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Poverty in India during the 1990s

A Regional Perspective

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Abstract

Kijima and Lanjouw provide estimates of poverty at the regional level in India spanning the 1990s. Such estimates have not been previously available due to concerns regarding noncomparability of the 1993–94 and 1999–2000 National Sample Survey Organization (NSSO) household survey data. They implement an adjustment procedure to restore comparability based on a methodology developed by Elbers and others (2003). The results indicate a less rapid decline of poverty at the all-India level than has been suggested by Deaton and Drèze (2002) based on a related adjustment methodology. The authors attempt to uncover the source of disagreement across these procedures by probing a number of their underlying assumptions.

Poverty in India during the 1990s: A Regional Perspective

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I. Introduction

There has been intensive debate in recent years regarding the extent to which poverty in India declined during the 1990s. The decade was one during which aggregate economic growth accelerated, at least in part the result of a program of economic reform and liberalization that was initiated during the 1980s and further intensified during the 1990s. A key question concerns the degree to which this economic growth contributed to higher living standards among India's poor.

Much of the analysis of poverty in India is based on National Sample Survey (NSS) household survey data. During the 1990s, NSS surveys were fielded annually, with two rounds - in 1993/4 (the 50th round), and then again in 1999/0 (the 55th round) – covering samples sufficiently large to yield state- and even sub-state level estimates of poverty with reasonably high levels of precision (NSS regions).

A recent special issue of <u>Economic and Political Weekly</u> (January 25, 2003) is devoted to the subject of poverty and its recent evolution in India, and pays particular attention to an important potential measurement problem in the NSS surveys for the 1990s. The problem is well described in several of the papers included in the special issue (Deaton, 2003a, Datt, Kozel and Ravallion, 2003, Sundaram and Tendulkar, 2003). To briefly summarize, consumption data in the 50th round of the NSS survey used a 30-day recall period for all goods. Starting from the 51st round (referring to the 1994/5 period) and continuing through to the 54th round (known as "thin" rounds due to their relatively small sample sizes), the NSS experimented with different recall periods. Households were randomly assigned either the original uniform 30-day recall questionnaire or one that applied different recall periods to different types of goods (a 7-day recall period for food

items, for example, and a 365-day recall period for non-food, low-frequency items). The next "thick" round of the NSS survey - the 55th round (referring to 1999/0) - continued with the experimentation, but introduced a new innovation in that all households were asked to report expenditures for both the 30-day and the alternative recall period. As Deaton (2003a) argues, the results are unlikely to be comparable with those from a questionnaire in which only the 30-day questions are used (as in the 50th round). It seems likely that, possibly inadvertently, households would try to reconcile their answers to questions that refer to different recall periods, thereby compromising comparability with the earlier consumption data.

Ignoring these potential comparability problems produces estimates of poverty for 1999/0 that are dramatically lower than in 1993/4. Deaton and Drèze (2002) present estimates of the decline in poverty between the 50th and the 55th rounds based on unadjusted figures and indicate, for example, that in rural areas poverty declined from an all-India headcount rate of 37.1 percent to 26.8 percent. In urban areas, the rate of decline is only slightly slower (in terms of the percentage point decline) with poverty falling from 32.9 percent in 1993/4 to a headcount of 24.1 percent in 1999/0. Such rates of poverty decline in India are remarkable given past trends, and have attracted much attention.

To what extent is this evidence of impressive poverty reduction driven by the problems of non-comparability outlined above? A variety of approaches have been proposed to "correct" poverty estimates for 1999/0 and render them comparable with those for 1993/4. Datt and Ravallion (2002), and Datt, Kozel and Ravallion (2003) predict the rate of poverty reduction over the period 1994-2000 on the basis of an econometric time-series model based on 20 rounds of NSS data for India's 15 main states between 1960 and

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1994. They find that the overall incidence of poverty is projected to have declined only slowly during the 1993/4-1999/0 period; more slowly than during the 1980s. Sundaram and Tendulkar (2003), on the other hand, suggest that the rate of decline of rural poverty between the 50th and 55th rounds is indeed not far from the 10 percentage point decline that derives from the unadjusted poverty comparisons. Their conclusion is based on an assessment of potential "contamination" of responses to the 30-day reference period questions on food consumption in the 55th round questionnaire as well as some adjustments to low-frequency goods consumption in the 50th round.[2] They use complementary data from Schedule 10 of the NSS survey – an employment module that contains some aggregated information on consumption, and which is fielded in 1999/0 to a different sub-sample of households.

This paper studies yet another approach to achieving comparability of poverty estimates across this time period. The idea here is to predict per capita consumption at the level of each household in the 55th round based on a model of consumption estimated using the 50th round, thereby ensuring that the definition of consumption remains the same across the two data sources. We estimate poverty in the 55th round based on this imputed consumption aggregate, and track changes in poverty over time by comparing these poverty estimates with those derived from the 50th round.

This approach of imputing consumption from one data source into another data source has been applied by Elbers, Lanjouw and Lanjouw (2002, 2003) in a number of countries in the context of producing "maps" of poverty and inequality by imputing consumption from a household survey into the population census. In a series of recent papers, Angus Deaton and colleagues have explored similar methods to address the specific

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[2] Sen (2003) casts some doubt on the conclusions reached by Sundaram and Tendulkar (2003).

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question of how poverty has evolved in India during the 1990s (Tarozzi, 2001, Deaton 2001, 2003a and Deaton and Drèze, 2002). In this latter set of studies, adjustments to the poverty estimates for 1999/0 are proposed that are based on the observation that some goods were treated the same way in both the 50th and 55th round questionnaires. In the 55th round, information on household consumption of items belonging to six broad classes (fuel and light, miscellaneous goods, miscellaneous services, non-institutional medical services, rent, and consumer cesses and taxes) were solicited only on the basis of 30-day recall, just as in the 50th round. There are thus grounds to suppose that this "30-day intermediate goods" consumption is comparable across the two surveys. Consumption on these intermediate goods accounts for around 20 percent of all expenditures and is also highly correlated with total household expenditure. Assuming that reported expenditures on the 30-day intermediate goods are not contaminated by the changes elsewhere in the questionnaire, non-parametric regression techniques are applied to "predict" poverty rates in 1999/0 based on the observed empirical relationship in 1993/4 between total per capita consumption and 30-day intermediate goods consumption. In this way Deaton and Drèze (2002) produce estimates of poverty at the national and state-level.[3]

In this paper we produce estimates of poverty for 1999/0, but at the level of "NSS regions" within states, in addition to the state level (there are some 60 regions within the 15 main states of India). We use a method which is either fully- or semi-parametric (see Elbers et al, 2002, 2003) and show that it can produce estimates that are very close the Deaton and Drèze (2002) non-parametric state level estimates.

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[3] The adjusted figures presented in Deaton and Drèze incorporate not just adjustments to correct for changes in questionnaire design, but also apply improved spatial and temporal price indices proposed by Deaton and Tarozzi (2000), and Deaton (2003b). Throughout this paper all calculations incorporate these improved price indices. Differences in results are thus only due to alternative approaches to correcting data for changes in questionnaire design.

The appeal of the more parametric methods is that they can be very easily applied in a large number of smaller regions. They can also be readily extended to produce not just the expectation of poverty in 1999/0 conditional on 30-day intermediate goods expenditures, but also the expectation conditional on any number of alternative or additional variables. We use this latter feature to gauge whether the poverty estimates reported in Deaton and Drèze (2002) are robust to alternative specifications of the prediction model.

We are also able to assess whether the techniques applied here could in principle be used in settings where a sub-component of consumption, comparable to the 30-day intermediate goods expenditure is not available. Problems with comparability of consumption data across surveys are ubiquitous in developing countries. It is not always the case in such settings that any components of consumption are strictly comparable. But there are almost always at least some non-consumption variables in the two surveys that are identically defined.

We show that basing projections of poverty in 1999/0 on 30-day intermediate goods expenditure (hereafter "30-day expenditure") produces estimates of region-level poverty, and of region-level poverty decline, that are sometimes quite striking.[4] Estimates of region-level poverty based on sets of variables other than 30-day expenditure at times differ markedly from the estimates based on 30-day expenditure. All of the imputation procedures examined in this paper rely on an assumed stability of relationships over time. We note that the estimates based on the "preferred" multivariate model are predicated on an assumption of underlying model stability that may be viewed as less attractive than if one works only

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[4] Datt and Ravallion (2002) and Datt, Kozel and Ravallion (2003) show on the basis of longitudinal data that poverty decline in India has historically been strongly associated with growth in nonagricultural output, high levels of initial rural development

with 30-day expenditure. Although the data are available for only a few states, we consider a third specification of the consumption model based on durable goods ownership in an attempt to probe further these assumptions of stability.

In the next section of this paper we provide a description of the methodology we employ to produce state and region-level estimates of poverty in rural India. We describe the basic implementation of the method with the NSS data. Section III presents results and compares estimates of poverty at the state and regional level, and across the variety of methods that have been proposed. In Section IV we probe some of the assumptions underlying the various adjustment methods. In Section V we examine how well regional estimates of rural poverty correlate with data on region-average agricultural wages and employment shares. In section VI we summarize and conclude.

II. A Methodology for Producing Region-Level, Comparable, Estimates of Poverty

The methodology we implement here has been described in detail in Elbers, Lanjouw and Lanjouw (2002, 2003). The basic idea is straightforward. We estimate poverty based on a household per-capita measure of consumption expenditure, y_h. A model of y_h is estimated using the NSS survey data from the 50th (1993-4) round, restricting explanatory variables to those that are strictly comparable across the 50th and 55th NSS rounds. We use three different specifications. The first, in the spirit of Tarozzi (2001), Deaton (2003a), and Deaton and Drèze (2002), models per capita total expenditure as a function of the single regressor, 30-day expenditure. The second and third specifications are multivariate models that exclude 30-day expenditure. The second specification regresses

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consumption on a set of demographic, occupational and educational variables from the non-consumption sections of the Schedule 1.0 NSS questionnaire. The explanatory variables employed in this specification all come from the first few pages of the questionnaire, before any information on consumption expenditures has been solicited (and therefore before households are confronted with any changes in the consumption related questions). The third specification regresses consumption on household ownership of a set of consumer durables. For reasons of data availability (discussed further below) we are unable to estimate our third specification in all states and regions of India and we thus view this third model mainly as a useful check on robustness of the other two.

Letting W represent an indicator of poverty or inequality, we estimate the expected level of W given NSS 55th round observable characteristics (30 day expenditure, or the sets of alternative variables) and parameter estimates from model estimated on the 50th round data.

We model the observed log per-capita expenditure for household h as:

(1) $\ln y_h = \mathbf{x}_h \beta + u_h,$

where $\mathbf{x}_h \beta$ is a vector of k parameters and u_h is a disturbance term satisfying $E[u_h|x_h] = 0$. The model in (1) is estimated using the 50th round data. We will use these estimates to calculate the welfare of an area or group in the 55th round data. We will refer to our target population as a 'region'.

Because the disturbances for households in the target population are always unknown, we consider estimating the expected value of the indicator given the 55th round households' observable characteristics and the model of expenditure in (1). We denote this expectation as

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(2) $\mu_v^s = \mathrm{E}[W \mid \mathbb{X}_v^s, \xi]$,

where ξ is the vector of model parameters, including those which describe the distribution of the disturbances, and the superscript 's' indicates that the expectation is conditional on the sample of 55th round households from region v rather than a census of households.

In constructing an estimator of μ_v^s we replace the unknown vector ξ with consistent estimators, $\hat{\xi}$, from the 50th round expenditure regression. This yields $\hat{\mu}_v^s$. This expectation is generally analytically intractable so we use simulation to obtain our estimator, $\tilde{\mu}_v^s$.

The difference between $\tilde{\mu}_v^s$, our estimator of the expected value of W for the region, and the <u>actual</u> level of welfare for the region reflects four components. The first, (*idiosyncratic error*), is due to the presence of a disturbance term in the first stage model which implies that households' actual expenditures deviate from their expected values. This component becomes important only if the target population (an NSS-region in our case) is very small.[5] In our application this is never the case, and we can thus ignore this component of the prediction error. The second component is due to the fact that we are imputing into a sample rather than a census of households (*sampling error*). We calculate sampling errors on our poverty estimates taking into account the fact that the NSS surveys are complex samples which involve stratification and multi-stage clustering (see Howes and Lanjouw, 1998, Deaton, 1997) . The third component of our prediction error is due to variance in the first-stage estimates of the parameters of the expenditure model (*model error*). We calculate the variance due to model error using the delta method (see Elbers et al 2002, 2003). The

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[5] Elbers et al (2002) suggest that the idiosyncratic error is likely to disappear with populations of 10,000 households or more. Note, that the population of concern is not the *sample* but the actual true underlying *population*.

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fourth component of our prediction error is due to inexact method to compute $\hat{\mu}^s$ (*computation error*). This component can be set arbitrarily small by choosing a large enough set of simulation draws.

