

On urban versus rural poverty in India

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1. Introduction

1.1 Official headcounts of poverty in India use different poverty lines for urban and rural areas. The current lines were derived in 1979 by calculating the level of per capita household expenditure that was associated with calorie counts of 2,400 and 2,100 per capita per day in rural and urban areas respectively. This procedure yielded poverty lines of Rs. 49.09 per capita per month for rural areas and Rs. 56.64 per capita per month in urban areas. The lines were then held constant in real terms, and were updated in nominal terms only for inflation. Until recently, the urban and rural lines have been updated using a common All-India price index, the implicit price deflator of consumers' expenditure from the National Accounts, so that the ratio of urban to rural poverty lines has varied neither across states nor through time. In recent years, there have been two important attempts to replace the All-India price index by price deflators that are both state-specific and are differentiated by urban and rural sectors. These are by Minhas, Jain, and Tendulkar (1991) and most recently Government of India (1993), which proposes a new set of state and sector specific poverty lines to be adopted in future official poverty statistics. Compared with the 'old' poverty lines, the new lines are relatively much higher in urban than in rural areas, so that the new official poverty counts increase the numbers of urban relative to rural poor. Using the new lines, the latest available large scale NSS data, the 43rd Round of 1987–88, shows higher poverty counts for urban than rural areas for most of the large states, including Andhra Pradesh, Bihar, Gujarat, Haryana, Karnataka, Kerala, Madhya Pradesh, Punjab, Rajasthan, and Uttar Pradesh, Government of India (1993, Table 4.5). Although it is a clear conceptual improvement to replace national by state and sector specific price indices, there is some skepticism about the large differentials

between urban and rural poverty lines.

1.2 This report uses household expenditure data from six states from the 43rd Round (1987–88) of the National Sample Survey to provide some direct (although partial) evidence on rural and urban price differences. In particular, we use unit values for food to make inferences about prices paid for food, and to construct urban to rural price indices for food. Because food comprises about two thirds of all consumers' expenditure, food price indices are informative about the cost of living in general, and can be used to infer what price differences would have to exist for non-foods in order to justify the new poverty lines in terms of urban to rural differences in the cost-of-living. This exercise is documented in Section 2. Section 3 makes direct comparisons of the distributions of nominal household per capita expenditure in urban versus rural areas, and calculates for various poverty lines the level of urban to rural price differences that would equalize the urban and rural headcount ratios. These calculations provide information on the importance of price relatives for making comparisons of poverty between urban and rural areas. The remainder of this introduction sets the stage by discussing in more detail the various different poverty lines that have been used in India.

1.3 A good account of poverty lines in India is given in the report of the 1993 Expert Group set up to advise on estimating numbers and proportions of the poor, Government of India (1993). Official poverty lines in India go back to 1962, although for the purposes of this report, we need start only with a Planning Commission report of 1979 which set separate urban and rural poverty lines by using NSS data to calculate the household per capita ex-

penditure levels at which rural (urban) households attained a calorie consumption of 2,400 (2,100) per person per day. Using data from 1973–74, this procedure generated poverty lines of Rs. 49.09 per capita per month for rural areas, and Rs 56.64 per capita per month for urban areas, a difference of 15.4 percent. Rounded to Rs 49 and Rs 57 at 1973–74 prices, these lines have been the point of departure for subsequent revisions and discussions. The alternatives that we consider below are concerned not with the modification of these lines, but with their repricing to deal with interstate and intertemporal differences in the cost of living.

1.4 Before discussing alternative pricing strategies, it is worth reflecting briefly on the logic of the original lines. The strategy of anchoring poverty lines in calorie requirements is a familiar one, as is the method for using observed behavior to convert calorie counts into money. There is clearly a great deal of appeal in the idea that poverty lines should be based on whether people get enough to eat, and it can perhaps be argued that examination of the calorie Engel curves is the best way of discovering how much money people typically need to get enough to eat, given Indian tastes and social norms. Even accepting this, there are two points that are worth making. First, if the general methodology is correct and was so for the 1973–74 data, it is hard to see why it should not be consistently applied to other more recent data, instead of what has actually been done, which is to hold the lines fixed in real terms and to reprice to give the lines in current rupees. If the methodology was sound in the first place, the current poverty lines are unlikely to be correct; if it was wrong in the first place, the current lines are also without foundation. The second point concerns the difference between the urban and rural lines. The use of different calorie norms for urban and rural workers

reflects the clearly sensible notion that rural workers are more likely to undertake heavy manual labor than are urban workers, and that given the greater non-food needs of the latter, such as transportation and housing, they have less money available for food. But these informal and sensible considerations are far from providing a formal demonstration that the differential calorie counts and their associated expenditure levels do indeed equalize welfare across the sectors. Without such a demonstration, the calculations are hostage to any factor that shifts the position or slope of urban versus rural calorie Engel curves, see for example the closely related arguments for Indonesia in Bidani and Ravallion (1993). There is also some evidence that recent growth in urban incomes in India has generated little growth in per capita consumption of basic cereals. If so, the reapplication of the original method to recent data would give ever increasing poverty lines for urban areas, a conclusion that might be correct but is not obviously so. Even so, and having made these points, it should be emphasized that the differences between the urban and rural lines in 1973–74 is a relatively modest sixteen percent, which (as we shall see) is close to what might be expected from cost of living differences alone.

1.5 What we shall refer to as the ‘old’ method of updating the poverty lines uses a single all-India price index, the implicit price deflator of consumers’ expenditure from the National Accounts. This is applied to both urban and rural lines, and there are no differences across states. Although it was recognized that it would in principle be better to work with a price deflator that reflected the consumption patterns of those at or near the poverty line, such adjustments made little difference in practice, which is to be expected given that poverty lines

are near the middle of the distribution in India. When updated by this old procedure, the nominal values of the rural and urban poverty lines in 1987–88 are Rs. 131.8 and Rs. 152.1 per capita per month. Because there is only a single price index, these lines preserve the original urban to rural differential of 15.4 percent.

1.6 The official poverty estimates presented by the Planning Commission under this old procedure were subject to a number of other adjustments unrelated to price deflation. In particular, because the consumption aggregates from the NSS are less than those estimated in the National Accounts, the household expenditure figures from the NSS data are inflated by the ratio of one to the other, thus reducing the fractions of people in poverty compared with what would be obtained by direct application of the poverty lines to the NSS data. This adjustment has been subject to a good deal of criticism, and the recent Expert Group report recommends that it be discontinued. In this report, we attempt no such adjustment. We also note that the official counts of numbers of people in poverty are calculated, not directly from the NSS data, but by multiplying the census-based estimates of population totals by the headcount ratios obtained from the NSS data. This is because the NSS population estimates are low relative to those from the census. In this report, we work entirely with headcount ratios, and do not report numbers of people in poverty, so that no adjustment is necessary.

1.7 The Expert Group report recommends updating nominal poverty lines not only for general inflation, but also for state and sector specific price changes. This follows earlier calculations by Minhas, Jain, and Tendulkar (1991). The Expert Group's calculation is based on three

separate elements: (i) a baseline set of state specific price relatives calculated for 1960–61 by Chatterjee and Bhattacharya (1974), (ii) a state specific rural price index, the consumer price index for agricultural laborers, and (iii) a state specific urban price index derived from two component price indices, the consumer price index for industrial workers, and the consumer price index for non-manual employees. The Chatterjee and Bhattacharya statewise urban and rural prices are updated to 1973–74 using (ii) and (iii), and are then scaled so that the all-India rural and urban averages are Rs. 49 and Rs 57 respectively. This scaling preserves the original calorie-based lines, at least for the country as a whole, while introducing variation to pick up interstate differences in the cost-of-living. The state-specific lines are then updated to later years using index (ii) for the rural lines and index (iii) for the urban lines. The two price indices (ii) and (iii) are calculated with some sophistication. In particular, the overall price indices are decomposed to the maximum amount permitted by the data, and are then reweighted using 1973–74 NSS measured expenditure patterns of households around the poverty line. The procedure used by Minhas, Jain, and Tendulkar (1991) is more tersely described, but appears to be conceptually the same and uses the same underlying price indices. The only apparent differences in the two sets of calculations are the choice of base year and the weighting procedures for calculating the two deflators (ii) and (iii). Even so, the nominal poverty lines for 1987–88, which is the year that will concern us, are very different in the Expert Group report and in Minhas *et al.*, and we have been at a loss to understand the differences, either from close reading of the text or from comparison of the relatively few numbers that overlap in the two reports.

