Regional poverty estimates for India, 1999-2000

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This note presenta adjusted poverty headcount ratios for the regions of the major state of India using the data from the 55th Round of the Indian National Sample Survey. These estimates are compatible with and extend those presented in Deaton and Drèze (2002) and are designed to be used alongside them. Deaton and Drèze presented estimates for the major states, but did not disaggregate beyond that. For many of the large states, in which poverty is not evenly distributed, there is considerable interest in the regional patterns of poverty and of poverty decline. The tables in this note are address that interest.

The methods used here are a simplified parametric version of the methods originally reported in Deaton (2003a) Deaton (2003b), Tarozzi (2003), and Deaton and Drèze (2002). As in those papers, the adjustment to the raw data in the 55th Round relies on the fact that a subset of goods was collected in the same way, using a 30-day recall period, in the 55th Round as in previous rounds. The procedure begins by using the 50th Round to estimate, for each state and sector separately, the probability of a household being in poverty as a function of its expenditure on these "30-day goods." These estimated functions are then combined with actual expenditures (at 50th Round prices) on 30-day goods in the 55th Round in order to calculate the fraction of people in poverty. In Deaton's original calculations, and those reported in Deaton and Drèze, the first stage estimation was done nonparametrically, and the second stage evaluation by integrating the estimated function over the nonparametrically estimated density of 30-day goods in the 55th Round.

Given that I wish to estimate at a level below the state, a replication of the original method would require estimating probability of being poor functions at the regional level. Alternatively, it is possible to retain the state-level probability functions, but apply them at the regional level. I report results for both methods in Tables 2 through 16; HCR Round 55(S) refers to estimates

using probability of being poor functions estimated at the state level, while HCR Round 55 (R) refers to estimates using region-level estimates. The state-based procedure economizes on data, but that does not seem to be a problem here, and there is evidence that, at least within some states, there are regional differences in the probability of being poor conditional on expenditures on 30-day goods. As a result, the regional estimates are to be preferred.

For transparency, and possibly also for additional precision, I have replaced the nonparametric probability functions by simple probits, so that the first stage is to estimate the probability of being poor as a probit on the logarithm of per capita expenditure on 30-day goods. Other functional forms and choice of variable are clearly possible, but this one appears to be adequate, in terms of replicating the original nonparametric results. At the second stage, I have replaced the integration by a simpler and more transparent method. For each household in the 55^{th} Round, I use the parameters from the first stage probit, together with the logarithm of real expenditures on 30-day goods in the 55^{th} Round, to calculate a probability of its being poor. Averaging these estimated probabilities over states should give state-level poverty estimates that are close to those in Deaton and Drèze, while averaging over regions within states provides regional level poverty estimates that are automatically consistent with the state-level estimates already reported.

A few other details. The poverty lines for each sector of each state are those presented in Deaton (2003b) and used in Deaton and Drèze (2002). There is no attempt to calculate region-specific poverty lines, although that would be possible in principle given the original methodology. These state and sector poverty lines are based on the official All India rural poverty line for 1987-88, which is updated over time, sector, and state using food-based Tornqvist price indexes calculated from the survey data themselves, see Deaton and Tarozzi

(2000) and Deaton (2003b). The state and sector Tornqvist price index inflation rates for 1999-2000 relative to 1993-94 are used to deflate reported expenditure on 30-day goods from the 55th Round.

Note that there is no claim that these estimates are the only ones possible, nor even that they are the best available. But they have the virtue of being calculated on the basis of a clear and plausible set of assumptions, namely (a) that the probability of being poor (i.e. of having per capita total expenditure less than the constant real state and sector specific poverty line if the 55th Round had been executed in the same way as the 50th Round) conditional on reported expenditures on 30-day goods was the same in 1999-2000 as it was in 1993-94, and (b) that changes in the design of the survey had no effect on reported expenditures on 30-day goods. Such estimates should be contrasted with those such as Kijima and Lanjouw (2003), which are based on the assumption of a stable relationship between poverty and selected household characteristics, such as education, land-holding, district of residence, or scheduled caste and tribe status . Such a model cannot capture declines in poverty that are not associated with changes in household characteristics, for example those that come from an increase in agricultural productivity, or from an increase in the rate of return to education. One can only hope that, as India becomes less poor, at least some of the reduction in poverty comes from higher returns to the same amount of work, or from reducing the penalty associated with being a Dalit family. To assume that this cannot happen is as statistically unsound as it is defeatist.