Implementation

We describe below implementation of the approach when the model is estimated at the region level, and when the specification includes a large subset of explanatory variables. We then briefly describe how this basic implementation is modified when the models are estimated at the state-level, or when the single-variable specification of 30-day consumption is employed.

The first-stage estimation is carried out using the 50th round survey. This survey is stratified at the regional level (multiple regions within each state) and is intended to be representative at that level. Within each region there are further levels of stratification, and also clustering. At the final level, 10 households (a cluster) are randomly selected from a census enumeration area.

Our empirical model of household consumption allows for an intra-cluster correlation in the disturbances (see Elbers, Lanjouw and Lanjouw, 2002, 2003 for more details). Failing to take account of spatial correlation in the disturbances would result in underestimated standard errors. We estimate different models for each region and we include in our specification district dummies aimed at capturing district-level effects. All regressions are estimated with household weights. We also model heteroskedasticity in the household-specific part of the residual, limiting the number of explanatory variables to be cautious about overfitting. We approximate both the cluster- and household-level

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disturbances as either normal or t distributions with varying degrees of freedom.[6] Before proceeding to simulation, the estimated variance-covariance matrix is used to obtain GLS estimates of the first-stage parameters and their variance.

As mentioned above, to produce region-level estimates of poverty, a separate model is estimated for each region. Chow tests generally reject the null that parameter estimates are the same across regions, even within the same state. Table 1 presents an example of the model estimates for one region in Andhra Pradesh, western AP, and for the first two specifications (30-day expenditure only, and the set of household regressors). As noted by Deaton (2003a) the 30-day intermediate goods expenditure variable is highly correlated with per-capita total expenditure. Adjusted R^2's for this specification are generally in the range of 0.6-0.8, while those for the multivariate model are generally in the 0.3-0.7 range.[7]

The same specification for the multivariate model was used in all regions for reasons of convenience. Greater explanatory power might have been achieved if the model were more closely tailored to specific regions. Sample sizes at the region level range from around 300 observations to more than 3000.

III. Poverty Trends: State and Regional Level

State-Level Comparisons Across Methods

Table 2 presents state-level estimates of rural poverty in India from the 50th and 55th rounds of the NSS surveys (Table 3 provides comparable estimates of urban poverty). Column one reproduces the estimates of the incidence of poverty in the 50th round presented by Deaton and Drèze (2002), and column two presents the Deaton and Drèze

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[6] Rather than drawing from parametric distributions in our simulations, we can also employ a semi-parametric approach by drawing from observed residuals in the first stage model. Our results were found to be quite robust to the choice of parametric or semi-parametric draws.

adjusted estimates for the 55th round, based on the non-parametric method and 30-day expenditure. Column 3 presents state-level estimates based on the parametric method described above and also the 30-day expenditure explanatory variable. Comparing columns 2 and 3 in Tables 2 and 3 we see that the choice of employing a parametric or a non-parametric method to produce estimates of poverty at the state level does not seem to matter much. Predicted poverty rates from the parametric approach are very close to those reported by Deaton and Drèze (2002). In very few cases, notably rural Uttar Pradesh or urban Tamil Nadu, is the Deaton and Drèze estimate outside the (generally narrow) 95% confidence interval around the predicted poverty rate from the parametric method. If a standard error around the Deaton and Drèze estimate (not reported by them) were also taken into consideration, it is likely that one would fail to reject equality of even the Uttar Pradesh estimates.

In column 4 we present population weighted averages of region-level estimates of poverty obtained from the parametric method and employing the same single-regressor model. Although Chow tests generally indicate that models should be estimated at the region-level, Column 4 in Tables 2 and 3 indicates that regional estimates aggregated to the state-level are largely the same as those that emerge when a single model is estimated for each state (Column 3).

What does matter is the choice of explanatory variables. Compare the Deaton and Drèze (2002) estimates with the estimates in column 5, based on the multivariate specification comprising an extended set of household characteristics and excluding 30 day expenditure. In general, poverty in the 55th round is higher when estimated on the basis of

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[7] For reasons of space we do not reproduce here the parameter estimates and full set of diagnostics for all regression models. These can be furnished upon request.

the multivariate model. For example, while Deaton and Drèze (2002) report a decline of 7.5 percentage points between the 50th and 55th rounds in rural Bihar, and 7.1 percentage points in rural Uttar Pradesh, the multivariate model suggests that poverty decline in these two states over this period has been much more modest – 2.7 percentage points in rural Bihar and 2.6 percentage points in rural Uttar Pradesh. Similarly, whereas Deaton and Drèze suggest that poverty in urban Bihar has declined marginally from 26.7 to 24.7 percent, the multivariate model suggests that urban poverty may in fact have *risen*, to 30.4 percent. Although in general the multivariate model suggests that the rate of poverty decline in urban and rural areas has been slower than that suggested by Deaton and Drèze (2002), the multivariate model does not systematically report a slower rate of decline relative to the Deaton and Drèze estimates. In some states, rate of poverty decline is *higher* according to this model. For example, in rural Andhra Pradesh poverty is estimated to have declined from 29.2 to 22.7 percent rather than to 26.2 percent as estimated by Deaton and Drèze, and in Orissa the multivariate model predicts a decline of poverty from 43.5 to 37.4 percent compared to virtually no change according to Deaton and Drèze (2002).

In general the *ranking* of states by poverty in 1999/0 according to the two models is not wildly different. The multivariate model suggests that several states in South (Kerala, Karnataka, Andhra Pradesh) would move up in a state-ranking of rural poverty (with more poverty giving a lower rank) while several states in the North and North West (Gujarat, Haryana, Uttar Pradesh) and also Tamil Nadu in the South, would move down in the rankings. According to the 30-day expenditure model, the stars in terms of percentage decline in rural poverty are Haryana (66.4% decline), Punjab (61.3% decline), Kerala (48.7%), Himachal Pradesh (42.6%), Gujarat (38%) and Tamil Nadu (37%). The

multivariate model also confirms the good progress in Kerala and Himachal Pradesh (30% and 26% declines respectively), but finds less impressive reductions in these other states and no evidence of change at all in rural Punjab.

For urban areas the 30-day expenditure model suggests that poverty has declined most rapidly in Delhi (73%), Himachal Pradesh (64%), Haryana (57%), Punjab (56%) and Gujarat (56%). The multivariate model also suggests that urban poverty has declined significantly in Delhi, Kerala, Gujarat and Himachal Pradesh, but not obviously so in Punjab and Haryana. In addition, the multivariate model suggests that Karnataka and Maharashtra have generally done better in terms of urban poverty decline, relative to other states, than does the 30-day expenditure model.

At the national level, consistent with slower progress at the state level, the multivariate model finds poverty to have declined somewhat more slowly between 1993/4 and 1999/0 than the 30-day expenditure model, from 33.0 to 28.8 in rural areas and from 18.1% to 16.1% in urban areas, compared to the decline in rural poverty from 33.0 to 26.3 and in urban poverty from 18.1 to 12.0, reported by Deaton and Drèze (2002).

Finally, Column 6 suggests, again, that weighted averages of region-level estimates from the multivariate model are largely the same as those from estimates at the state-level. However, in the case of rural Andhra Pradesh and Orissa, where the state-level estimates appeared to indicate more rapid declines in poverty than was estimated by Deaton and Drèze (2002), the weighted averages from the region-level estimates suggest that the poverty decline has been rather more muted (Table 2).

Region-Level Estimates

Tables 4 and 5 present the regional-level estimates of rural and urban poverty, respectively. Column 1 produces region-level estimates of poverty from the 50th round survey, and columns 2 and 3 produce estimates in the 55th round based on, respectively, the 30-day expenditure model, and the multivariate model.

When regional poverty estimates for rural areas in column 2 of Table 4 are scrutinized, we see some striking results. For example in Southern Uttar Pradesh, a relatively underpopulated region of historically high poverty (sample size of 400 households), the headcount rate emerging from the 30-day expenditure model declines from some 50 percent in 1993/4 to 16 percent in 1999/0. This rate of progress is dramatically higher than what is recorded at the state-level (a decline from 29 to 21.5 percent).[8] Similarly, while poverty in the state of Andhra Pradesh as a whole is estimated to have declined from 29 to about 26 percent between 1993/4 and 1999/0 according to the 30-day expenditure model, in the southern region of that state (sample size of 400 households), poverty is estimated to have risen 10 percentage points, from 22 to 32 percent. These regional trends imply not only dramatic changes in poverty within a specific region but also important changes over time in the relative poverty ranking across regions within a given state.

The two examples above refer to regions that have small populations, and as such have poverty estimates that do not contribute importantly to state-level average poverty. However further scrutiny of regional estimates in Column 2 of Table 4 indicates that in a number of states much of the momentum at the state-level is driven by changes in poverty in

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[8] Note, the dramatic reduction in poverty in South UP is not simply the consequence of a small rise in consumption levels leading to a crossing of the poverty line by large mass of people previously located just below the line. According to the 30-day expenditure model, average per capita consumption in South UP is predicted to have risen by nearly 50% between the 50th and 55th rounds – from Rs 220 per person per month to 310. We will comment further below on the large "swings" in predicted consumption based on the 30-day expenditure model.

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only a subset of the regions within that state. For example, the respectable decline in poverty in Bihar (from 49 to 41 percent) appears to be associated mainly with a particularly sharp decline of poverty in the North, and a somewhat less dramatic decline in the South, but no real change at all in the central region. Similarly, the decline in poverty in Karnataka has been driven by falling poverty in the East and Southern regions, while it has remained unchanged the North and Coastal regions. In Orissa, the state-level poverty estimates suggest little change during the 1990s. Within the state, however, it appears that in the Coastal region poverty has declined, while it appears to have risen in both the South and Northern regions. It seems clear from these, and similar findings in other states, that geography is very important to understanding how poverty has evolved during the 1990s.

Column 3 of Table 4 presents region-level rural poverty estimates that are based on the multivariate model. The significance of regional variation remains evident, but the implied region-level trends are not always of the same magnitude or even in the same direction. For example, in Southern Uttar Pradesh poverty is projected to have declined only from 50 to 45 percent, and in Southern Andhra Pradesh the projections suggest no appreciable increase in poverty. On balance, using the multivariate model-based estimates of poverty we find fewer examples of dramatic changes in poverty over time, whether rises or declines. But there are exceptions. For example, in Southern Gujarat both models indicate that poverty has declined significantly from around 41 percent to around 25-26 percent. But the two models disagree with respect to the decline in poverty in the Dry Areas of Gujarat with the 30-day expenditure model suggesting that poverty declined from 39 per cent to 23 percent, and the multivariate model suggesting that the decline was much more modest; from 39 to 35 percent.

Absent detailed information on the particular development experience in these specific regions, it is difficult to judge which of the region-level poverty trends are more plausible. Note, we have not attempted to produce region-level estimates based on the non-parametric method described in Tarozzi (2001) and Deaton (2003a), and employed by Deaton and Drèze (2002). We cannot therefore assert that the region level estimates we produce with our parametric method and 30-day expenditure are the same as those we would produce with the non-parametric approach and the same model. However, given that at the state level there is a good deal of correspondence across the two methodologies, we expect that differences at the regional level would be minor.

Deaton and Drèze (2002) point to the possibility that state-level estimates of poverty may be masking local pockets of poverty and that against a general background of declining poverty there may be localities or population sub-groups that are experiencing impoverishment rather than rising welfare. Our estimates from both the 30-day expenditure and the multivariate model confirm that this should be a concern. Column 3 in Table 4 indicates that in the regions of Western Assam, Central Bihar, Eastern Gujarat, Southern Orissa, Northern Punjab, Western Uttar Pradesh, and Eastern West Bengal, rural poverty has risen. The question of why this should be happening in regions such as Northern Punjab and Western Uttar Pradesh, which are generally regarded as economically advanced, is an interesting one. The answer may be related to the inflow of workers from neighboring, poorer, regions into these areas.[9]

The multivariate model projects minimal decline and even small increases in rural poverty over the 1990s in a few of India's states: Assam, Bihar, Orissa, Punjab and West Bengal. Within even these states, however, there are some regions where progress has been

made in reducing poverty. In the Hills of Assam, in Southern Bihar, in Northern and Coastal Orissa, in Southern Punjab, and in Himalayan West Bengal, rural poverty is estimated to have declined during the 1990s. To the extent that these estimates are robust, there may be useful lessons to be learnt from studying these regions and the way that they have managed to achieve progress in an overall state-level environment which has not been encouraging.

Region level estimates of poverty in urban areas in Table 5 show, once again, that an assessment of the decline in urban poverty during the 1990s will vary depending on whether the estimates are based on the 30-day expenditure model (column 2) or the multivariate model (column 3). In addition, as was found in Table 4, there is often considerable heterogeneity in experience across regions within a given state, irrespective of which model is used. One additional limiting factor that influences some of the regional estimates of urban poverty is that sample sizes are sometimes quite small, so that standard errors on poverty estimates for those regions are often quite large. For example, column 2 of Table 5 suggests that urban poverty in the Hill region of Assam rose from 4.7 percent in 1993/4 to about 15.3 percent in 1999/0 according to the 30-day expenditure model and 19.3 percent according to the multivariate model. However, the standard errors on these estimates for 1999/0 are enormous, and so there is little basis for taking them seriously.