1.8 The replacement of an All-India price deflator with state specific price deflators is clearly a conceptual improvement, especially in a country as large and as spatially diverse as is India. Nevertheless, the results of the calculations, especially those in the expert group report, are controversial. In particular, the use of separate price deflators has had the effect of introducing large and growing differences between the urban and rural poverty lines instead of the fixed sixteen percent differential embodied in the old procedures. Table 1 shows the ratios of urban to rural poverty lines for the two years 1983 and 1987–88 from both Minhas *et al* (1991) and the Expert Group. Both show larger ratios in 1983 than the 1.16 of the old procedure, though the Minhas *et al* estimate averages only 1.19 for All India. Both also show a widening of the urban/rural gap that presumably comes from the fact that the CPI for industrial and non-manual workers has risen more rapidly than the CPI for agricultural laborers. The major puzzle is that the Expert Group ratios are much larger than those in Minhas *et al*. Indeed, the former are sufficiently large to make the 1987–88 urban headcount poverty measures larger than the rural headcount ratios for the majority of states. Pending a resolution of the differences between these two sets of numbers, and absent any information about the quality of the urban and rural price deflators (particularly the latter, whose village sample is now of considerable antiquity,) we proceed in the rest of this report to provide some direct evidence on urban/rural price differences, as well as to investigate the sensitivity to price relatives of urban/rural poverty counts.

2. Urban/rural price indices for food

2.1 We work from the unit record data from the 43rd round of the NSS, a survey that was

carried out in 1987–88, and which collected detailed consumption information from all households. Each household reports expenditures over the last month on a large number of consumption items and in the case of foods, the physical quantity purchased, usually measured in kilograms. For households that produce food, the value and quantity of home consumption is also recorded. The ratio of expenditure to quantity is treated as a measure of price for each household. We then compute means and medians of prices paid for all rural and all urban households separately, with the latter our preferred measure of price. The urban to rural price relatives for each good are then combined into a food price index, in this case the Törnqvist index, which is a geometrically weighted average of price ratios using as weights the average of the urban and rural expenditure shares at or near the poverty lines. This procedure is a straightforward one, but there are a number of practical issues that have to be discussed prior to its implementation.

2.2 Perhaps the main concern is with the legitimacy of treating the ratios of expenditures to quantities, or unit values, as prices. These data do not come from direct observations of market prices, or from individual trades, but are rather the cost per unit of sometimes quite heterogeneous collections of commodities. For a category such as fruits, we are literally adding apples and oranges, and if we extend it to fruit and vegetables, we are adding in cabbages, spinach, potatoes and carrots, and then dividing the gross undifferentiated weight into the expenditure on the group. Even for a much more homogenous category such as rice, variations in quality between households will imply differences in unit values even when all households face the same prices. Indeed, there is a substantial literature going back to Prais

and Houthakker (1955) that estimates income (or total expenditure) elasticities of quality by regressing the logarithm of unit value on the logarithm of household income (or expenditure.)

2.3 In spite of the fact that unit values are not prices, they are nevertheless very close to being so in practice. First, comparison of unit values from the NSS data with recorded market prices gives a very good correspondence, see Deaton, Parikh and Subramanian (1993) for comparisons of NSS unit values in Maharashtra in 1983 with independent data on prices in local markets. Second, the unit values vary across time and space in the way that we would expect if they were good measures of price. Unit values rise by about 18 percent from one harvest to the next, and they vary across space in line with production and transport margins. Third, a large fraction of the variation across households in unit values is accounted for by village (i.e. spatial) and time components, and although total expenditure is also a significant explanatory variable, the quality elasticities are small, usually less than ten percent. And to the extent that income effects on unit values are important, the result will be to bias *upward* the urban to rural price relative, since average incomes are higher in urban areas. Fourth and finally, for most commodities and for most households, the recorded unit values are whole numbers, suggesting that what we are observing are genuine market prices. For example, in rural Maharashtra in the 43rd round data, the median unit value for rice is Rs. 3.5. There are 5,211 households who report rice consumption of whom 2,416 report unit values of exactly Rs 3.0 per kilo, Rs 3.5 per kilo, or Rs. 4.0 per kilo. For wheat, there are 4,650 households who record consumption, the median unit value is Rs 3.0 per kilo, and 1,164 households report exactly this value.

2.4 One practical problem concerns the NSS treatment of consumption out of own production. For each household, a separate record of expenditures and quantities is kept for purchases in the market on the one hand and for consumption out of home production on the other. The latter is valued by the NSS at local harvest prices, which are lower than market prices by the costs of distribution and marketing. Since our interest here is in measuring the cost of living, and not the cost of consumption at the margin, we have used the sum of expenditures divided by the sum of quantities, so that the unit value will be a weighted average of the harvest and market prices for producer households who also buy in the market.

2.5 A second problem concerns the treatment of outliers, especially contamination by a few values of something that is clearly different from the main body of the data. The category milk and milk products is one example, where sweets are much more expensive than milk, and where a few high unit values are always present. Another more puzzling example is eggs, where median unit values are usually a little less than one rupee. Nevertheless, in all six states that we examined, and in both urban and rural sectors, there were always a few reported unit values of around 15 rupees. We have not been able to find the reason for these values, although it is possible that some respondents reported eggs in dozens instead of in units as instructed. We protect ourselves against these cases by using medians rather than means of unit values as our preferred measures of price. Medians are much less sensitive to outliers than are means, and although they will be affected by a few large egg unit values (for example) they are affected only by their presence, and not by their magnitude. We also spent a good deal of time examining histograms and oneway plots of unit values, and removed a

few clearly egregious values, typically a dozen or so in rural areas, and less in urban areas.

This allows us also to calculate price indices using mean prices, although we still have a preference for the medians.

2.6 In a few cases, the use of medians is not sufficient to protect us against the heterogeneity of a commodity group. Figure 1 illustrates what happened on our first attempt to calculate unit values for the category 'meat' for urban and rural Maharashtra. Both histograms show that there are at least two different distributions; further investigation shows that the low unit values are for eggs and beef, while mutton, chicken, and even fish have relatively similar unit values in the upper end of the distribution. The problem here is not the heterogeneity itself, but the fact that the balance between beef and eggs on the one hand, and chicken, mutton, and fish on the other is different in the urban and rural sectors. As a result, if we use the data as presented in the Figure, it will appear that 'meat' is a good deal more expensive in rural than in urban Maharashtra, where in fact what we are really observing is not a difference in price, but a difference in tastes, or at least in expenditure patterns. Using medians is of no help here; the medians are as sensitive as are the means. Instead, it is necessary to disaggregate the category into its components, eggs, beef, mutton, chicken, and fish, and deal with each separately. By this argument, the ideal disaggregation of commodities is the maximum permitted by the data, and given more time and resources, this is the course that we should have adopted. However, in order to keep the data sets of manageable size, we worked with 23 commodity groups; this appeared to be sufficient to eliminate any further cases of bimodality in the distribution of unit values. In particular, we have been careful to disaggregate not only

the meats, but the various cereals. While there is no guarantee that the price differences in some of the remaining heterogeneous categories (milk and milk products, fruit and vegetables) are not in part driven by differences in expenditure patterns within the group, we have spent a great deal of time inspecting the data, and we do not believe that the remaining heterogeneity is having any significant effect on our results.