Not only do Kijima and Lanjouw's estimates suffer from the inclusion of illegitimate variables in their probability of being poor functions, but they also suffer from exclusion of the most important variable, expenditure on 30-day goods. This exclusion, which appears to be motivated by nothing more than a desire to distinguish their estimates from those of Deaton and

Drèze (and certainly the failure of assumption b above is the least of our concerns), costs a great deal in their ability to fit per capita expenditure and thus to accurately capture the probability of being poor. Across all the urban and rural regions reported here, the correlation between the logarithm of total per capita expenditure and the logarithm of per capita expenditure on 30-day goods ranges from 0.71 to 0.93. According to Kijima and Lanjouw, their multivariate regressions have R^2 statistics that average only around 0.5.

Table 1 presents the state level headcount ratios for the 50th Round, as well as those from the 55th Round, as reported in Deaton and Drèze (2002), and as recalculated here using the simplified parametric method. The Table's main function is to show that the simplifications deliver almost the same results as the original method. The subsequent tables, for each of the main states, presents the 50th Round regional headcount ratios, as well as those calculated in this paper under the two sets of assumptions about the conditional probability functions. The final columns are my currently preferred estimates.

The estimates in the final column are often close to, but are far from identical to, those presented by Kijima and Lanjouw as representative of what the Deaton and Dreze method would imply. The differences presumably come from differences in the parametric specification, and perhaps from the unnecessarily roundabout method used by Kijima and Lanjouw, who do not estimate the probability of being poor directly, but first estimate per capita total expenditure. Such roundaboutness is always a potential source of error.

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Table 1
Headcount ratios: 50th Round and 55th Round

	Round 50	Round 55: Deaton and Drèze	Round 55: parametric simplified
Rural			
Andhra Pradesh	29.2	26.2	26.4
Assam	35.4	35.5	36.2
Bihar	48.6	41.1	41.5
Gujarat	32.5	20.0	20.0
Haryana	17.0	5.7	5.6
Himachal Pradesh	17.1	9.8	9.4
Jammu & Kashmir	10.1	6.1	5.9
Karnataka	37.9	30.7	30.9
Kerala	19.5	10.0	9.7
Madhya Pradesh	36.6	31.3	31.2
Maharashtra	42.9	31.9	32.0
Orissa	43.5	43.0	43.6
Punjab	6.2	2.4	2.6
Rajasthan	23.0	17.3	17.1
Tamil Nadu	38.5	24.3	24.1
Uttar Pradesh	28.6	21.5	21.4
West Bengal	25.1	21.9	22.5
Urban			
Andhra Pradesh	17.8	10.8	11.4
Assam	13.0	11.8	12.9
Bihar	26.7	24.7	24.7
Gujarat	14.7	6.4	6.4
Haryana	10.5	4.6	4.8
Himachal Pradesh	3.6	1.2	1.0
Jammu & Kashmir	3.1	1.3	1.7
Karnataka	21.4	10.8	10.7
Kerala	13.9	9.6	8.9
Madhya Pradesh	18.5	13.9	13.8
Maharashtra	18.2	12.0	12.1
Orissa	15.2	15.6	15.8
Punjab	7.8	3.4	3.2
Rajasthan	18.3	10.8	10.3
Tamil Nadu	20.8	11.3	10.9
Uttar Pradesh	21.7	17.3	17.4
West Bengal	15.5	11.3	11.0
Delhi	8.8	2.4	2.5