In general, estimates based on the 30-day expenditure suggest that urban poverty has declined in most regions. In the few cases where poverty is estimated to have risen, standard errors on the estimates tend to be large. With the multivariate model there is evidence of increases in poverty in a somewhat larger number of regions, particularly in northern Tamil Nadu (which includes Chennai) and western West Bengal. The two models

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[9] Note that the 30-day intermediate goods expenditure model predicts significant declines in poverty in Western Uttar Pradesh.

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are in close agreement in some cases (northern Karnataka, coastal and northern Maharashtra, eastern UP and Himalayan, eastern and central West Bengal), but in general the multivariate model tends to suggest that urban poverty has declined less rapidly during the 1990s, if at all.

Appendix Tables 1 and 2 employ the multivariate model to produce, respectively, rural and urban estimates of the poverty gap and average per capita consumption for 1999/0, at the region and state level. In the case of the poverty gap, comparing these estimates with estimates for 1993/4 we find that in general the direction of change is the same as with the head count rates discussed above. However, this is not always the case. For example, while the rural headcount is estimated to have declined from 39 percent to 33 percent in Western Andhra Pradesh, the poverty gap for that region is estimated to have risen slightly. Similarly, the poverty gap for urban southern Orissa is estimated to have risen between 1993/4 and 1999/0 even though the headcount suggests a modest decline from 27 to 24 percent.

The multivariate model produces estimates of average real per-capita consumption that are typically only slightly higher in 1999/0 than in 1993/4. In rural areas rankings of states in terms of per-capita consumption put Punjab, Haryana, Kerala, and Himachal Pradesh at the top in both survey years, and find Assam, Madhya Pradesh, Orissa and Bihar at the bottom. The rankings in urban areas are quite similar. Regional estimates suggest that growth is often quite heterogeneous across regions within states. For example, in rural Himalayan UP per-capita consumption grew from Rs 306 to 375 per person while it is estimated to have risen only slightly in the other four regions of UP. Similarly, although growth in rural per-capita consumption is estimated to have grown steadily in the Coastal,

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South and Inland regions of Tamil Nadu, growth was almost zero in the Northern region of the state.

IV. Probing the Assumptions

Experimenting with the Durable Goods Specification

We have suggested in Section I that estimates of poverty based on the multivariate model comprising household characteristics such as demographics, education and occupation of family members, are predicated on an assumption of stability over time which is possibly less appealing than the comparable assumption needed for the one-variable model based on 30-day expenditure.

In order to probe the robustness of the poverty estimates that derive from this multivariate model we experiment with a second set of explanatory variables that is distinct from the single-variable 30-day expenditure model, but also from the variables included in the multivariate model specification of the preceding section. In the consumption questionnaire of the 50th and 55th round surveys, households are asked identical questions as to their ownership, at the time of the survey, of a list of consumer durables. The questions on consumer durable ownership are located in the middle of the consumption questionnaire of the NSS survey (in the section that canvasses information on expenditures on major non-food items). While the recall period on new purchases of durables has changed between the 50th and 55th round surveys, the question on the stock of durables owned has not changed.

We estimate a new multivariate model of per capita consumption as a function of household size and the number owned of a series of consumer durables. There are a number of issues that arise with respect to this model. First, as with all of the adjustment approaches

that are being discussed in this paper, the estimates here are predicated on an assumption of stability over time in the underlying relationship between consumption and consumer durables ownership. For the durables model this assumption is perhaps somewhat more appealing than for the multivariate specification described above (although still more difficult to justify theoretically than the 30-day expenditure model). One would expect changes in the number of durables owned to track well changes in consumption levels.

A second important issue relates to the data on consumer durables. All things equal our preference would have been to produce estimates of poverty in 1999/0 in all regions and states with the multivariate specification including consumer durables. However, NSS durables data for the 50th round appear to be incomplete in a number of states, and for this reason we can only estimate this multivariate specification in a few states. Table 6, Appendix Table 3, and Table 7 illustrate the problem. Table 6 presents figures on household level ownership of 21 types of consumer durables in, respectively, the 50th and 55th rounds of the NSS survey, at the all-India level and for a number of states. These can be compared with figures from the 1992/3 and 1998/9 DHS survey for India (Appendix Table 3). In some states the figures on durable ownership correspond reasonably well across the two data sources. In others, there appears to be marked disagreement. For example, in Uttar Pradesh, Rajasthan and Tamil Nadu, radio ownership in the NSS 50th round is estimated at 9%, 7% and 8% respectively. This compares with figures of 33%, 33% and 44%, respectively in the DHS. The problem appears to be a disproportionately large number of zero entries in the NSS 50th round data. For example, out of the roughly 4000 households in rural Tamil Nadu, the 50th round NSS data suggest that about 2700

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households possess no durables at all (Table 7). Such problems are observed in a large number of states, in both rural and urban areas. [10]

In Table 8 we present state-level regression results of our model of consumption on durables data in 1993/4, for two states, Gujarat and Andhra Pradesh, where the durables data do seem plausible. In the case of Andhra Pradesh, the estimate of poverty based on the durables model is 23.3% (with a standard error of 1.1%). This compares well with the estimate of 22.7% (1.0%) based on the multivariate model presented in the preceding sections. Both of these estimates are below the 26.2% presented in Deaton and Drèze (2002) for Andhra Pradesh. In the case of Gujarat the multivariate and the durables model-based estimates are again very close: 25.7% (1.4%) for the durables model and 26.1% (1.8%) for the earlier multivariate model. Again they are both quite different from the estimate of 20.0% for Gujarat in Deaton and Drèze (2002). [11]

There are some important problems with the NSS durables data in the 50th round, and these prevent us from a wholesale application of these durables-based models (which would otherwise be very appealing). However, incorporating information on durables ownership in our models of consumption, offers us an opportunity to check for the robustness of poverty estimates based on our multivariate model. In those states where the durables data are plausible, we have shown that the adjusted poverty estimates that derive from them are closer to those from our multivariate model than from the estimates reported by Deaton and Drèze (2002).

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[10] Note that the 55th round durables data appear to be reasonably complete. Estimates of state-wise durable ownership from this round are in the same ballpark as estimates from DHS data for 1998/9.

[11] Durables data also appear to be appear to be reasonably complete in West Bengal, Himachal Pradesh, Karnataka and Madhya Pradesh. Here too, poverty estimates for 1999/0 based on models of consumption on durable ownership, suggest that poverty has declined less rapidly than is suggested by Deaton and Drèze (2002). For these states estimates based on these

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Do changes in 30-day expenditures reflect changes in welfare?

We turn now to a more close examination of 30-day expenditures at the region level. We demonstrate that even within states there can be marked differences in sub-components of the 30-day expenditure aggregate across regions. And over time, changes in these components can also be marked. Because of the underlying stability assumption needed to produce poverty estimates with the 30-day expenditure model, "swings" in certain sub-components of 30-day expenditure can translate directly into changes in overall estimated poverty for that region. We show that for certain regions such "swings" can account for the marked disagreement between the single-regressor based estimates and those based on the multivariate model. The question then arises whether the stability assumption underpinning the 30-day expenditure model is truly more compelling than the one underpinning the multivariate model.[12]

Table 9 presents a breakdown of consumption on 30-day intermediate goods sub-components in four NSS regions (two in rural Andhra Pradesh and two in rural Gujarat, respectively) in both 1993/4 and 1999/0. These four regions were chosen to show how, within each respective state, the 30-day expenditure model and the multivariate model can agree on the estimate of poverty for one region, and disagree markedly for another region. Thus, in rural Andhra Pradesh Coastal the one-variable model estimates poverty in 1999/0 to be 24.2 percent, down from 31.3% in 1993/4. The multivariate model produces an estimate of 24.3 percent for 1999/0 for this region. In rural Andhra Pradesh South, however, the one-variable model implies that poverty has *risen* from 21.9% in 1993/4 to 31.9 percent in 1999/0, while the multivariate model suggests that poverty in this region remained

durables models are also generally closer to those produced with our earlier multivariate model than with the 30-day expenditure model.

essentially unchanged. In Gujarat the "problematic" region is Gujarat Dry Areas while in Gujarat South the two adjustment procedures produce very similar estimates.

It is noteworthy that trends at the sub-component level can be highly heterogeneous across regions, even within a given state. Is such volatility real? Can one make sense of a decline in average household spending on non-institutional medical services from Rs 8800 per month to 5000 per month in AP South, while such spending actually grew slightly in AP Coastal? How should one view an increase in non-institutional medical spending in the Dry Areas region of rural Gujarat from Rs 3500 to 8655, when such expenditures increased much more moderately in the South region of that state?[13]

These examples indicate that at least in some of the cases where the one-variable and multivariate models disagree, the changes in 30-day goods consumption over time comprise exceptional "swings" in isolated expenditure components. Is it reasonable to assume that these "swings" carry through to similar swings in welfare as a whole? We cannot answer such questions with the data at hand. But further scrutiny does seem warranted.

V. Rural Poverty Correlates: Agricultural Wages and Employment Shares

Deaton and Drèze (2002) compare their state level poverty estimates and trends against related evidence from national accounts statistics, the NSS employment-unemployment surveys, and data on agricultural wages. Their estimates fit reasonably well the patterns in these other data. How do the rural poverty estimates based on the multivariate model compare with similar related evidence? In this section we focus in

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[12] Sen (2003) follows another line of argument to also question the stability assumption underpinning the 30-day expenditure model.

[13] We have checked whether dropping non-institutional medical spending from 30-day intermediate goods expenditure results in poverty estimates that are less at odds with the estimates from the alternative model, in the two "problematic" regions of Table 6, but find that poverty estimates change only slightly as a result of redefining 30-day consumption in this way.

particular on agricultural wage data at the state and regional level, and also examine the correlation of our rural poverty estimates with data on sectoral employment trends.

Figure 1 plots state-level poverty estimates for 1999/0 from the multivariate model (Column 6 in Table 2) against a three year average of state level real agricultural wages ending in 1999-2000. These agricultural wage data were taken from Drèze and Sen (2002) and come from Agricultural Wages in India (AWI), a publication produced by the Indian Ministry of Agriculture. Figure 1 can be compared to Figure 4 in Deaton and Drèze (2002) and differs from that figure only with respect to the adjusted poverty estimates for 1999/0. The generally strong negative relationship between poverty and agricultural wages is clearly apparent in both Figure 1 and the associated Figure 4 in Deaton and Drèze (2002). As is noted by Deaton and Drèze (2002) the quality of the AWI wage data is not entirely clear, and so Figure 2 plots the same relationship but uses the state-level population weighted average agricultural wage from Schedule 10 of the NSS survey. Here our data on wages and employment come from the employment-unemployment schedules (schedule 10) of the same surveys from which our expenditure data are obtained. These questionnaires are fielded in the same clusters as the consumption questionnaires, but to a different set of households. The employment and wage questions were not altered during this time period. It is clear from Figure 2 that the relationship between agricultural wages in 1999/0 and estimated poverty in that year is robust to the source of the agricultural wage data.

Figure 3 considers the relationship between changes in the incidence of poverty between 1993/4 and 1999/0 and changes in agricultural wages. Figure 3 starts, again, with published figures on the growth rate of agricultural wages (Drèze and Sen, 2002) and plots this against the proportionate decline in the rural headcount incorporating the alternative

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model's projected poverty rate for 1999/0. This figure can be compared to Figure 5 in Deaton and Drèze (2002). In both figures one can discern a strong positive relationship. In this case, however, the two figures do exhibit some important differences. Deaton and Drèze (2002) find dramatic reductions in rural poverty in Punjab and Haryana (more than 60% over this time period) despite little evidence of rising agricultural wages in these states. In fact, in Punjab real agricultural wages declined over this period. In Figure 3, the multivariate model's projection of the performance of Punjab and Haryana in reducing poverty is markedly less positive than that projected by Deaton and Drèze (2002). In fact in Punjab poverty is projected to have risen slightly over this time period.

The attraction of calculating agricultural wages directly from the NSS data, is that it allows us to calculate average wages at the region level. Figures 4 and 5 depict, respectively, the relationship between the region-level headcount (based on the multivariate model) and the region-level agricultural wage in 1993/4 and 1999/0, respectively. The strong negative correlation observed at the state-level is also evident at the region-level in both survey years. Figure 6 suggests that although a positive correlation holds between the proportionate change in the rural head count and the growth rate of agricultural wages, the relationship is not strong and there are some clear outliers.