2.7 In the time available to us in India, we were able to examine unit values for six states, Gujarat, Karnataka, Kerala, Madhya Pradesh, Maharashtra, and Tamil Nadu; these were not selected purposively, but according to the ability of IGIDR to download the data quickly. The median prices are presented in the first two columns of the detailed Appendix Tables 1 through 6. These were obtained from the household records and are weighted by the NSS inflation factors for each household. In some cases, for example millet in rural Kerala, or maize in urban Kerala, no households report purchases of the commodity, and the entry is missing. In a number of other cases, again mostly involving coarse grains, the medians are calculated from a very small number of recorded purchases, and the estimates are unlikely to be reliable. But neither these nor the missing values affect the calculation of the price indices since they receive little or no weight, precisely because few or no households make purchases. Although the NSS reports a quantity for processed food, we judged the category too heterogeneous for practical use, and we report no unit values for this category. Since processed food is largely food, we would expect its price to vary with the prices of other, non-processed foods, although there may also be need to make some allowance for urban/rural wage differentials in processing costs.

2.8 The third and fourth columns in Tables 1 through 6 show the averages of the budget shares for rural and urban households. These are computed by first calculating the budget shares for each household, and then averaging the shares over all households with weights given by the inflation factor multiplied by household size, so that each set of budget shares is thought of as belonging to an individual, not a household. Note also that the average of budget shares is quite different from the budget shares of average expenditures obtained by dividing average expenditures on each good by average total expenditure. Simple algebra shows that the latter is a weighted average of the former with total household expenditures as weights; as a result the average of the individual budget shares is representative of a much lower point in the income distribution than are the budget shares of average expenditures. The Appendix Tables show that the average budget share for food is between 60 and 70 percent for all states and sectors; the lowest value is 61.8 percent in urban Maharashtra and the highest is 69.4 percent in rural Gujarat. Except for Kerala—of which more below—average urban food shares are always a few points lower than rural food shares. The expenditure patterns are also quite different across states. In particular, coarse cereals—particularly jowar and to a lesser extent bajra—are important in Gujarat, Maharashtra, and Tamil Nadu. Wheat is an important element of the budget in Gujarat, Maharashtra, and Madhya Pradesh, but not in Kerala, Karnataka, or Tamil Nadu. In Karnataka and Tamil Nadu, expenditure on rice alone is more than a quarter of the budget. This sort of evidence suggests not only that attention be paid to differential price movements by state, but that consideration be given to using different weights in different states. Increases in the price of wheat or sorghum do not much affect consumers in Kerala.

2.9 There are many different schemes for weighting together the individual prices to calculate an overall price index. One of the simplest, and one with theoretically desirable properties, is the Törnqvist index, given by the formula

$$\ln P = \sum_{k=1}^n 0.5(w_k^1 + w_k^0) \ln(p_k^1/p_k^0) \quad (1)$$

where P is the overall price index comparing situation (place or time) 1 relative to situation 0, w_k^1 and w_k^0 are the budget shares of good k in 1 and 0 respectively, and p_k^1/p_k^0 is the price relative for good k . The index is a geometric weighted average of the individual price relatives, with weights equal to the average of the budget shares in the two situations. The average budget shares are given in the penultimate column of each of the tables; these are the simple averages of the numbers in the previous two columns.

2.10 The literature on poverty lines in India has emphasized the importance of constructing price indices using as weights the expenditure patterns of people at or near the poverty line. Provided we use the average of the budget shares (as opposed to the budget shares of the averages) and given that Indian poverty lines are around the middle of the per capita expenditure distribution, such corrections will not have a large effect on the price indices or poverty lines. Nevertheless, it is good practice to make such corrections, and we have recalculated budget shares around the poverty line. We do this using a weighted average of budget shares for each person in the sample, but with each person weighted according to the closeness to the poverty line of the per capita expenditure of the household in which he or she lives. Households closer to the poverty line are given more weight than households further from the poverty line, and in the scheme used here, households far enough from the poverty line get no

weight at all. To make these notions precise, write x for the logarithm of household per capita expenditure, and z for the logarithm of the poverty line for the relevant sector and state. Since our purpose is to investigate the extent to which the new poverty lines can be justified in terms of urban to rural price differences, we use the new poverty lines to calculate the z 's.

We then calculate a poverty-weighted average budget share according to the formula

$$w_i^P = \sum_{h=1}^H w_i^h \mu^h K\left(\frac{x^h - z}{b}\right) \quad (2)$$

where w_i^P is the poverty weighted budget share for good i , w_i^h is the budget share of good i for household h , and μ^h is a weight, here the product of the sample multiplier (inflation factor) and the household size. The function $K(\cdot)$ is a positive weighting function that is monotone declining in the absolute value of its argument, so that maximum weight is given when the household is at the poverty line ($x^h = z$), and where b is a 'bandwidth' or sensitivity parameter that controls how quickly the weights fall off as we move away from the poverty line. When b is small, the weight is concentrated close to the poverty line; when it is large, households further away from the line are given more weight. Ideally, b should be as small as possible, since we want to confine attention to the poverty line itself, but we must also ensure that there are enough households in the average (2) to give a reasonably precise estimate. The weighting function used here takes the form

$$\begin{aligned} K(t) &= \frac{15}{16}(1-t^2)^2 & \text{if } |t| \leq 1 \\ &= 0, & \text{otherwise.} \end{aligned} \quad (3)$$

We used three different values for b , the standard deviation of the logarithm of per capita expenditure σ , $\sigma/2$, and $\sigma/4$. The number of households contributing to the average, *i.e.* who

satisfy the first condition in (3), are listed in Table 2. Even with the smallest bandwidth, there are probably enough households, and our preferred poverty-weighted budget shares come from this ‘narrow’ average. The final column in Appendix Tables 1 to 6 gives the associated weight for the Törnqvist index; poverty weighted budget shares are calculated separately for urban and rural households, and their simple average calculated and displayed in the Tables. As anticipated, this column is not very different from the previous one, although the expenditure patterns are shifted somewhat towards the more necessary foods, and away from the more luxurious items.

2.11 The final product of these calculations, the urban to rural Törnqvist food price indices (excluding processed food) are reported in Table 3. The preferred estimates are in the final column of the top panel, where we combine median prices with narrow poverty-line weights, but the weighting scheme makes very little difference to the results. There is slightly more difference between the top and bottom panels, which compare median and mean prices, but once again the differences are small. The major variations are across states, with a 16 percent urban rural difference in Madhya Pradesh, followed by 13 percent in Maharashtra and 11 percent in Gujarat. The differential is nine and eight percent for Karnataka and Tamil Nadu respectively, and is smallest, less than two percent, in Kerala. This is perhaps not surprising; rice is the basic staple in Kerala, and it is sold in PDS shops at controlled prices throughout the state in both urban and rural areas. Kerala is also a state where there are many long strung out semi-urban villages, so that the distinction between the urban and rural sectors is often difficult to make. As a result, it would be surprising if there were to be large differ-

entials between urban and rural prices.

2.12 Although these food price indices are less than the 'old' poverty line differential of 16 percent for all six states, they leave out the third of the budget that is devoted to non-food, and it would be easy for larger price relatives (for example for housing) to make up the difference. The urban to rural differences are somewhat larger in the Minhas *et al* lines in Table 1, but the differences still seem potentially reconcilable. For example in Madhya Pradesh, which has the largest urban rural ratio (1.49) in the Minhas lines, but a food price index of only 1.16, the one third of the budget devoted to non-food would need a price relative of 2.15, which seems high but not impossible. But the 'new' poverty lines seem very high to be readily accounted for by price differences. In Madhya Pradesh, non-food would have to be 3.69 times more expensive in urban than in rural areas; in Gujarat, Karnataka, Kerala, Maharashtra, and Tamil Nadu, the corresponding ratios would have to be 2.37, 2.74, 3.01, 3.66, and 3.36 respectively. The figure of 3.01 for Kerala seems particularly implausible given the urban/rural geography of the state.