Table 2

Andhra Pradesh poverty rates

Rural	HCR Round 50	HCR Round 55(S)	HCR Round 55(R)
State	29.2	26.4	26.3
Coastal	31.3	23.1	24.3
Northern	26.1	26.1	24.9
Western	38.6	34.9	37.8
Southern	21.9	35.3	29.9
Urban			
State	17.8	11.4	11.2
Coastal	20.1	11.4	12.2
Northern	12.3	10.0	8.7
Western	20.3	20.1	17.9
Southern	26.1	10.5	12.8

Table 3

Assam poverty rates

Rural	HCR Round 50	HCR Round 55(S)	HCR Round 55(S)
State	35.4	36.2	35.8
Eastern	29.2	34.6	32.6
Western	39.5	36.4	37.5
Hills	31.0	50.5	43.6
Urban			
State	13.0	12.9	13.3
Eastern	8.2	15.1	17.2
Western	16.5	11.4	11.4
Hills	4.7	17.9	11.1

Table 4

Bihar poverty rates

Rural	HCR Round 50	HCR Round 55 (S)	HCR Round55 (R)
State	48.6	41.5	41.4
Southern	52.6	48.1	45.0
Northern	49.3	36.9	38.0
Central	44.4	44.0	44.1
Urban			
State	26.7	24.7	25.1
Southern	19.2	24.6	19.7
Northern	39.5	30.6	35.3
Central	27.3	20.8	23.3

Table 5

Gujarat poverty rates

Rural	HCR Round 50	HCR Round 55(S)	HCR Round 55(R)
State	32.5	20.0	20.7
Eastern	34.2	26.7	31.6
Northern	32.1	17.8	17.3
Southern	41.1	20.8	27.7
Dry Areas	38.7	23.7	24.0
Saurashtra	21.6	13.4	7.7
Urban			
State	14.7	6.4	6.4
Eastern	13.1	9.1	4.6
Northern	16.1	5.7	6.2
Southern	11.5	4.6	6.1
Dry Areas	12.0	11.3	12.5
Saurashtra	15.8	6.8	5.7

Table 6

Haryana poverty rates

Rural	HCR Round 50	HCR Round 55(S)	HCR Round 55(R)
State	17.0	5.6	5.2
Eastern	19.2	4.0	4.5
Western	13.9	8.7	6.5
Urban			
State	10.5	4.8	4.9
Eastern	9.9	4.1	4.1
Western	12.0	6.8	7.1

Table 7

Karnataka poverty rates

Rural	HCR Round 50	HCR Round 55(S)	HCR Round 55(R)
State	37.9	30.9	32.5
Coastal	12.1	21.9	11.4
Eastern	22.3	13.8	6.3
Southern	39.6	21.6	23.1
Northern	45.2	41.0	46.7
Urban			
State	21.4	10.7	10.5
Coastal	5.1	14.6	6.7
Eastern	19.7	13.0	8.4
Southern	11.6	3.7	3.5
Northern	35.9	19.8	22.1

Table 8

Kerala poverty rates

Rural	HCR Round 50	HCR Round 55(S)	HCR Round 55(R)
State	19.5	9.7	10.2
Northern	21.8	13.6	15.5
Southern	18.0	7.0	6.5
Urban			
State	13.9	8.9	9.2
Northern	15.3	13.8	15.4
Southern	13.0	5.7	5.2

Table 9

Madhya Pradesh poverty rates

Rural	HCR Round 50	HCR Round 55(S)	HCR Round 55(R)
State	36.6	31.2	31.5
Chattisgar	38.8	43.6	36.5
Vindhya	32.3	29.4	30.4
Central	45.7	24.3	22.2
Malwa	23.8	19.4	17.3
South	42.5	35.7	47.6
Western	64.9	26.1	47.8
Northern	15.2	23.4	16.1
Urban			
State	18.5	13.8	13.3
Chattisgar	13.5	14.2	9.5
Vindhya	15.1	25.4	18.6
Central	25.3	9.8	10.0
Malwa	15.3	7.8	7.9
South	22.6	14.5	20.1
Western	30.5	14.5	20.8
Northern	15.2	16.9	15.8