Economic growth in India during the 1990s is generally associated with liberalization of the Indian economy, particularly with respect to openness to trade and foreign investment. These factors are likely to impinge on the rural economy, at least in part, via diversification of the rural economy. One window on the process of diversification and the degree to which this can be viewed as pro-poor is to examine the composition of the workforce in rural areas, and how this has changed during the 1990s. Schedule 10 of the

NSS surveys provides data on occupational status of the adult population. We focus here on the percentage of the rural workforce that is employed in regular non-agricultural salaried employment. As has been documented by Lanjouw and Shariff (2003), the correlation between rural poverty and regular non-farm employment in rural areas is generally very strong (and negative). Figures 7 and 8 confirms this relationship in the two survey years (based on the multivariate model estimates). Once again, however, while a strong relationship is observed in the specific survey years, it is less clear when comparing trends on poverty and employment shares (Figure 9).

The overall impression is that the multivariate model estimates of regional poverty appear to correlate reasonably well with agricultural wage and employment share data obtained from Schedule 10 of the NSS surveys. Where comparisons can be made with similar correlations that use the Deaton and Drèze (2002) estimates, the multivariate model estimates seem to perform easily as well.

VI. Summary and Conclusions

The basic objective of this paper has been to produce estimates of poverty at the regional level in India spanning the 1990s. Reliable estimates of regional poverty that can be compared over time have not been available to date due to serious concerns regarding the comparability of consumption data in the two main survey rounds fielded by the National Sample Survey Organization in 1993/4 and 1999/0.

In order to produce comparable regional poverty estimates, this paper has applied a methodology whereby consumption in the 1999/0 round is predicted at the level of each household based on an observed relationship between total consumption in the 1993/4 round

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and a variety of household-level variables that have remained comparable across the two survey years. Variants of this methodology have been applied in other settings, such as when household survey data is combined with population census data to produce "poverty maps" (Hentschel, et al, 2000, and Elbers, Lanjouw and Lanjouw, 2003). In India, Deaton and Drèze (2002), Deaton (2003a) and Tarozzi (2001) have applied a similar, but non-parametric, method to produce comparable estimates of poverty at the level of Indian states. But we are aware of no attempt to apply such methods at the level of NSS regions, within states.

In producing our regional level estimates we have experimented with several different approaches to specifying the basic model of consumption in the 1993/4 survey data. First, we apply a parametric variant of the approach taken by Tarozzi (2001), Deaton (2003a) and Deaton and Drèze (2002) to estimate the relationship between total consumption in 1993/4 and one component of consumption, 30-day intermediate goods consumption. This particular component of consumption is thought to have remained fully comparable across the two survey years, even though other components of consumption have lost comparability due to changes in the recall period applied in the later survey round. We show that state-level estimates produced with this particular approach are very close to those reported by Deaton and Drèze (2002) and we therefore conclude that the parametric approach implemented here yields fundamentally the same results as the non-parametric approach applied by Tarozzi (2001) and Deaton (2003a) and Deaton and Drèze (2002). Poverty estimates based on 30-day expenditure were produced at the NSS region level and we argued that at least some of these estimates are surprising in that they show changes in

poverty in a number of regions, such as southern Uttar Pradesh or southern Andhra Pradesh, that are contrary to popular wisdom.

We then repeat the exercise using a different set of explanatory variables. In this second, multivariate, approach we replace the single regressor, 30-day consumption, explanatory variable with a set of household characteristics as explanatory variables. These household characteristics are available in the two survey rounds from sections of the questionnaire that have not been altered. We do not include 30-day intermediate goods consumption in this specification for three reasons: a) it is conceivable that responses to questions on the consumption of 30-day intermediate goods have been affected by changes in the way questions are asked about the consumption of other items; b) the stability assumption that underlies the poverty estimates from the 30-day expenditure model may not appeal to everyone; and c) from a methodological point of view it is interesting to see how well the multivariate model works when comparable sub-components of consumption are not available, as this is a common problem in many developing country settings.

We show that regional poverty based on this approach is estimated with levels of precision that are similar to those based on the 30-day expenditure model. However, the poverty estimates at both the state and region level are not everywhere the same as those produced with the 30-day expenditure model. In general, the estimates produced with the multivariate model tend to suggest that poverty in India has declined less rapidly than has been suggested by Deaton and Drèze (2002). At the region level, there is less evidence of the dramatic changes in poverty between 1993/4 and 1999/0 amongst those regions that had drawn attention on the basis of the 30-day expenditure model. We show that the regional

poverty estimates for rural areas produced with the multivariate model align closely with data on agricultural wages from the NSS surveys, as well as with data on rural employment.

For estimates of poverty for 1999/0 from the multivariate model to be credible one must, of course, be prepared to assume that the conditional expectation of consumption based on a set of household characteristics has remained constant since 1993/4. In other words, that the "returns" to consumption from these regressors has not changed over time, even though the levels of the regressors clearly have.[14] The related assumption in the 30-day expenditure model would seem to be less onerous; one is simply arguing that the Engel relationship between full and sub-component consumption is stable over time.

To probe concerns regarding the underlying assumptions of stability, we experiment with a third specification. In this third specification we use explanatory variables measuring possession of consumer durables. These questions, like 30-day consumption, were not changed in the questionnaire design. A model of consumption on durables also seems closer to the 30-day expenditure model in terms of the assumption of stability that is required. Unfortunately, due to incomplete durables data, it is not possible to estimate this model for all states and all regions of India. Where it is possible, we find that estimates of poverty based on the durables model are closer to those produced with the multivariate model described above, than they are to estimates produced with the 30-day expenditure model.

Why might the 30-day expenditure model estimates be problematic? It is difficult to show that 30-day consumption has been contaminated by changes in the consumption questionnaires. But it does seem that 30-day consumption data at the region-level varies

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markedly from sub-component to sub-component, and also over time. While this may not be evidence of contamination, it does lead one to think that the assumption of stability underlying the 30-day expenditure model is, perhaps, not so innocuous after all.

The adjustment models we have been concerned with in this paper, whether non-parametric or parametric, can in principle be implemented in myriad other settings where there are concerns about comparability of underlying consumption or income data. As such, they are potentially powerful tools for analysis of distributional dynamics. However, it is clear that these "tools" are predicated on important, underlying assumptions. The India example with which we have been concerned in this paper provides something of an extreme case study: we have been projecting poverty into a dataset for 1999/0 based on a relationship observed in 1993/4 – against a backdrop of considerable economic growth. Our final assessment is thus somewhat tentative. While it seems fairly clear that poverty has fallen during the 1990s, the estimated rate of decline varies with alternative adjustment procedures. Whether the 1990s should be viewed as a period during which poverty reduction *accelerated* remains, in our view, debatable.

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[14] Although there is no presumption in the alternative model that the estimated parameters capture the causal relationship between the household characteristics and consumption. Indeed, omitted variable bias can actually improve the predictive power of the model.

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Table 1: First Stage Regression Model of log per capita expenditure (Andhra Pradesh Western region)

	OLS	GLS	OLS	GLS
Log 30-day intermediate goods expenditure	0.713	0.725		
	(0.022)	(0.020)		
Income from cultivation during last 365 days (dummy)			0.103	0.147
			(0.052)	(0.035)
Income from other agricultural enterprise (dummy)			0.004	-0.026
			(0.058)	(0.048)
Income from wage/salaried employment (dummy)			-0.015	-0.106
			(0.047)	(0.038)
Income from non-agricultural enterprises (dummy)			0.127	-0.014
			(0.054)	(0.040)
Income from pension (dummy)			-0.263	-0.220
			(0.204)	(0.354)
LPS as primary source of energy for cooking			0.463	0.0409
			(0.143)	(0.088)
Electricity as primary source of energy for lighting			0.235	0.195
			(0.054)	(0.039)
Per capita land owned			0.0003	0.0002
			(0.0002)	(0.0001)
Proportion of land irrigated over land cultivated			0.123	0.0492
			(0.079)	(0.070)
Number of household members (household size)			-0.116	-0.161
			(0.028)	(0.020)
Household size squared			0.003	0.007
			(0.002)	(0.002)
Proportion of boys aged less than 6 years old			-0.624	-0.487
			(0.207)	(0.142)
Scheduled caste household dummy			-0.112	-0.127
			(0.059)	(0.052)
Below primary as highest educational attainment			0.033	0.124
In the household			(0.066)	(0.047)
Primary schooling as highest educational attainment			0.136	0.193
			(0.068)	(0.053)
Middle schooling as highest educational attainment			0.220	0.396
			(0.073)	(0.053)
Secondary schooling as highest educational attainment			0.604	0.678
			(0.078)	(0.065)
Tertiary schooling as highest educational attainment			0.784	0.902
			(0.097)	(0.083)
District dummy			0.043	0.107
			(0.047)	(0.067)
Intercept	2.736	2.714	10.235	10.336
	(0.086)	(0.084)	(0.083)	(0.082)
R squared	0.698		0.486	
Adjusted R squared	0.697		0.465	
Number of observations	477		477	

Table 2
Rural State-Level Head Count Rates Estimated With Alternative Methodologies
(Deaton-Tarozzi Poverty Lines)

	(1)	(2)	(3)	(4)	(5)	(6)
Round	50th	55th	55th	55th	55th	55th
Methodology		DD	ELL	ELL	ELL	ELL
Explanatory vars		30day	30day	30 day	multivariate	multivariate
Estimation level		final	state	Region	state	Region
Andha Pradesh	29.2	26.2	25.4 (0.010)	25.8	22.7 (0.010)	23.57
Assam	35.4	35.5	36.4 (0.017)	36.3	35.2 (0.017)	36.78
Bihar	48.6	41.1	40.7 (0.011)	41.4	45.9 (0.012)	48.30
Gujarat	32.5	20.0	22.3 (0.016)	21.6	26.1 (0.018)	27.68
Haryana	17.0	5.7	5.6 (0.008)	5.6	14.2 (0.018)	14.24
Himachal Pradesh	17.1	9.8	8.9 (0.010)	8.9	12.7 (0.014)	12.69
Karnataka	37.9	30.7	29.3 (0.016)	30.9	29.3 (0.016)	30.96
Kerala	19.5	10.0	8.9 (0.007)	9.6	13.5 (0.011)	14.35
Madhya Pradesh	36.6	31.3	29.5 (0.012)	29.3	32.4 (0.013)	32.85
Maharashtra	42.9	31.9	29.8 (0.013)	29.9	35.0 (0.014)	35.44
Orissa	43.5	43.0	43.5 (0.016)	43.0	37.4 (0.016)	41.28
Punjab	6.2	2.4	3.5 (0.006)	3.2	6.3 (0.008)	6.39
Rajasthan	23.0	17.3	16.6 (0.011)	16.9	20.2 (0.013)	20.39
Tamil Nadu	38.5	24.3	23.6 (0.011)	23.4	30.5 (0.014)	31.84
Uttar Pradesh	28.6	21.5	18.2 (0.006)	18.8	26.0 (0.008)	26.18
West Bengal	25.1	21.9	22.3 (0.011)	22.2	22.3 (0.011)	26.41
All Rural	33.0	26.3	25.4	25.4	28.8	30.1

Note (1) Head count ratio for 50th Round (2) HCR calculated by Deaton-Tarozzi methodology for 55th Round in Table 2a, Deaton and Drèze (2002). (3) HCR calculated by Elbers, Lanjouw and Lanjouw (2003) methodology with 30-day intermediate goods expenditure as explanatory variable at state level for 55th Round. (4) Weighted average of HCRs from regional model with 30 day intermediate goods expenditure. (5) HCR calculated by ELL methodology with 18 explanatory variables at state level. (6) HCR calculated by ELL methodology with 18 explanatory variables at region level (weighted average up to state level). Standard errors in brackets.