3. Urban and rural poverty comparisons

3.1 In this final section, we approach the urban to rural differentials in another way, looking at the distribution of nominal per capita expenditure in each, and asking how different the cost-of-living would have to be in order to affect the relative poverty rankings as judged by headcount ratios. We do this by considering the empirical cumulative distributions of per capita household expenditure for each sector. The right hand panels of Figures 2 through 4

show these cumulatives for each state and by urban and rural separately. These are graphed, not for the whole range of per capita expenditure, but over a poverty-line relevant range, from a half of the lowest poverty line under consideration to twice the highest. As always, the calculations are done on an individual basis, so that household per capita expenditure is imputed to each member of the household, and the multipliers from the sample design taken into account. The cumulation is done, not for the level of per capita expenditure, but for its logarithm; this does not affect the empirical distribution functions since the number of people whose per capita expenditure is less than x is the same as the number of people whose logarithm of per capita expenditure is less than the logarithm of x . As expected and as usual, the rural empirical distributions are in all cases above the urban distributions, so that, at any common nominal poverty line, there will be a higher headcount ratio in rural than in urban areas. Kerala is not an exception, but the two lines are very close, consistent once again with a lack of sharp distinction between urban and rural areas in that state.

3.2 The figures also show the six poverty lines, for urban and rural, from the old and new procedures, and from Minhas *et al* (1991). The points of intersection of the various poverty lines with the relevant cumulatives are shown as circles, and inspection of these shows which headcount ratio is higher according to which poverty measure. For example, in Gujarat, the ‘old’ lines give substantially more poverty in the rural sector, while the difference between the new lines is large enough to overcome the distance between the two cumulatives and to give a larger headcount ratio in the urban sector. The urban Minhas line is close to the ‘new’ urban line, but the rural line is much higher, so that according to Minhas *et al*, there is still

more rural poverty in 1987–88.

3.3 One way to make these comparisons more generally is to note that any price deflation of urban per capita expenditure will cause the urban cumulative distribution plot to shift horizontally to the left by a fixed amount. In consequence, the horizontal distance between the two cumulatives measures the (log of the) urban/rural price relative that would equate the headcount ratios in the two sectors. The left-hand panel of each graph shows these horizontal differences as a function of the logarithm of per capita expenditure in the rural sector. Put differently, the left hand panel is constructed from the right hand panel by starting from a given value of log per capita expenditure, looking it up on the rural cumulative, measuring the horizontal distance to the urban cumulative, and plotting that distance against the original value of log per capita expenditure. For example, in Gujarat (Figure 2), the horizontal distance between the cumulatives is about 30 percent at the lower levels of rural per capita expenditure, and climbs to about 40 percent among somewhat better-off households. For poverty lines in the relevant ranges, poverty rates in urban Gujarat will therefore exceed poverty rates in rural Gujarat only if the urban cost of living exceeds the rural cost of living by more than 30 percent for low lines and 40 percent for high lines. The graphs also show the three rural poverty lines, together with the ratios of urban to rural lines marked as circles. By construction, if the circle is above the plot, the urban/rural ratio of poverty lines is large enough to overcome the stochastic dominance in the nominal figures in the right hand panel and to give a higher headcount ratio in the urban sector.

3.3 The results show that, apart from Kerala, the urban cost of living has to be between 30 and 50 percent (depending on the position of the rural poverty line) higher than the rural cost of living in order to give more poverty in urban than in rural areas. In Kerala, the cumulatives are close together over the relative range, so that much smaller price differences are capable of generating higher urban than rural headcounts. But by the same token, big price differences between the two sectors are implausible, as is the urban/rural ratio implicit in the new poverty lines for Kerala. In Gujarat, Madhya Pradesh, and Karnataka, the new lines are further apart than is necessary to make the urban sector poorer, and in Maharashtra and Tamil Nadu, the difference is close to what is required to equalize the poverty measures.

3.4 This final exercise, like the previous one, documents that urban per capita expenditure levels are a good deal higher than rural per capita expenditure levels, and that substantial price differences would be required if we are to believe that poverty is higher in urban than in rural areas, no matter what poverty line we work from. These price differences are much larger than would be justified by the food price indices calculated in the previous section, and would require very high urban/rural price relatives for non-foods to be correct. Our provisional conclusion then is that the Minhas et al (1991) poverty lines—or indeed even the old lines that take no account of differences across states—appear to be a good deal more plausible than those recommended by the more recent Expert Group, Government of India (1993). It would be good to have a better understanding of why two such similar methodologies give such different answers.

4. References

- Bidani, Benu and Martin Ravallion, 1994, 'How robust is a poverty profile?' *World Bank Economic Review*, 8, 75–102.
- Chatterjee, G.S. and N. Bhattacharya, 1974, 'Between state variation in consumer prices and per capita household consumption in rural India,' in T.N. Srinivasan and Pranab Bardhan, eds., *Poverty and Income Distribution in India*, Statistical Publishing Society, Calcutta.
- Deaton, Angus S., Kirit Parikh, and Shankar Subramanian, 1993, 'Food demand patterns and pricing policy in Maharashtra: an analysis using household level survey data,' Indira Gandhi Institute of Development Research, Bombay, and Research Program in Development Studies, Princeton University, processed.
- Government of India, 1993, *Report of the Expert Group on Estimation of Proportion and Number of Poor*, Perspective Planning Division, Planning Commission, New Delhi, July.
- Minhas, B.S., L.R. Jain, and S.D. Tendulkar, 1991, 'Declining incidence of poverty in the 1980s: evidence versus artefacts,' *Economic and Political Weekly*, July 6–13.
- Prais, Sigbert J. and Hendrik S. Houthakker, 1955, *The analysis of family budgets*, Cambridge. Cambridge University Press.

Table 1: Ratios of urban to rural poverty lines 1983 and 1987–88, Minhas et al (1991) and Government of India (1993)

	Minhas et al 1983	Minhas et al 1987–88	Expert Group 1983	Expert Group 1987–88
Andhra Pradesh	1.30	1.43	1.54	1.73
Assam	0.93	0.93	1.06	1.10
Bihar	1.11	1.18	1.19	1.34
Gujarat	1.30	1.34	1.50	1.53
Haryana	1.09	1.08	1.16	1.16
Jammu and Kashmir	0.95	1.02	1.08	1.17
Karnataka	1.26	1.40	1.46	1.64
Kerala	1.14	1.11	1.29	1.34
Madhya Pradesh	1.38	1.49	1.49	1.67
Maharashtra	1.29	1.35	1.44	1.60
Orissa	1.26	1.30	1.20	1.41
Punjab	1.01	1.00	1.14	1.16
Rajasthan	1.25	1.21	1.46	1.42
Tamil Nadu	1.17	1.33	1.29	1.48
Uttar Pradesh	1.22	1.25	1.32	1.35
West Bengal	0.91	1.01	1.00	1.15
All India	1.19	1.29	1.31	1.43

Table 2: Numbers of households used in weighting price indexes

	sample size		wide poverty sample		medium poverty sample		narrow poverty sample	
	urban	rural	urban	rural	urban	rural	urban	rural
Gujarat	2258	1594	1394	922	792	529	396	283
Karnataka	2307	3251	1465	1987	845	1122	446	582
Kerala	1430	3357	931	1944	555	1138	295	601
Madhya Pradesh	2886	6294	1867	4178	1069	2395	544	1268
Maharashtra	5496	5723	3082	3806	1652	2199	812	1203
Tamil Nadu	4108	4562	2807	3022	1631	1747	899	889

Notes: The first panel shows sample sizes and thus the number of households whose expenditure patterns are used in calculating mean weights for the price indices. The three other panels show the numbers of households around the poverty line that are given positive weight in the kernel weighting function when the bandwidth is σ , $\sigma/2$, and $\sigma/4$ respectively, where σ is the standard deviation of the logarithm of pce.

Table 3: Törnqvist urban to rural price indices, six states 1987–88.

