Analysis Using Grouped Data" (Policy Research Department, World Bank, Washington, D.C., 1992).

51. So, e.g., the elasticity of the urban head-count index of -1.1 is the

ratio of the percentage decrease in that index over the period (−17.85, from table 2) to the percentage increase in the mean, normalized by the poverty line (16.79, from table 3).

52. The formulas for these elasticities can be found in Kakwani (n. 38 above). While we focus solely on the 1991/92 distribution, the results in table 7 indicate that these elasticities are quite stable over time.

53. Martin Ravallion and Monika Huppi, "Measuring Changes in Poverty: A Methodological Case Study of Indonesia during an Adjustment Period," *World Bank Economic Review* 5 (1991): 57–84. Over this period in Indonesia, the national Gini index fell by 3.0% (from 33.1% to 32.1%) while mean real consumption per person rose by 15.7%. In urban areas the Gini fell by 1.2%, while the mean rose by 12.1%, while in rural areas the corresponding percentages were 5.5 and 14.6.

54. The number of poor will then remain constant if the rate of growth in national income equals the rate of population growth times 1 − 1/(growth elasticity).