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Table 3
Urban State-Level Head Count Rates Estimated with Alternative Methodologies
(Deaton-Tarozzi Poverty Lines)

Urban	(1)	(2)	(3)	(4)	(5)	(6)
Round	50th	55th	55th	55th	55th	55th
Explanatory vars		30 day	30 day	30 day	multivariate	multivariate
Estimation level		DD Final	state	region	state	region
Andhra Pradesh	17.8	10.8	12.1 (0.008)	11.6	15.2 (0.009)	14.6
Assam	13.0	11.8	11.9 (0.018)	11.8	14.0 (0.023)	13.8
Bihar	26.7	24.7	25.4 (0.017)	25.3	30.4 (0.019)	31.0
Gujarat	14.7	6.4	7.3 (0.008)	7.6	11.7 (0.012)	11.9
Haryana	10.6	4.6	6.3 (0.010)	5.3	10.2 (0.022)	11.2
Himachal Pradesh	3.6	1.3	2.4 (0.009)	2.4	1.0 (0.008)	1.0
Karnataka	21.4	10.8	11.9 (0.012)	11.5	13.7 (0.011)	13.9
Kerala	13.9	9.6	10.7 (0.010)	10.5	11.4 (0.013)	10.5
Madhya Pradesh	18.5	13.9	11.9 (0.009)	12.5	17.3 (0.012)	17.8
Maharashtra	18.2	12.0	11.5 (0.007)	11.6	12.4 (0.008)	14.7
Orissa	15.2	15.6	16.4 (0.020)	16.3	16.8 (0.021)	17.9
Punjab	7.8	3.4	3.3 (0.006)	3.0	8.0 (0.011)	8.4
Rajasthan	18.3	10.8	9.0 (0.009)	8.1	14.1 (0.013)	15.7
Tamil Nadu	20.9	11.3	14.2 (0.009)	13.1	23.0 (0.013)	22.0
Uttar Pradesh	21.7	17.3	17.4 (0.010)	16.9	19.6 (0.013)	20.5
West Bengal	15.5	11.3	10.4 (0.008)	10.1	12.9 (0.010)	14.3
Dehli	8.8	2.4	1.8 (0.007)	1.8	5.5 (0.024)	5.5
All Urban	18.1	12.0	12.7	12.4	16.1	16.7

Note (1) Head count ratio for 50th Round (2) HCR calculated by Deaton-Tarozzi methodology for 55th Round in Table 2a, Deaton and Drèze (2002). (3) HCR calculated by Poverty Mapping methodology with 30-day goods as explanatory variable at state level. (4) Weighted average of HCRs from regional model with 30 day expenditure. (5) HCR calculated by ELL methodology with 18 alternative explanatory variables (excluding 30-day goods expenditure) as explanatory variables at state level. (6) HCR calculated by ELL methodology with 18 explanatory variables as explanatory variables at region level (weighted average up to state level).

Table 4
Rural Head Count Rates: Regional Level
(Deaton-Tarozzi Poverty Line)

State	NSS region	(1) 50th	(2) 55th ELL 30 day	s.e.	(3) 55th ELL multivariate	s.e.
Andhra Pradesh		29.17	25.76		23.57	
	Coastal	31.26	24.20	1.5	24.32	1.7
	Northern	26.05	23.62	1.8	20.64	1.8
	Western	38.57	36.07	3.9	33.13	3.8
	Southern	21.89	31.86	3.0	22.31	3.1
Assam		35.43	36.33		36.78	
	Eastern	29.18	35.61	2.7	28.25	2.3
	Western	39.55	36.67	2.3	43.20	2.2
	Hills	30.98	38.52	7.4	28.14	7.3
Bihar		48.57	41.37		48.3	
	Southern	52.62	43.69	2.1	46.11	2.5
	Northern	49.26	37.55	1.6	50.65	1.8
	Central	44.37	45.63	2.0	46.20	2.1
Gujarat		32.45	21.62		27.68	
	Eastern	34.23	36.56	4.4	36.08	5.0
	Northern	32.13	17.28	2.5	26.24	4.0
	Southern	41.11	26.38	4.1	25.13	5.7
	Dry Areas	38.70	23.03	4.3	35.19	4.9
	Saurashtra	21.62	8.85	3.2	18.75	5.8
Haryana		17.01	5.58		14.24	
	Eastern	19.15	5.27	0.8	16.90	2.8
	Western	13.88	6.15	1.0	9.24	2.1
Himachal Pradesh		17.10	8.92	1.0	12.69	1.4
Karnataka		37.90	30.92		30.96	
	Coastal	12.09	11.29	3.2	9.41	2.5
	Eastern	22.32	6.29	1.7	14.63	3.3
	Southern	39.60	21.87	2.4	30.33	2.9
	Northern	45.24	44.22	2.5	38.30	1.7
Kerala		19.48	9.57		14.35	
	Northern	21.77	15.01	1.4	18.66	2.0
	Southern	17.96	5.77	0.6	11.34	1.4
Madhya Pradesh		36.60	29.33		32.85	
	Chattisgar	38.83	32.44	2.2	35.47	2.1
	Vindhya	32.35	28.12	3.2	28.12	3.4
	Central	45.65	19.54	2.8	36.67	4.7
	Malwa	23.82	18.87	2.2	23.95	3.5
	South	42.47	46.77	3.3	35.23	3.8
	Western	64.89	42.45	3.7	65.86	3.7
	Northern	15.20	14.98	2.2	11.67	2.8

Table 4, cont.

State	region	50th	50th 30 day	s.e.	55th multivariate	s.e.
Maharashtra		42.89	29.90		35.44	
	Coastal	19.09	13.48	2.9	16.93	3.2
	Western	29.72	16.30	1.9	21.26	2.3
	Northern	53.30	38.15	3.8	47.04	3.7
	Central	53.41	39.56	2.8	43.58	3.1
	Inland Eastern	55.59	40.18	3.3	45.66	3.9
	Eastern	55.18	43.07	3.8	52.11	4.7
Orissa		43.47	43.04		41.28	
	Coastal	38.97	32.17	2.0	34.68	2.1
	Southern	63.23	70.49	3.8	67.79	3.6
	Northern	39.26	43.60	4.7	36.42	2.7
Punjab		6.15	3.20		6.39	
	Northern	3.58	3.55	0.8	5.51	1.3
	Southern	9.54	2.79	1.2	7.43	1.1
Rajasthan		23.00	16.86		20.39	
	Western	21.54	13.73	1.6	18.87	2.1
	Northern	15.02	9.89	1.3	14.48	1.8
	Southern	42.42	35.51	4.7	43.03	6.4
	Eastern	30.54	25.97	4.5	18.07	3.0
Tamil Nadu		38.46	23.37		31.84	
	Northern	49.54	35.64	2.5	37.30	2.8
	Coastal	24.77	17.18	2.0	25.66	2.4
	Southern	42.10	20.62	1.9	37.30	2.6
	Inland	29.84	15.64	2.0	24.11	2.5
Uttar Pradesh		28.63	18.83		26.18	
	Himalayan	13.15	8.08	2.0	6.37	2.2
	Western	16.95	10.76	0.7	18.40	1.4
	Central	37.10	27.07	1.8	32.61	2.2
	Eastern	33.81	23.12	1.1	29.34	0.6
	Southern	50.97	16.14	3.4	44.86	5.8
West Bengal		25.07	22.23		26.41	
	Himalayan	37.59	23.28	4.0	30.77	4.4
	Eastern	29.97	29.12	2.1	35.87	3.2
	Central	20.15	16.25	1.4	19.51	1.7
	Western	21.15	20.36	2.4	20.87	3.0

Note (1) Head count ratio for 50th Round (2) HCR calculated by ELL methodology with 30-day intermediate goods expenditure as explanatory variable at region level for 55th Round. (3) HCR calculated by ELL methodology with 18 explanatory variables at region level (weighted average up to state level).

Table 5
Urban Head Count Rates: Regional Level
(Deaton-Tarozzi Poverty Line)

State	region	50th	55th 30day goods	s.e.	55th multivariate	s.e.
Andhra Pradesh		17.78	11.61		14.57	
	Coastal	20.11	13.10	1.3	16.86	1.6
	Northern	12.33	9.49	1.1	10.21	1.2
	Western	20.31	17.18	3.9	28.13	4.9
	Southern	26.11	10.07	2.8	13.08	3.5
Assam		12.98	11.81		13.77	
	Eastern	8.23	12.95	3.7	9.78	3.1
	Western	16.53	10.99	2.4	15.57	2.6
	Hills	4.74	15.32	8.1	19.30	5.0
Bihar		26.68	25.25		31.03	
	Southern	19.21	21.26	2.6	19.41	2.3
	Northern	39.50	34.81	4.3	45.37	4.4
	Central	27.26	22.56	2.6	31.88	3.1
Gujarat		14.72	7.61		11.89	
	Eastern	13.11	9.32	3.7	17.39	6.5
	Northern	16.10	6.31	1.2	12.05	1.9
	Southern	11.49	6.57	1.3	8.60	2.1
	Dry Areas	11.98	14.48	4.7	13.61	5.5
	Saurashtra	15.85	8.05	1.9	12.85	2.2
Haryana		10.55	5.31		11.22	
	Eastern	9.94	4.92	1.1	10.86	2.4
	Western	12.04	6.43	2.2	12.26	5.2
Himachal Pradesh		3.64	2.39	0.9	1.03	0.8
Karnataka		21.44	11.49		13.94	
	Coastal	5.14	9.35	2.9	7.50	3.0
	Eastern	19.69	7.08	2.6	15.14	4.2
	Southern	11.59	4.33	0.8	7.53	1.1
	Northern	35.93	23.46	2.5	24.43	2.4
Kerala		13.87	10.54		10.52	
	Northern	15.30	16.75	2.1	11.33	2.2
	Southern	13.03	6.38	1.0	9.97	1.7
Madhya Pradesh		18.50	12.50		17.81	
	Chattisgar	13.50	10.00	1.8	15.03	2.4
	Vindhya	15.06	18.92	4.3	15.56	4.5
	Central	25.34	10.04	2.7	21.63	3.9
	Malwa	15.32	6.54	1.4	13.68	2.7
	South	22.56	15.80	2.3	18.47	4.2
	Western	30.48	18.36	3.7	34.56	5.1
	Northern	15.22	16.70	2.7	13.28	2.5

		50th	55th 30day goods	s.e.	55th multivariate	s.e.
Maharashtra		18.24	11.64		14.69	
	Coastal	3.89	2.72	0.5	2.87	0.5
	Western	16.18	9.88	1.3	13.70	3.1
	Northern	31.01	20.27	3.5	23.88	3.6
	Central	43.31	30.39	3.1	39.65	4.1
	Inland	37.86	25.23	6.2	32.06	3.4
	Eastern	19.80	14.27	4.1	18.18	6.5
Orissa		15.19	16.28		17.93	
	Coastal	15.13	15.09	2.9	18.83	3.1
	Southern	26.72	15.35	5.0	24.45	8.4
	Northern	11.06	18.39	3.1	14.28	3.2
Punjab		7.75	2.97		8.39	
	Northern	5.23	3.28	0.7	6.93	1.1
	Southern	12.35	2.37	0.7	11.27	2.3
Rajasthan		18.26	8.06		15.71	
	Western	10.70	5.57	1.4	13.35	2.3
	Northern	21.13	8.24	1.3	16.85	2.0
	Southern	15.09	4.75	2.6	14.57	6.9
	Eastern	27.99	18.61	4.2	19.91	5.0
Tamil Nadu		20.85	13.06		22.02	
	Northern	20.93	16.21	1.3	28.98	2.2
	Coastal	22.78	9.85	2.4	18.40	3.0
	Southern	27.50	12.60	1.5	20.82	2.1
	Inland	12.70	8.69	4.3	10.30	1.4
Uttar Pradesh		21.71	16.93		20.48	
	Himalayan	9.54	4.16	2.6	2.87	2.0
	Western	18.02	15.86	1.5	18.40	1.8
	Central	22.34	16.29	2.0	21.26	2.8
	Eastern	24.43	18.93	2.0	19.18	2.6
	Southern	46.34	26.46	6.3	47.79	6.5
West Bengal		15.53	10.10		14.28	
	Himalayan	23.93	10.93	3.6	12.32	2.7
	Eastern	25.56	19.18	3.7	19.87	3.9
	Central	11.39	8.33	1.0	10.86	1.3
	Western	33.49	12.08	2.6	47.63	6.1
Delhi		8.79	1.75	0.7	5.51	2.4

Note: State-level estimates for 55th round are weighted averages from regional estimates by using 55th population weights.