	Mean weights	Wide poverty weights	Middle poverty weights	Narrow poverty weights
<i>Median Prices</i>				
Gujarat	1.1085	1.1108	1.1104	1.1107
Karnataka	1.0884	1.0875	1.0874	1.0866
Kerala	1.0132	1.0083	1.0075	1.0077
Madhya Pradesh	1.1633	1.1628	1.1632	1.1640
Maharashtra	1.1345	1.1341	1.1345	1.1353
Tamil Nadu	1.0830	1.0839	1.0837	1.0838
<i>Mean prices</i>				
Gujarat	1.1166	1.1201	1.1186	1.1180
Karnataka	1.0818	1.0827	1.0827	1.0824
Kerala	1.0014	1.0012	1.0011	1.0012
Madhya Pradesh	1.1747	1.1759	1.1761	1.1768
Maharashtra	1.1422	1.1414	1.1416	1.1419
Tamil Nadu	1.0956	1.0969	1.0967	1.0969

Notes: The Törnqvist index is a weighted geometric mean of price relatives. The first column uses the average of mean rural and mean urban budget shares. The second uses the poverty-line weighted kernel averaged budget shares with a bandwidth set to the standard deviation of the logarithm of pce. The third and fourth lines also use poverty-line weights with bandwidths of a half and a quarter standard deviation respectively. The price relatives in the top panel are the preferred estimates and use median unit values; the estimates in the final column are the most relevant for people near the poverty line.

APPENDIX: Detailed tables of prices and budget shares for six states

Appendix Table 1: Median prices and budget shares, urban and rural Gujarat

GUJARAT						
	median unit values		mean budget shares		price index weights	
	rural	urban	rural	urban	average	Poverty-weighted
rice	3.8	4.5	8.3	6.9	7.6	8.4
wheat	2.5	3.0	9.0	11.7	10.3	10.5
jowar	2.1	2.4	4.3	0.9	2.6	2.8
bajra	2.3	2.5	6.2	2.9	4.6	5.6
maize	2.1	2.8	2.8	0.1	1.5	1.4
barley	2.2	2.8	0.0	0.0	0.0	0.0
millet	1.2	6.0	0.0	0.0	0.0	0.0
ragi	2.0	.	0.2	0.0	0.1	0.2
cereal subs	10.0	8.0	0.0	0.1	0.1	0.0
gram	6.0	6.0	0.2	0.3	0.2	0.3
pulses	9.0	9.1	8.0	7.2	7.6	8.0
milk	5.0	5.1	16.4	20.2	18.3	16.1
oils	19.0	22.7	11.0	14.7	12.8	12.7
beef	.	10.0	0.0	0.1	0.0	0.1
other meats	24.0	25.0	0.8	1.6	1.2	1.6
chicken	25.0	28.0	0.4	0.0	0.2	0.3
eggs	0.8	0.8	0.2	0.3	0.2	0.3
fish	12.7	15.0	0.5	0.5	0.5	0.8
fruit & veg	2.7	2.9	13.0	14.0	13.5	13.0
sugar	5.7	6.1	6.3	5.7	6.0	6.1
salt	0.5	0.6	0.1	0.1	0.1	0.1
spices	0.02	0.02	4.5	4.0	4.2	4.5
proc food	.	.	7.9	8.6	8.3	7.3
All food	.	.	69.4	65.7	67.5	70.5

Notes: Median unit values are rupees per kilo except for eggs and chicken which are rupees per unit. For most goods, most unit values are whole numbers, so that the medians are also typically whole numbers. The use of medians also limits the effects of contamination due to mixtures of products, e.g. eggs and egg products. The budget shares are percentage shares of each food in total food, including processed food. The first column in the price index weight panel is the average of the rural and urban budget shares in the previous panel, while the second number is the average of the poverty line weighted budget shares for urban and rural. Poverty line weighted shares are quartic kernel weighted averages of budget shares of households around the poverty line using the revised, sector and state specific poverty lines. Households are ordered by the logarithm of household per capita expenditure, and are included in the kernel weighting function if their logarithm of pce is within a quarter standard deviation of the logarithm of the poverty line. Within the kernel households further from the poverty line get lower weights.

Appendix Table 2: Median prices and budget shares, urban and rural Karnataka

KARNATAKA						
	median unit values		mean budget shares		price index weights	
	rural	urban	rural	urban	average	Poverty-weighted
rice	3.5	4.0	18.3	20.0	19.2	20.4
wheat	3.2	3.5	2.4	4.1	3.3	3.2
jowar	2.0	2.3	11.1	5.7	8.4	7.8
bajra	1.8	2.0	0.4	0.0	0.2	0.2
maize	2.0	2.0	0.3	0.1	0.2	0.3
barley	14.0	.	0.0	0.0	0.0	0.0
millet	1.8	2.0	0.3	0.0	0.2	0.3
ragi	2.0	2.0	7.6	2.2	4.9	5.5
cereal subs	3.0	7.0	0.0	0.0	0.0	0.0
gram	6.8	7.0	0.3	0.3	0.3	0.3
pulses	7.9	9.3	7.6	7.1	7.4	7.6
milk	3.1	4.0	9.3	11.9	10.6	9.4
oils	24.0	23.0	6.2	7.2	6.7	6.5
beef	7.0	10.0	0.2	0.2	0.2	0.3
other meats	30.0	32.0	2.6	4.2	3.4	3.7
chicken	24.0	24.0	0.4	0.3	0.4	0.3
eggs	0.7	0.7	0.4	0.7	0.5	0.5
fish	10.0	10.0	0.6	0.7	0.7	0.7
fruit & veg	2.1	2.0	12.2	12.8	12.5	12.1
sugar	5.0	5.3	5.2	4.4	4.8	4.9
salt	0.6	0.6	0.3	0.2	0.2	0.3
spices	0.02	0.02	6.4	5.1	5.7	6.1
proc food	.	.	7.9	12.5	10.2	9.6
All food	.	.	67.1	62.9	65.0	67.6

Notes: Median unit values are rupees per kilo except for eggs and chicken which are rupees per unit. For most goods, most unit values are whole numbers, so that the medians are also typically whole numbers. The use of medians also limits the effects of contamination due to mixtures of products, e.g. eggs and egg products. The budget shares are percentage shares of each food in total food, including processed food. The first column in the price index weight panel is the average of the rural and urban budget shares in the previous panel, while the second number is the average of the poverty line weighted budget shares for urban and rural. Poverty line weighted shares are quartic kernel weighted averages of budget shares of households around the poverty line using the revised, sector and state specific poverty lines. Households are ordered by the logarithm of household per capita expenditure, and are included in the kernel weighting function if their logarithm of pce is within a quarter standard deviation of the logarithm of the poverty line. Within the kernel households further from the poverty line get lower weights.

Appendix Table 3: Median prices and budget shares, urban and rural Kerala

KERALA						
	median unit values		mean budget shares		price index weights	
	rural	urban	rural	urban	average	Poverty-weighted
rice	3.6	3.7	31.2	24.8	28.0	31.4
wheat	3.5	3.3	1.4	2.0	1.7	1.6
jowar	2.5	2.3	0.0	0.0	0.0	0.0
bajra	4.2	2.5	0.0	0.0	0.0	0.0
maize	3.5	.	0.0	0.0	0.0	0.0
barley	10.0	7.0	0.0	0.0	0.0	0.0
millet	.	3.0	0.0	0.0	0.0	0.0
ragi	3.5	3.0	0.0	0.0	0.0	0.0
cereal subs	1.5	1.5	2.4	0.7	1.6	2.0
gram	8.0	7.5	0.3	0.5	0.4	0.4
pulses	9.2	9.0	2.6	3.0	2.8	2.7
milk	4.2	5.0	6.4	9.1	7.7	5.8
oils	23.5	22.3	5.1	5.4	5.3	5.0
beef	12.0	13.0	1.0	0.9	1.0	0.7
other meats	14.0	32.0	0.8	1.1	0.9	0.7
chicken	25.0	25.0	0.3	0.4	0.3	0.1
eggs	0.6	0.7	0.6	0.9	0.8	0.4
fish	10.0	10.0	9.1	10.5	9.8	10.3
fruit & veg	2.6	2.4	15.9	16.6	16.3	15.4
sugar	5.6	5.6	3.9	3.7	3.8	4.0
salt	0.6	0.6	0.2	0.2	0.2	0.2
spices	0.02	0.02	5.4	4.7	5.0	5.4
proc food	.	.	13.3	15.4	14.4	13.7
All food	.	.	65.9	64.8	65.4	68.2

Notes: Median unit values are rupees per kilo except for eggs and chicken which are rupees per unit. For most goods, most unit values are whole numbers, so that the medians are also typically whole numbers. The use of medians also limits the effects of contamination due to mixtures of products, e.g. eggs and egg products. The budget shares are percentage shares of each food in total food, including processed food. The first column in the price index weight panel is the average of the rural and urban budget shares in the previous panel, while the second number is the average of the poverty line weighted budget shares for urban and rural. Poverty line weighted shares are quartic kernel weighted averages of budget shares of households around the poverty line using the revised, sector and state specific poverty lines. Households are ordered by the logarithm of household per capita expenditure, and are included in the kernel weighting function if their logarithm of pce is within a quarter standard deviation of the logarithm of the poverty line. Within the kernel households further from the poverty line get lower weights.