Table 10

Maharashtra poverty rates

Rural	HCR Round 50	HCR Round 55(S)	HCR Round 55(R)
State	42.9	32.0	32.6
Coastal	19.1	25.6	15.2
Western	29.7	19.3	16.2
Northern	53.3	43.1	43.3
Central	53.4	39.5	42.2
Inland Eastern	55.6	33.7	46.6
Eastern	55.2	46.1	45.2
Urban			
State	18.2	12.1	12.6
Coastal	3.9	4.1	2.0
Western	16.2	9.9	8.5
Northern	31.0	22.9	23.2
Central	43.3	32.2	40.0
Inland Eastern	37.9	21.1	28.2
Eastern	19.8	13.4	11.7

Table 11

Orissa poverty rates

Rural	HCR Round 50	HCR Round 55(S)	HCR Round 55(R)
State	43.5	43.6	43.3
Coastal	39.0	31.3	31.8
Southern	63.2	67.5	70.3
Northern	39.3	48.0	44.9
Urban			
State	15.2	15.8	16.0
Coastal	15.1	14.5	14.5
Southern	26.7	18.8	20.8
Northern	11.1	16.7	16.3

Table 12

Punjab poverty rates

Rural	HCR Round 50	HCR Round 55(S)	HCR Round 55(R)
State	6.2	2.6	2.5
Northern	3.6	2.7	2.2
Southern	9.5	2.5	2.9
Urban			
State	7.8	3.2	2.9
Northern	5.2	3.4	2.6
Southern	12.3	2.7	3.6

Table 13

Rajasthan poverty rates

Rural	HCR Round 50	HCR Round 55(S)	HCR Round 55(R)
State	23.0	17.1	17.5
Western	21.5	16.7	14.4
Northern	15.0	16.6	9.4
Southern	42.4	17.8	38.0
Eastern	30.5	18.6	28.3
Urban			
State	18.3	10.3	9.8
Western	10.7	9.2	4.8
Northern	21.1	11.5	11.7
Southern	15.1	4.0	4.5
Eastern	28.0	13.4	23.4

Table 14

Tamil Nadu poverty rates

Rural	HCR Round 50	HCR Round 55 (S)	HCR Round 55 (R)
State	38.5	24.1	24.1
Northern	49.5	30.4	38.0
Coastal	24.8	24.1	16.7
Southern	42.1	23.1	19.7
Inland	29.8	16.9	17.2
Urban			
State	20.8	10.9	10.8
Northern	20.9	9.7	11.1
Coastal	22.8	13.2	12.4
Southern	27.5	13.1	12.3
Inland	12.7	9.7	7.5

Table 15

Uttar Pradesh poverty rates

Rural	HCR Round 50	HCR Round 55(S)	HCR Round 55(R)
State	28.6	21.4	21.5
Himalayan	13.2	18.9	10.3
Western	17.0	13.8	11.8
Central	37.1	25.4	30.9
Eastern	33.8	26.4	26.4
Southern	51.0	17.4	21.2
Urban			
State	21.7	17.4	17.5
Himalayan	12.0	10.8	14.5
Western	18.0	16.2	16.0
Central	22.3	17.7	17.5
Eastern	24.4	21.0	20.4
Southern	46.3	21.7	25.7

Table 16

West Bengal poverty rates

Rural	HCR Round 50	HCR Round 55 (S)	HCR Round 55 (R)
State	25.1	22.5	22.9
Himalayan	37.6	25.4	26.1
Central	30.0	25.7	28.5
Eastern	20.2	16.8	16.7
Western	21.2	25.2	22.4
Urban			
State	15.5	11.0	10.8
Himalayan	23.9	17.0	13.7
Central	25.6	18.1	21.1
Eastern	11.4	9.4	8.5
Western	33.5	11.7	14.4