Table 6: Distribution of Ownership of Durables by Items (%)

	All India		AP		WB		UP		RJ		TN	
	50th	55th	50th	55th	50th	55th	50th	55th	50th	55th	50th	55th
all durables	71.33	93.52	97.11	92.00	89.48	89.25	52.91	93.93	36.49	98.91	30.53	89.42
bed stead	54.48	82.25	85.21	79.18	73.40	79.16	28.78	90.47	23.55	95.73	8.91	54.20
almirah	18.63	37.18	21.01	36.58	23.19	31.57	2.51	20.83	2.33	28.41	6.17	41.60
chair	37.63	60.90	60.97	68.29	53.74	64.18	9.60	43.00	6.99	50.77	10.48	65.97
suitcase	54.12	77.59	83.38	76.22	77.62	70.40	24.21	79.52	21.18	83.73	16.44	68.70
foam	2.08	5.30	1.99	6.21	1.70	2.15	0.52	4.07	0.31	3.54	0.17	3.45
carpet	12.39	18.26	2.40	3.42	12.81	12.84	6.36	13.81	6.33	25.01	1.01	6.34
paintings	1.85	3.64	0.84	2.52	1.46	1.58	0.67	2.22	0.28	2.40	0.12	1.02
gramophone	0.41	0.95	0.53	0.87	1.00	0.89	0.18	0.78	0.02	0.77	0.23	0.34
radio	25.75	34.21	37.98	22.93	40.09	46.00	9.29	30.80	7.19	28.99	8.38	36.03
television/vcr	13.53	32.42	15.53	32.69	14.23	20.21	2.83	25.59	2.29	30.56	3.42	37.46
electric fan	21.88	38.84	30.73	47.87	18.13	22.20	3.78	26.16	6.34	47.60	6.72	47.02
air conditioner	1.79	4.64	1.04	2.67	0.11	0.17	0.26	4.10	0.38	9.44	0.04	0.55
sewing machine	7.79	12.87	4.35	4.90	3.67	2.73	3.60	16.27	3.61	24.34	0.79	4.16
washing machine	1.13	2.82	0.58	1.37	0.30	0.71	0.06	1.92	0.04	2.15	0.30	4.36
stove	21.42	37.60	20.75	33.82	23.63	31.20	5.62	27.79	5.27	37.47	6.62	45.22
pressure cooker	13.18	24.16	6.84	13.10	12.29	13.56	3.43	23.17	2.57	20.15	1.88	18.76
refrigerator	3.34	8.38	2.28	6.26	2.73	4.45	0.21	4.61	0.16	7.44	0.33	7.88
bicycle	33.49	46.23	28.12	33.61	44.60	52.26	40.22	65.59	17.37	39.53	16.58	32.76
motor cycle	4.43	9.34	4.50	8.83	2.34	1.78	2.74	7.89	2.31	12.02	2.18	10.54
motor car	0.42	1.15	0.18	0.41	0.20	0.23	0.22	1.16	0.11	0.91	0.04	0.75
clock watch	31.10	46.62	36.03	44.25	40.91	37.11	11.80	40.04	11.00	59.90	8.72	45.33

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Table 7
Observations with Positive or Zero Ownership of Durable Goods by State

50th State	rural zero	rural positive	urban zero	urban positive
Andrha Pradesh	171	4737	72	3572
Arnachal Pradesh	973	92	213	26
Assam	312	2887	174	706
Bihar	4400	2579	1653	502
Goa	6	140	5	208
Gujarat	64	2155	23	2349
Haryana	19	1021	6	691
Himachal Pradesh	27	1848	1	399
Jammu&Kashimir	6	814	5	523
Karnataka	262	2355	132	2337
Kerala	136	2419	61	1769
Madhya Pradesh	293	5020	173	3060
Maharashtra	448	3992	179	5349
Manipur	899	101	638	61
Meghalaya	241	876	58	420
Mizoram	402	68	870	87
Nagaland	404	56	211	29
Orissa	2101	1237	592	445
Punjab	5	2041	43	1904
Rajasthan	1902	1195	1395	404
Sikkim	371	109	108	52
Tamil Nadu	2669	1232	3033	1009
Tripura	334	1196	114	446
Uttar Pradesh	4025	4985	2179	2272
West Bengal	382	4098	540	2798
A&N Islands	4	496	3	396
Chandigarh	0	80	1	149
Dadra&Nagar Haveli	25	215	2	76
Daman&Diu	4	76	0	80
Delhi	7	54	236	749
Lakshadweep	0	70	0	240
Pondicherry	22	48	115	205

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Table 8
First Stage Regression Model of log per capita expenditure with household weight

	Gujarat	Andhra Pradesh
Intercept	6.030	5.752
	(0.036)	(0.025)
Number of Almirahs household owned at the survey date	0.044	0.061
	(0.013)	(0.016)
Number of Chairs	0.020	0.034
	(0.006)	(0.005)
Number of Radios	-0.015	0.077
	(0.019)	(0.014)
Number of Television/VCRs	0.091	0.129
	(0.030)	(0.032)
Number of Electric fans	0.105	0.086
	(0.013)	(0.015)
Number of Stoves	0.018	0.081
	(0.016)	(0.021)
Number of bicycles	0.088	0.081
	(0.015)	(0.015)
Number of Motor cycles	0.227	0.109
	(0.042)	(0.049)
Number of Clock/ watches	0.011	0.064
	(0.009)	(0.010)
Number of Pressure cookers	-0.006	0.024
	(0.020)	(0.047)
Household size	-0.069	-0.084
	(0.003)	(0.003)
District dummies?	Yes	Yes
Adjusted R squared	0.410	0.312
Number of observations	2218	4907

Poverty Estimates

Durables Model	25.7	23.3
	(1.4)	(1.1)
Alternative Model	26.1	22.7
	(1.8)	(1.0)
Deaton and Drèze (2002)	20.0	26.2

Note: Numbers in parentheses are standard errors.

Table 9
Comparison of 30-day goods expenditure
Poverty Estimates based on multivariate adjustment procedure
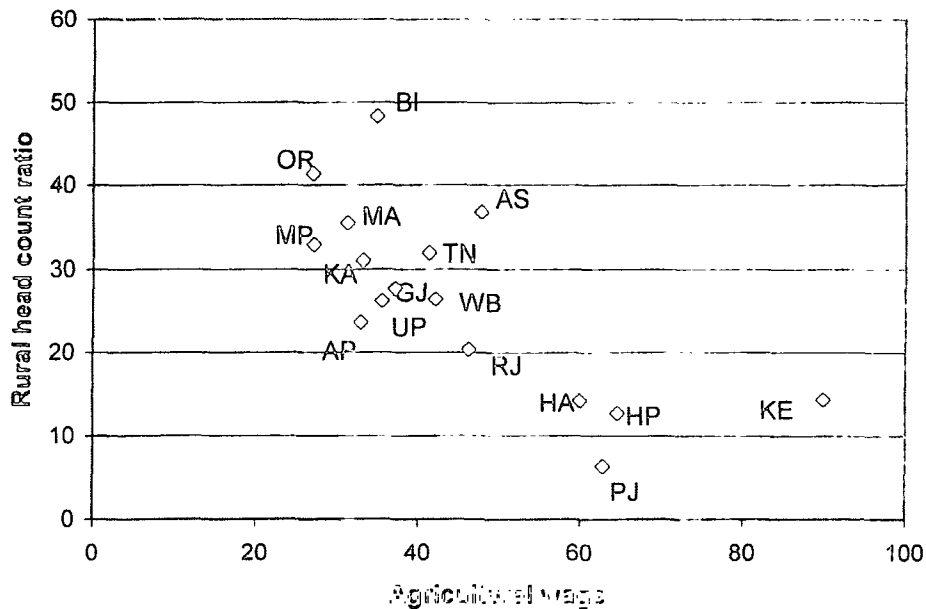**Selected Regions in Andhra Pradesh and Gujarat**

	AP South		AP Coastal		GJ Dry Areas		GJ South	
	50th	55th	50th	55th	50th	55th	50th	55th
HCR (extended model)	21.9	22.3	31.3	24.3	38.7	35.2	41.1	25.1
HCR (one variable model)	21.9	31.9	31.3	24.2	38.7	23.0	41.1	26.4
30-day intermediate goods household spending	35517.3	27158.8	28333.3	30667.6	35393.1	43006.5	38794.5	51064.0
Fuel & lights	8046.4	7030.4	7944.4	8779.0	12319.8	11670.3	13734.6	14457.5
Misc. consumer goods	9110.0	7440.4	7330.8	8580.0	8606.0	7948.4	9054.9	10169.1
Misc. consumer services	9192.4	6633.7	5999.1	5868.5	10201.0	13847.9	11203.7	19568.8
Rent	291.2	911.3	705.52	801.1	611.6	547.9	159.3	1066.0
Consumer taxes & cesses	100.3	83.7	246.7	208.1	135.4	336.9	782.4	662.7
Non-institutional medical	8777.1	5059.4	6106.9	6431.0	3519.3	8655.2	3859.6	5139.9

Figure 1: Real Agricultural Wage and Rural Poverty, 1999/00
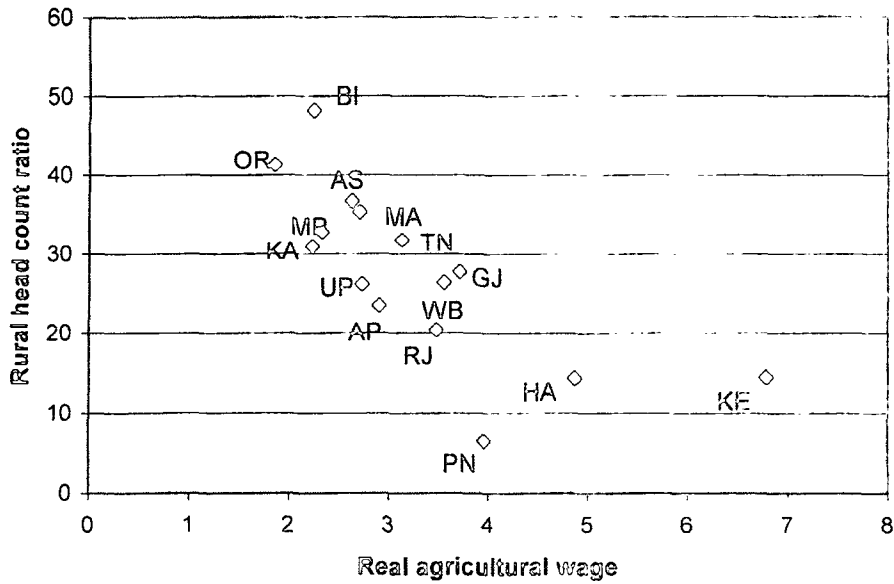
Source: Drèze and Sen (2002), Statistical Appendix, Table A3. Average wage rate of casual agricultural laborers, 1997-9 (Rs/day at 1960-1 prices).
Rural head count ratio is estimated by poverty mapping methodology with sensible explanatory variables at regional level.
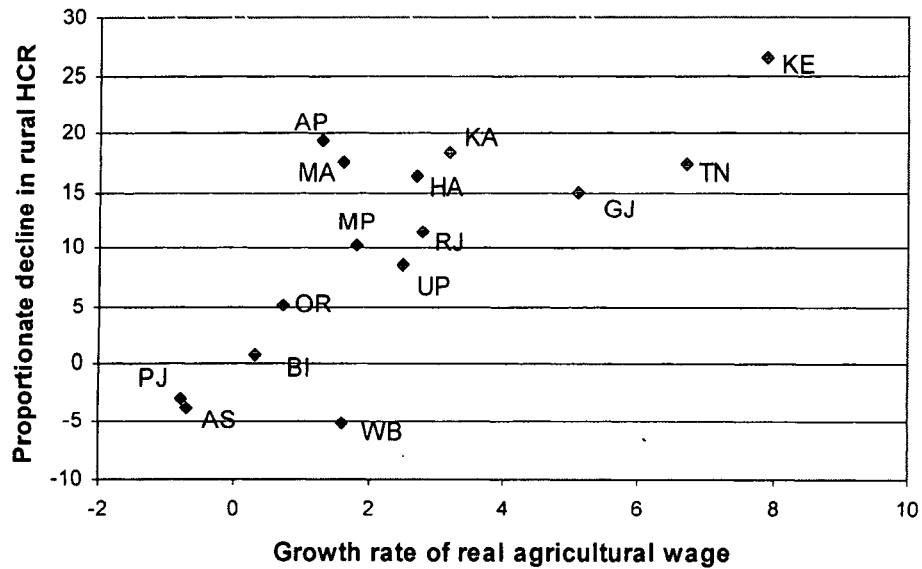
Figure 2: Real Agricultural Wage and Rural Poverty, 1999/00

Source: NSS 55 Schedule 10. Agricultural wage is nominal valued in 1999/2000.