Appendix Table 4: Median prices and budget shares, urban and rural Maharashtra

MAHARASHTRA						
	median unit values		mean budget shares		price index weights	
	rural	urban	rural	urban	average	Poverty-weighted
rice	3.5	4.0	10.3	8.3	9.3	10.6
wheat	2.8	3.1	6.5	10.3	8.4	8.8
jowar	1.8	2.5	14.7	5.2	10.0	10.5
bajra	2.0	2.5	2.6	0.8	1.7	1.4
maize	2.0	1.8	0.0	0.0	0.0	0.0
barley	1.2	4.0	0.0	0.0	0.0	0.0
millet	5.0	6.0	0.0	0.0	0.0	0.0
ragi	2.0	3.5	0.6	0.0	0.3	0.4
cereal subs	8.0	8.0	0.8	0.6	0.7	0.7
gram	6.0	8.0	0.2	0.2	0.2	0.3
pulses	8.2	9.1	9.3	7.7	8.5	9.0
milk	4.0	5.0	9.4	14.6	12.0	10.8
oils	22.0	24.0	10.2	11.5	10.9	11.2
beef	8.0	8.0	0.2	0.5	0.4	0.5
other meats	28.0	30.0	2.8	3.6	3.2	3.2
chicken	25.0	26.0	0.3	0.2	0.2	0.2
eggs	0.7	0.7	0.4	0.7	0.6	0.6
fish	14.7	17.3	1.2	1.4	1.3	1.2
fruit & veg	2.5	2.4	11.9	14.6	13.2	12.7
sugar	5.8	6.2	6.8	5.3	6.1	6.3
salt	0.8	1.0	0.2	0.2	0.2	0.2
spices	0.02	0.02	4.9	3.8	4.4	4.6
proc food	.	.	6.4	10.5	8.5	6.8
All food	.	.	66.2	61.8	64.0	66.3

Notes: Median unit values are rupees per kilo except for eggs and chicken which are rupees per unit. For most goods, most unit values are whole numbers, so that the medians are also typically whole numbers. The use of medians also limits the effects of contamination due to mixtures of products, e.g. eggs and egg products. The budget shares are percentage shares of each food in total food, including processed food. The first column in the price index weight panel is the average of the rural and urban budget shares in the previous panel, while the second number is the average of the poverty line weighted budget shares for urban and rural. Poverty line weighted shares are quartic kernel weighted averages of budget shares of households around the poverty line using the revised, sector and state specific poverty lines. Households are ordered by the logarithm of household per capita expenditure, and are included in the kernel weighting function if their logarithm of pce is within a quarter standard deviation of the logarithm of the poverty line. Within the kernel households further from the poverty line get lower weights.

Appendix Table 5: Median prices and budget shares, urban and rural Madhya Pradesh

MADHYA PRADESH						
	median unit values		mean budget shares		price index weights	
	rural	urban	rural	urban	average	Poverty-weighted
rice	3.3	4.0	23.9	11.9	17.9	19.9
wheat	2.5	2.6	15.6	17.2	16.4	16.7
jowar	1.6	1.8	4.8	0.9	2.9	2.4
bajra	2.0	2.1	0.4	0.0	0.2	0.2
maize	2.0	2.0	2.1	0.2	1.2	0.8
barley	1.8	1.5	0.1	0.0	0.1	0.0
millet	1.5	10.0	0.6	0.0	0.3	0.3
ragi	2.0	.	0.0	0.0	0.0	0.0
cereal subs	8.0	8.0	0.1	0.1	0.1	0.1
gram	5.0	6.0	0.3	0.3	0.3	0.2
pulses	6.8	8.6	8.7	8.3	8.5	8.8
milk	4.0	5.5	10.4	16.3	13.4	12.7
oils	25.6	26.0	8.2	10.8	9.5	9.5
beef	.	6.0	0.0	0.0	0.0	0.0
other meats	25.0	28.0	0.9	2.1	1.5	1.5
chicken	20.0	25.0	0.7	0.2	0.4	0.4
eggs	1.0	0.8	0.1	0.5	0.3	0.2
fish	13.0	20.0	0.7	0.6	0.7	0.7
fruit & veg	1.9	2.0	9.6	12.6	11.1	10.8
sugar	5.0	6.0	4.7	5.5	5.1	5.2
salt	0.6	1.0	0.3	0.2	0.3	0.3
spices	0.02	0.02	4.2	3.8	4.0	4.0
proc food	.	.	3.5	8.3	5.9	5.3
All food	.	.	68.6	62.0	65.3	67.7

Notes: Median unit values are rupees per kilo except for eggs and chicken which are rupees per unit. For most goods, most unit values are whole numbers, so that the medians are also typically whole numbers. The use of medians also limits the effects of contamination due to mixtures of products, e.g. eggs and egg products. The budget shares are percentage shares of each food in total food, including processed food. The first column in the price index weight panel is the average of the rural and urban budget shares in the previous panel, while the second number is the average of the poverty line weighted budget shares for urban and rural. Poverty line weighted shares are quartic kernel weighted averages of budget shares of households around the poverty line using the revised, sector and state specific poverty lines. Households are ordered by the logarithm of household per capita expenditure, and are included in the kernel weighting function if their logarithm of pce is within a quarter standard deviation of the logarithm of the poverty line. Within the kernel households further from the poverty line get lower weights.

Appendix Table 6: Median prices and budget shares, urban and rural Tamil Nadu

TAMIL NADU						
	median unit values		mean budget shares		price index weights	
	rural	urban	rural	urban	average	Poverty-weighted
rice	3.8	4.2	39.1	33.0	36.1	38.0
wheat	3.4	3.3	0.6	1.7	1.1	1.1
jowar	2.4	2.5	1.9	0.1	1.0	0.8
bajra	2.2	2.4	1.9	0.1	1.0	1.0
maize	2.2	2.5	0.0	0.0	0.0	0.0
barley	6.0	10.0	0.0	0.0	0.0	0.0
millet	2.0	2.5	0.3	0.0	0.2	0.2
ragi	2.2	2.5	3.3	0.3	1.8	1.7
cereal subs	1.5	2.0	0.2	0.0	0.1	0.1
gram	8.0	8.0	0.2	0.3	0.3	0.2
pulses	9.6	9.9	5.9	6.5	6.2	6.4
milk	3.5	4.2	4.4	9.5	6.9	6.5
oils	24.4	23.7	6.0	6.7	6.4	6.4
beef	10.0	10.0	0.5	0.3	0.4	0.3
other meats	30.0	34.0	2.7	3.4	3.1	3.1
chicken	20.0	23.0	0.3	0.3	0.3	0.3
eggs	0.7	0.7	0.4	1.0	0.7	0.6
fish	10.5	14.5	1.5	1.4	1.4	1.4
fruit & veg	2.2	2.1	10.5	12.4	11.4	11.3
sugar	5.1	5.5	2.1	2.7	2.4	2.4
salt	0.5	0.6	0.3	0.2	0.2	0.2
spices	0.02	0.02	7.3	6.4	6.8	7.1
proc food	.	.	10.8	13.7	12.2	11.1
All food	.	.	69.3	62.1	65.7	68.3

Notes: Median unit values are rupees per kilo except for eggs and chicken which are rupees per unit. For most goods, most unit values are whole numbers, so that the medians are also typically whole numbers. The use of medians also limits the effects of contamination due to mixtures of products, e.g. eggs and egg products. The budget shares are percentage shares of each food in total food, including processed food. The first column in the price index weight panel is the average of the rural and urban budget shares in the previous panel, while the second number is the average of the poverty line weighted budget shares for urban and rural. Poverty line weighted shares are quartic kernel weighted averages of budget shares of households around the poverty line using the revised, sector and state specific poverty lines. Households are ordered by the logarithm of household per capita expenditure, and are included in the kernel weighting function if their logarithm of pce is within a quarter standard deviation of the logarithm of the poverty line. Within the kernel households further from the poverty line get lower weights.

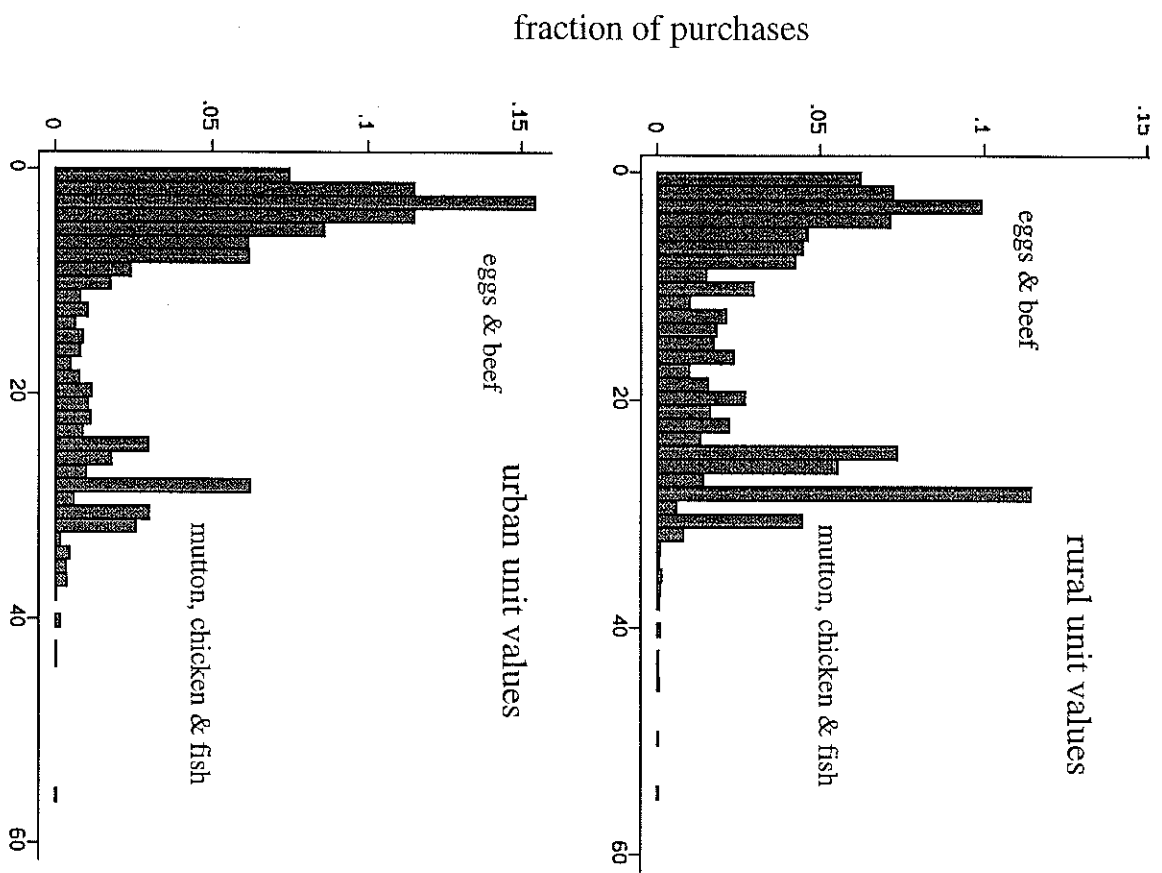


Figure 1: Unit values for 'meats', rural and urban Maharashtra

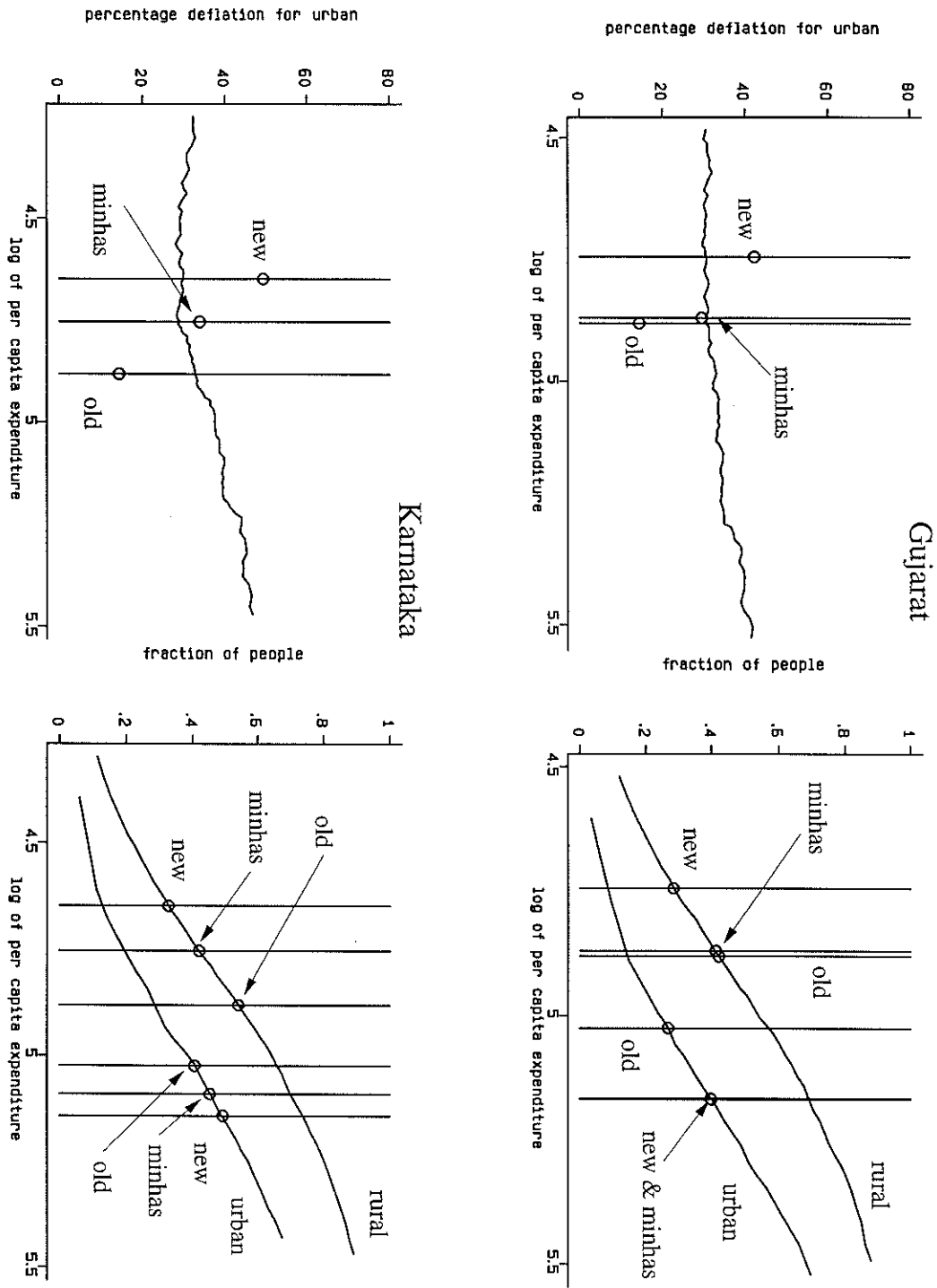


Figure 2: Urban and rural poverty comparisons, Gujarat and Karnataka, 1987-88