Figure 3: Growth Rate of Real Agricultural Wage and Poverty Decline, 1993/4-1999/00

Figure 4: Regional Level HCR and Agricultural Wage (50th Round) (1993 prices)
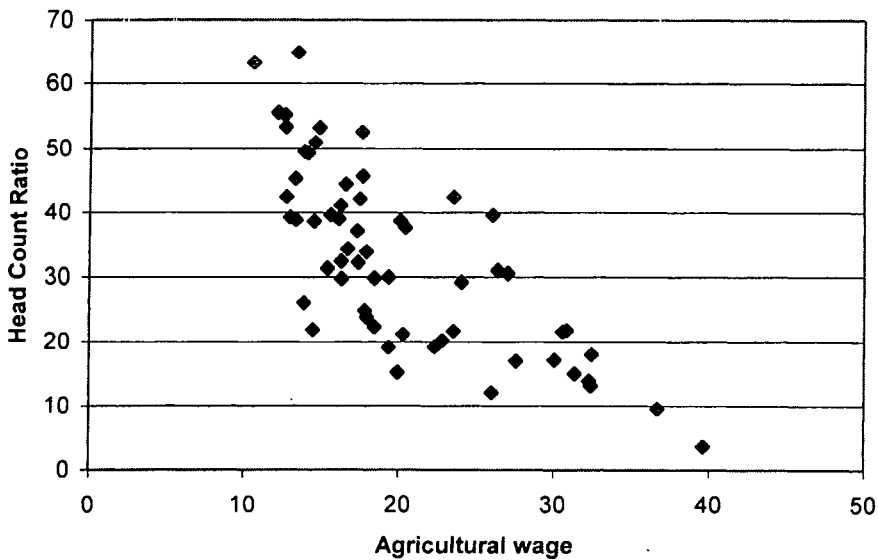
Correlation coefficient= - 0.755

Figure 5: Regional Level HCR and Agricultural Wage (55th Round) (1993 prices)
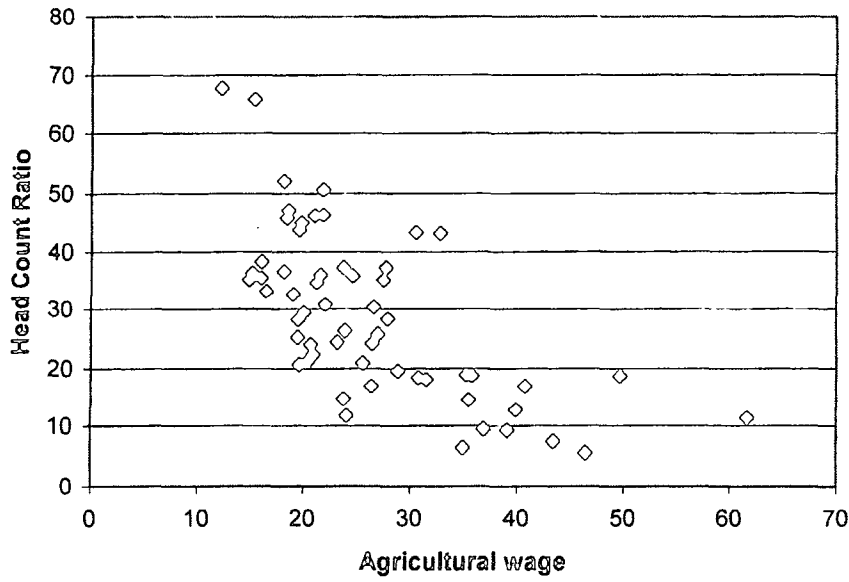
Correlation coefficient= - 0.663

Figure 6: Proportionate Decline in Head Count Ratio and Growth Rate of Real Agricultural Wage (Tornqvist) between 1993/4 and 1999/2000

Correlation coefficient= 0.20

81: Haryana Eastern,122: Kerala Southern, 201: Punjab Northern, 251: Uttar Pradesh Himalayan

Figure 7: **Regional Head Count Ratio and Proportion of Regular Non-farm Employment in 1993/4**
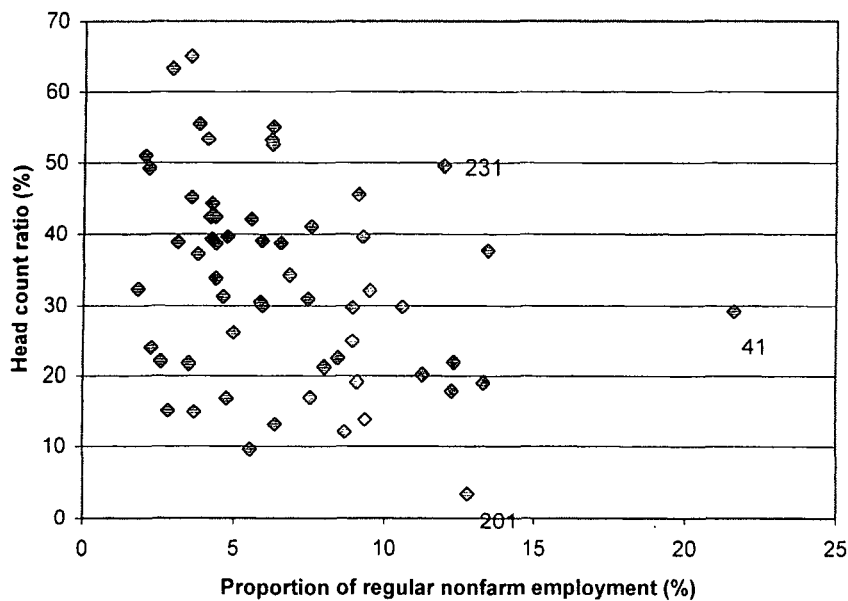
Correlation coefficient= -0.306
41: Assam Eastern, 201: Punjab Northern, 231: Tamil Nadu Coastal Northern

Figure 8: Regional Head Count Ratio and Proportion of Regular Non-farm Employment in 1999/2000
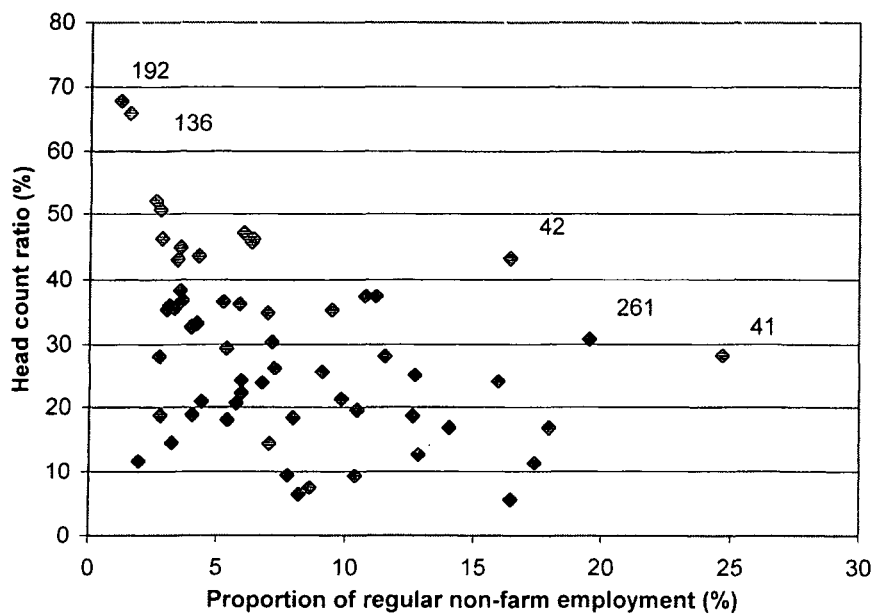
Correlation coefficient= -0.391, 41: Assam Eastern, 42: Assam Western, 136: Madhya Pradesh Western, 192: Orissa: Southern, 261: West Bengal Himalayan

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Figure 9: Proportionate Decline of Regional Head Count Ratio and Proportion of Regular Nonfarm Employment between 1993/4 and 1999/2000

Correlation coefficient= 0.005
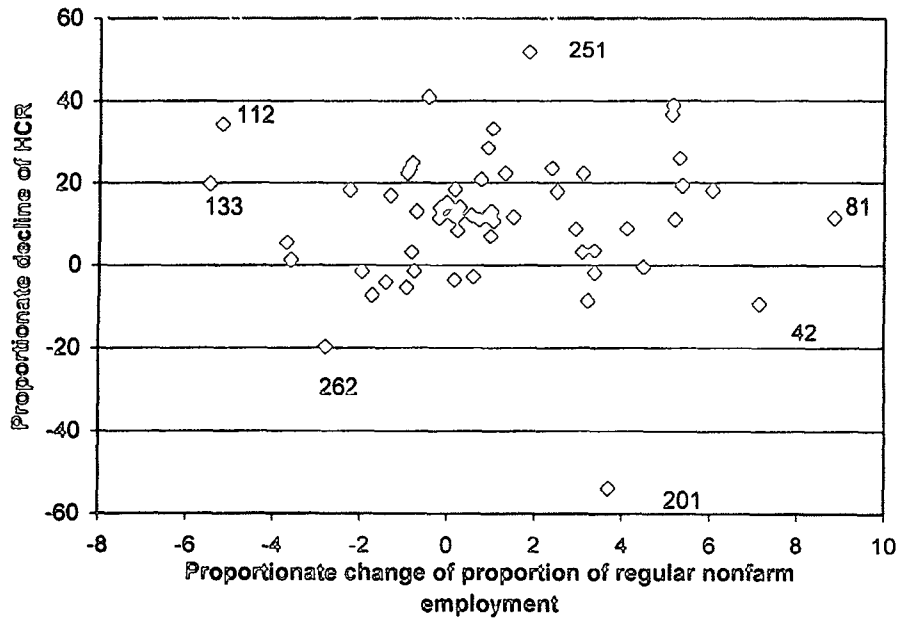
Correlation coefficient= 0.005
42: Assam Western, 81: Haryana Eastern, 112: Karnataka Eastern, 133: Madhya Pradesh Central, 201: Punjab Northern, 251: Uttar Pradesh Himalayan, 262: West Bengal Eastern

Appendix Table 1
Rural Regional-Level Head Count, Poverty Gap and Mean Per Capita Expenditure

NSS region	50th HCR	55th HCR	50th PGI	55th PGI	50th Average Per capita expenditure	55th Average Per capita expenditure	55th Population share
Andhra Pradesh	**29.17**	**23.57**	**5.84**	**5.00**	**288.70**	**319.06**	**0.077**
Coastal	31.26	24.32	6.43	5.03	277.77	322.23	0.444
Northern	26.05	20.64	4.92	4.07	296.45	315.14	0.375
Western	38.57	33.13	7.98	8.51	293.39	304.12	0.092
Southern	21.89	22.31	4.55	5.13	306.42	335.23	0.089
Assam	**35.43**	**36.81**	**5.68**	**6.73**	**258.11**	**260.11**	**0.030**
Eastern	29.18	28.25	4.72	4.91	270.29	274.43	0.391
Western	39.55	43.20	6.45	8.19	250.28	248.84	0.571
Hills	30.98	28.14	3.05	3.50	264.06	274.85	0.039
Bihar	**48.57**	**48.30**	**10.74**	**11.31**	**218.30**	**216.55**	**0.116**
Southern	52.62	46.11	11.97	11.02	214.56	221.62	0.212
Northern	49.26	50.65	10.85	11.93	215.24	207.07	0.477
Central	44.37	46.20	9.62	10.56	225.76	227.62	0.311
Gujarat	**32.45**	**27.68**	**6.81**	**5.75**	**303.32**	**331.44**	**0.044**
Eastern	34.23	36.08	8.25	7.43	282.18	305.81	0.204
Northern	32.13	26.24	6.65	5.72	307.28	347.87	0.265
Southern	41.11	25.13	8.82	5.80	300.74	323.79	0.161
Dry Areas	38.70	35.19	7.82	7.01	293.19	312.28	0.145
Saurashtra	21.62	18.75	3.74	3.43	326.60	353.16	0.225
Haryana	**17.01**	**14.24**	**3.10**	**3.07**	**385.00**	**439.99**	**0.021**
Eastern	19.15	16.90	3.45	3.63	349.22	389.73	0.653
Western	13.88	9.24	2.45	2.01	437.30	534.58	0.347
Himachal Pradesh	**17.10**	**12.69**	**3.05**	**2.19**	**350.63**	**408.00**	**0.007**
Karnataka	**37.90**	**30.95**	**8.56**	**6.91**	**269.38**	**290.37**	**0.051**
Coastal	12.09	9.41	2.09	1.45	368.91	423.95	0.085
Eastern	22.32	14.63	3.74	2.77	299.21	338.94	0.111
Southern	39.60	30.33	8.19	6.90	264.44	294.76	0.280
Northern	45.24	38.30	11.07	8.69	247.12	256.55	0.523
Kerala	**19.48**	**14.35**	**3.89**	**2.93**	**390.41**	**439.56**	**0.030**
Northern	21.77	18.66	4.95	3.88	358.60	388.49	0.411
Southern	17.96	11.34	3.19	2.26	411.57	475.19	0.589
Madhya Pradesh	**36.60**	**32.83**	**8.20**	**7.59**	**252.01**	**262.81**	**0.089**
Chattisgar	38.83	35.47	7.15	7.36	227.29	238.43	0.288
Vindhya	32.35	28.12	6.51	5.71	252.11	264.27	0.148
Central	45.65	36.67	10.34	7.97	214.54	244.69	0.085
Malwa	23.82	23.95	4.63	4.90	284.69	286.23	0.174
South	42.47	35.23	10.37	8.58	271.17	257.84	0.123
Western	64.89	65.86	20.72	20.93	185.35	178.27	0.087
Northern	15.20	11.67	3.00	2.32	335.81	391.58	0.095