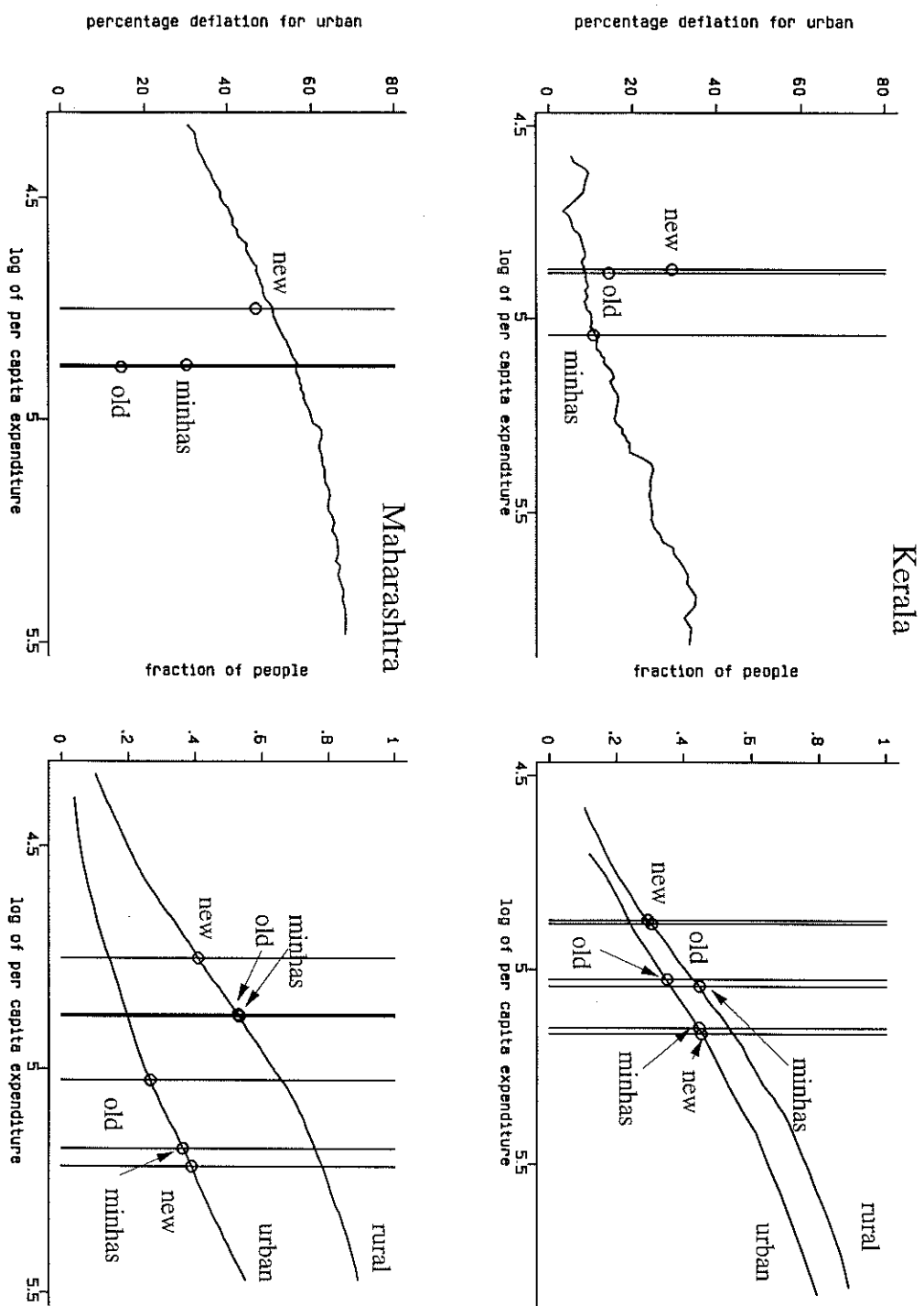


Figure 3: Urban and rural poverty comparisons, Kerala and Maharashtra, 1987-88

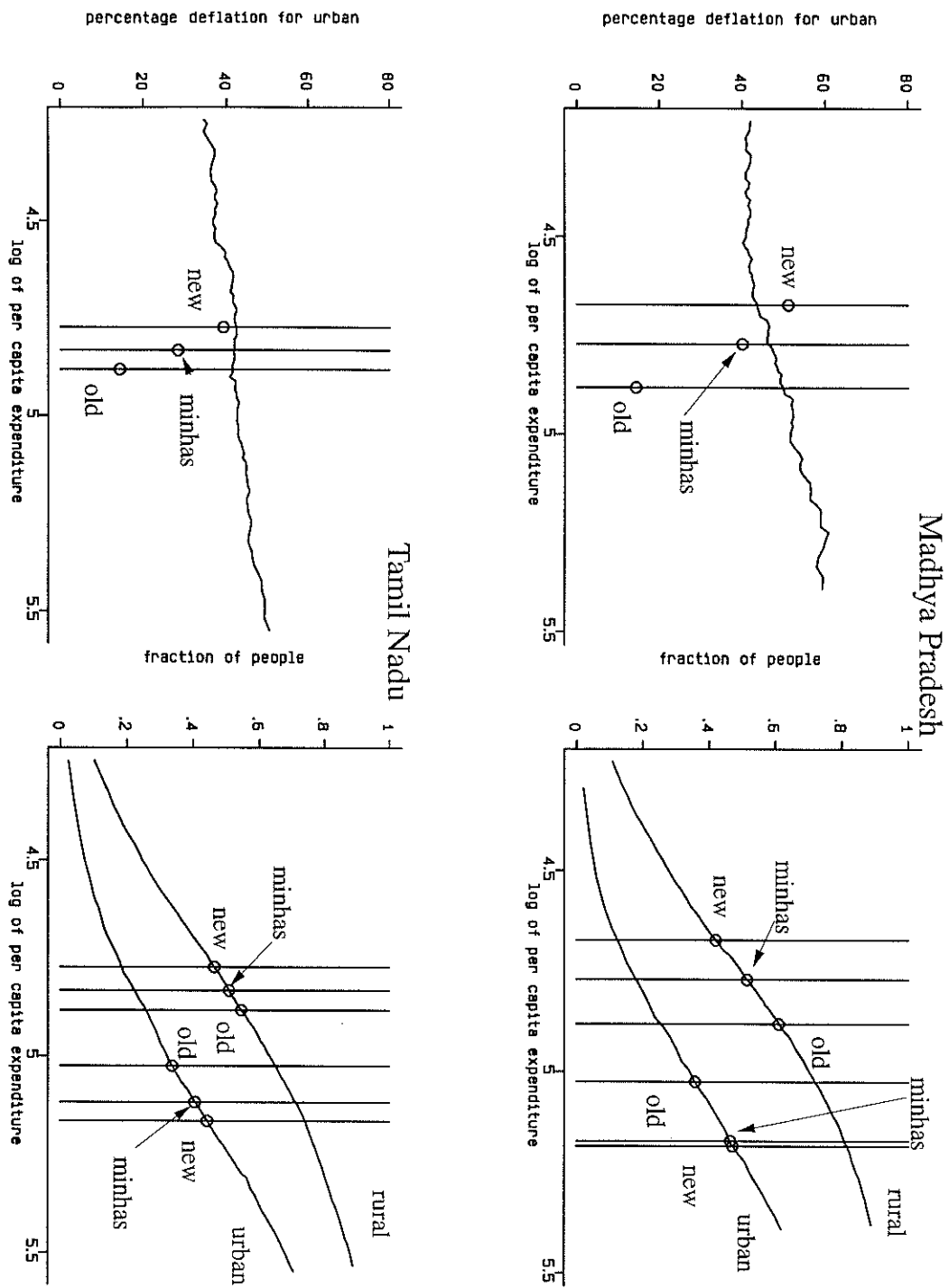


Figure 4: Urban and rural poverty comparisons, Madhya Pradesh and Tamil Nadu