	50th HCR	55th HCR	50th PGI	55th PGI	50th Average	55th Average	55th
Maharashtra	42.89	35.45	11.19	9.44	272.66	306.89	0.082
Coastal	19.09	16.93	3.36	3.21	361.92	363.97	0.112
Western	29.72	21.26	6.37	4.56	298.47	349.24	0.298
Northern	53.30	47.04	13.35	12.39	232.75	306.13	0.137
Central	53.41	43.58	18.09	14.57	262.20	293.12	0.204
Inland Eastern	55.59	45.66	13.97	11.65	230.99	249.63	0.170
Eastern	55.18	52.11	13.24	13.54	229.88	226.32	0.079
Orissa	43.47	41.27	9.73	9.62	219.80	227.64	0.043
Coastal	38.97	34.68	8.29	7.45	226.57	241.21	0.476
Southern	63.23	67.79	15.81	18.78	179.22	173.39	0.181
Northern	39.26	36.42	8.50	7.79	232.04	237.44	0.343
Punjab	6.15	6.39	0.97	1.12	433.00	490.18	0.022
Northern	3.58	5.51	0.53	0.94	448.49	495.36	0.541
Southern	9.54	7.43	1.54	1.34	412.73	484.08	0.459
Rajasthan	23.00	20.39	4.40	4.08	322.39	331.79	0.054
Western	21.54	18.87	3.48	3.67	306.83	328.19	0.314
Northern	15.02	14.48	2.92	2.65	342.39	350.13	0.412
Southern	42.42	43.03	8.35	9.66	293.04	264.89	0.142
Eastern	30.54	18.07	6.90	3.48	329.88	355.07	0.132
Tamil Nadu	38.46	31.84	9.14	7.59	293.62	314.18	0.056
Northern	49.54	37.30	12.82	9.48	286.88	290.27	0.308
Coastal	24.77	25.66	5.23	5.51	327.58	352.43	0.199
Southern	42.10	37.30	10.71	9.04	257.89	283.82	0.255
Inland	29.84	24.11	5.37	5.34	316.22	345.65	0.238
Uttar Pradesh	28.63	26.16	5.84	5.80	273.83	284.16	0.191
Himalayan	13.15	6.37	1.68	0.95	306.27	374.87	0.036
Western	16.95	18.40	2.95	3.81	317.19	320.86	0.329
Central	37.10	32.61	8.28	7.43	251.47	255.86	0.167
Eastern	33.81	29.34	6.68	6.34	249.73	266.26	0.420
Southern	50.97	44.86	13.14	13.03	220.09	224.34	0.047
West Bengal	25.07	26.42	4.29	5.27	278.78	283.65	0.085
Himalayan	37.59	30.77	5.58	4.52	217.11	246.05	0.087
Eastern	29.97	35.87	5.45	8.16	272.43	254.10	0.343
Central	20.15	19.51	3.67	3.58	300.39	316.97	0.336
Western	21.15	20.87	2.99	3.75	279.30	293.10	0.234

Note: 55th round state-level estimates are weighted averages of regional estimates from the multivariate model. 55th population weights shown in the last column. The population shares for regions are the shares within state.

Appendix Table 2
Urban Regional-Level Head Count Ratio, Poverty Gap and Mean Per Capita Expenditure

NSS region	50th HCR	55th HCR alternative	50th PGI	55th PGI	50th Average Per capita expenditure	55th Average Per capita expenditure	55th Pop. share
Andhra Pradesh	**17.78**	**14.55**	**3.41**	**3.26**	**408.60**	**457.53**	**0.098**
Coastal	20.11	16.86	3.89	3.56	381.66	451.25	0.392
Northern	12.33	10.21	2.14	2.10	460.18	473.09	0.443
Western	20.31	28.13	4.84	8.60	382.12	393.04	0.084
Southern	26.11	13.08	4.67	2.54	359.71	463.93	0.082
Assam	**12.98**	**13.78**	**2.03**	**2.35**	**458.57**	**494.26**	**0.011**
Eastern	8.23	9.78	0.91	0.92	502.71	560.23	0.335
Western	16.53	15.57	2.80	3.04	430.99	468.00	0.623
Hills	4.74	19.30	1.17	3.68	439.63	366.39	0.041
Bihar	**26.68**	**31.06**	**5.57**	**7.78**	**353.03**	**348.47**	**0.055**
Southern	19.21	19.41	3.48	4.20	410.10	425.07	0.345
Northern	39.50	45.37	8.64	12.21	287.60	268.95	0.258
Central	27.26	31.88	6.05	8.02	328.35	334.43	0.396
Gujarat	**14.72**	**11.90**	**2.59**	**2.26**	**454.18**	**491.71**	**0.063**
Eastern	13.11	17.39	2.10	3.58	407.11	456.51	0.044
Northern	16.10	12.05	2.76	2.18	463.62	491.25	0.386
Southern	11.49	8.60	2.58	1.67	511.61	567.05	0.211
Dry Areas	11.98	13.61	2.61	3.60	563.33	523.19	0.077
Saurashtra	15.85	12.85	2.41	2.25	378.32	434.40	0.281
Haryana	**10.55**	**11.33**	**1.90**	**2.18**	**473.92**	**489.64**	**0.024**
Eastern	9.94	10.86	1.98	2.08	460.40	487.65	0.740
Western	12.04	12.26	1.72	2.47	507.35	495.30	0.260
Himachal Pradesh	**3.64**	**1.03**	**0.48**	**0.16**	**746.93**	**937.27**	**0.002**
Karnataka	**21.44**	**13.44**	**4.91**	**3.11**	**423.14**	**486.78**	**0.062**
Coastal	5.14	7.50	1.13	2.49	571.91	533.76	0.069
Eastern	19.69	15.14	2.96	4.22	418.34	460.09	0.064
Southern	11.59	7.53	2.06	1.45	476.88	559.90	0.519
Northern	35.93	24.63	9.24	5.51	336.53	374.39	0.347
Kerala	**13.87**	**10.52**	**2.70**	**2.08**	**493.83**	**547.62**	**0.033**
Northern	15.30	11.33	2.89	2.21	460.77	490.74	0.401
Southern	13.03	9.97	2.59	2.00	513.08	585.69	0.599
Madhya Pradesh	**18.50**	**17.82**	**3.50**	**3.81**	**408.06**	**412.24**	**0.078**
Chattisgar	13.50	15.03	2.53	2.71	410.29	456.07	0.181
Vindhya	15.06	15.56	1.85	2.99	413.39	418.40	0.118
Central	25.34	21.63	5.84	4.65	401.57	369.90	0.140
Malwa	15.32	13.68	2.27	2.77	429.20	425.88	0.235
South	22.56	18.47	4.05	3.26	387.67	395.28	0.107
Western	30.48	34.56	7.94	9.79	362.00	321.17	0.100
Northern	15.22	13.28	2.80	2.82	422.08	454.15	0.119

Appendix Table 2	Cont.						
	50th HCR	55th HCR	50th PGI	55th PGI	50th Average	55th Average	55th
Maharashtra	18.24	14.69	4.57	3.64	529.80	561.22	0.158
Coastal	3.89	2.87	0.55	0.44	676.59	695.57	0.467
Western	16.18	13.70	3.60	3.30	487.92	535.61	0.192
Northern	31.01	23.88	7.39	5.96	363.39	421.98	0.079
Central	43.31	39.65	13.25	11.85	385.95	364.13	0.097
Inland Eastern	37.86	32.06	10.05	7.74	375.86	391.50	0.143
Eastern	19.80	18.18	4.29	3.36	388.93	404.86	0.022
Orissa	15.19	17.94	2.97	4.27	402.54	396.66	0.026
Coastal	15.13	18.83	2.93	4.56	377.79	380.76	0.516
Southern	26.72	24.45	4.77	6.12	412.51	412.56	0.129
Northern	11.06	14.28	2.48	3.18	427.86	415.16	0.354
Punjab	7.75	8.39	1.13	1.63	510.73	535.21	0.031
Northern	5.23	6.93	0.76	1.35	532.31	555.09	0.664
Southern	12.35	11.27	1.80	2.17	471.39	495.93	0.336
Rajasthan	18.26	15.70	3.25	3.60	424.73	451.98	0.047
Western	10.70	13.35	1.54	3.21	434.91	445.85	0.364
Northern	21.13	16.85	3.86	3.82	425.06	466.23	0.449
Southern	15.09	14.57	2.75	3.08	463.45	445.86	0.083
Eastern	27.99	19.91	5.47	4.43	382.74	416.75	0.104
Tamil Nadu	20.85	22.03	4.46	6.98	438.29	516.71	0.093
Northern	20.93	28.98	5.03	11.15	448.70	526.95	0.451
Coastal	22.78	18.40	4.25	3.96	439.21	476.26	0.132
Southern	27.50	20.82	5.94	4.92	376.05	445.08	0.212
Inland	12.70	10.30	1.89	1.90	485.30	551.65	0.205
Uttar Pradesh	21.71	20.47	4.58	4.92	388.97	402.11	0.142
Himalayan	9.54	2.87	1.17	0.58	510.21	546.37	0.005
Western	18.02	18.40	3.99	4.10	422.50	412.16	0.486
Central	22.34	21.26	4.96	5.33	367.07	381.08	0.282
Eastern	24.43	19.18	4.45	4.53	353.87	438.80	0.186
Southern	46.34	47.79	11.28	14.14	239.47	243.47	0.041
West Bengal	15.53	14.29	2.91	2.64	474.19	532.65	0.072
Himalayan	23.93	12.32	5.12	2.60	335.39	400.23	0.049
Eastern	25.56	19.87	4.60	3.95	387.86	465.87	0.131
Central	11.39	10.86	2.14	2.28	511.42	562.97	0.761
Western	33.49	47.63	6.20	4.44	339.53	399.84	0.059
Delhi	8.79	5.51	1.69	1.31	794.95	719.78	0.005

Note: 55th round state-level estimates are weighted averages of regional estimates from the multivariate model. 55th population weights provided in the last column.

Appendix Table 3
Proportion of Households with Positive Asset Ownership
DHS Data for 1993/4 and 1998/9

state	radio		TV		fridge		bike		motor bike		car		sew		Clock/ watch		fan	
	1992	1998	1992	1998	1992	1998	1992	1998	1992	1998	1992	1998	1992	1998	1992	1998	1992	1998
Andhra Pradesh	0.43	0.35	0.18	0.33	0.05	0.06	0.32	0.39	0.07	0.09	0.01	0.01	0.11	0.10	0.42	0.62	0.33	0.54
Assam	0.30	0.35	0.12	0.20	0.03	0.04	0.41	0.50	0.04	0.05	0.02	0.02	0.11	0.11	0.40	0.58	0.16	0.22
Bihar	0.27	0.28	0.11	0.13	0.03	0.03	0.38	0.45	0.06	0.05	0.01	0.00	0.10	0.09	0.42	0.51	0.14	0.17
Gujarat	0.41	0.35	0.24	0.43	0.11	0.19	0.35	0.44	0.12	0.22	0.02	0.03	0.13	0.13	0.67	0.81	0.52	0.70
Haryana	0.50	0.46	0.40	0.58	0.14	0.25	0.54	0.67	0.12	0.20	0.02	0.03	0.54	0.55	0.75	0.87	0.76	0.85
Himachal Pradesh	0.50	0.53	0.32	0.57	0.07	0.19	0.15	0.18	0.05	0.08	0.01	0.02	0.60	0.64	0.64	0.86	0.40	0.57
Karnataka	0.52	0.52	0.22	0.41	0.05	0.10	0.30	0.38	0.11	0.16	0.01	0.02	0.11	0.14	0.55	0.74	0.25	0.41
Kerala	0.60	0.66	0.19	0.38	0.10	0.20	0.21	0.25	0.05	0.11	0.02	0.03	0.18	0.19	0.72	0.87	0.40	0.57
Madhya Pradesh	0.33	0.26	0.20	0.30	0.04	0.06	0.49	0.51	0.10	0.12	0.01	0.01	0.17	0.17	0.46	0.55	0.32	0.40
Maharashtra	0.43	0.36	0.30	0.48	0.10	0.15	0.33	0.37	0.09	0.12	0.02	0.02	0.17	0.17	0.57	0.70	0.40	0.60
Orissa	0.32	0.31	0.11	0.17	0.02	0.04	0.49	0.56	0.05	0.07	0.00	0.01	0.05	0.05	0.38	0.47	0.20	0.28
Punjab	0.51	0.45	0.52	0.70	0.24	0.42	0.68	0.80	0.18	0.32	0.02	0.05	0.65	0.71	0.74	0.92	0.90	0.93
Rajasthan	0.33	0.33	0.17	0.29	0.05	0.09	0.31	0.42	0.08	0.12	0.01	0.01	0.24	0.31	0.49	0.68	0.32	0.49
Tamil Nadu	0.44	0.50	0.20	0.38	0.04	0.07	0.37	0.48	0.08	0.14	0.01	0.01	0.08	0.10	0.53	0.79	0.35	0.55
Uttar Pradesh	0.33	0.32	0.17	0.27	0.06	0.08	0.59	0.63	0.07	0.08	0.01	0.01	0.23	0.24	0.52	0.60	0.23	0.33
West Bengal	0.44	0.39	0.19	0.27	0.05	0.08	0.47	0.53	0.04	0.05	0.01	0.01	0.11	0.09	0.58	0.62	0.27	0.34
New Delhi	0.65	0.67	0.70	0.87	0.41	0.60	0.43	0.49	0.26	0.36	0.08	0.11	0.60	0.69	0.85	0.97	0.85	0.94
Total	0.39	0.38	0.21	0.34	0.07	0.11	0.42	0.48	0.08	0.11	0.01	0.02	0.18	0.18	0.53	0.67	0.32	0.45

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