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Widowhood and poverty in rural India: Some inferences from household survey data [1]

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Abstract

This paper examines the relationship between widowhood and poverty in rural India, based on National Sample Survey data on consumer expenditure. In terms of standard poverty indices based on household per-capita expenditure, there is no evidence of widows being disproportionately concentrated in poor households, or of female-headed households being poorer than male-headed households. These findings also apply in terms of adult-equivalent consumption for any reasonable choice of equivalence scales. Poverty indices for different household types, however, are quite sensitive to the level of economies of scale. Even relatively small economies of scale imply that the incidence of poverty among single widows, widows living with unmarried children, and female household heads (all of whom tend to live in relatively small households) is higher than in the population as a whole.
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1. Introduction

Little information is available on the living conditions of widows in rural India. Informal field investigations, sociological studies and related sources suggest that many Indian widows live in a condition of acute deprivation and insecurity, but much remains to be learnt about the precise nature of this aspect of rural poverty in India. The shortage of economic studies of the living conditions of widows has contributed to this informational gap.

In this paper, an attempt is made to shed some light on the living conditions of widows in rural India using consumer expenditure data and related information from the 42nd round of the National Sample Survey (the reference year is 1986–1987). This approach, as will be discussed further on, has important limitations, particularly relating to the fact that consumer expenditure data apply to the *household* rather than to the individual. Given that intra-household distribution is often far from equal, and also varies a great deal between different households, household data on consumer expenditure provide a rather blunt informational basis for the investigation of individual well-being. It is quite possible, for instance, for a widow living in a household with high per-capita expenditure to have low consumption levels, and (to some extent) vice-versa. These limitations, however, do not entirely preclude useful enquiries based on consumer expenditure data. It remains useful, for instance, to ask whether widows tend to be concentrated in households with low expenditure per adult equivalent. A positive answer would suggest that widows are particularly deprived even in the absence of any discrimination against them in intra-household allocation. Similarly, it is also helpful to investigate whether expenditure per adult equivalent tends to be particularly low, say, in households headed by widows.

The interest of this enquiry partly arises from the apparent need to reconcile the economic evidence with other sources of information on the condition of widows. To illustrate, a recent demographic study indicates that mortality rates among Indian widows are almost twice as high as among married women of the same age. [2] This is a direct and telling indication of the deprivation of widows in Indian society. As will be seen in this paper, however, similar differences of well-being between widowed and married women seem to be hard to detect on the basis of expenditure data. There is a similar 'puzzle' about the comparative economic condition of female-headed and male-headed households: many field-based studies (by anthropologists and others) suggest that female-headed households are particularly vulnerable to deprivation, but standard analyses of consumer expenditure data often fail to corroborate this conclusion.

[2] See Mari Bhat (1994); this study corroborates similar results for Bangladesh (Rahman et al., 1992). For further discussion, see also Chen and Drèze (1995).

Table 1
Number of sample households of different types[a]

	Male-headed	Widow-headed	Other female-headed	Total
With widow				
Single widow	0 (0)	859 (2.0)	0 (0)	859 (2.0)
Nuclear	489 (1.1)	917 (2.1)	3 (0)	1409 (3.2)
Extended	5069 (11.5)	1188 (2.7)	151 (0.3)	6408 (14.6)
Without widow	33,815 (76.9)	0 (0)	1491 (3.4)	35,306 (80.3)
Total	39,373 (89.5)	2964 (6.7)	1645 (3.7)	43,982 (100.0)

[a]Percentage of all households in brackets (rounded to the nearest decimal).
Source: National Sample Survey, 42nd round (1986–1987), special tabulation.

Aside from the practical importance of acquiring a better understanding of the living conditions of widows in rural India, the investigations presented in this paper may have some general methodological interest. In particular, the problems that arise in making poverty comparisons between groups of households that have very different demographic characteristics are likely to arise in many other contexts.

2. Household types

The economic condition of widows is likely to depend, in general, on their living arrangements, including the type of household they live in. Widows living with unmarried children, for instance, may be particularly vulnerable to deprivation; one purpose of the analysis presented here is to identify such patterns. In this paper, we distinguish between different types of households, based on the following classification criteria: (1) whether the household head is male or female, (2) the marital status of the household head (if the head is female), (3) whether or not a widow lives in the household, and (4) the composition of the household in terms of family structure (single person, nuclear, 'extended', or other). These criteria potentially define 48 different categories of households, but we focus primarily on 20 particularly relevant categories.

One aspect of this classification procedure concerns households with at least one widow. [3] These households are divided into three groups: (1) single widows; (2) 'nuclear' households, consisting of a widow and unmarried children; (3) 'extended' households (all households other than single widows and nuclear households). The 'extended household' arrangement typically arises when a widow lives with one of her married sons and his family.

[3] In the sample under consideration, 8% of these households have more than one widow.

Table 1 gives the number and percentage of households of different types, based on the National Sample Survey data for 1986–1987. [4] Some preliminary observations follow: (1) among all rural households, 20% include at least one widow; (2) among households with at least one widow, 10% are single widows, another 16% are 'nuclear' (widow with unmarried children), and the rest are 'extended'; (3) within the 'nuclear' sub-group, two thirds of the households are headed by the widow herself, and one third are headed by one of her sons (usually the eldest); (4) nearly two thirds of all female-headed households are headed by a widow; (5) nearly two thirds of all households with widow are male-headed (and a large majority of these male-headed households are of the 'extended' type).

3. Poverty comparisons

In Table 2, we present the average per-capita consumption expenditure (APCE) of different household types, and also three different poverty indices for each group (P_0, P_1 and P_2). [5] The head-count ratio is 63.4 for the rural population as a whole, but varies considerably between different groups, from 14.5% for single males to 68.2% among extended male-headed households with at least one widow (a majority of these households consist of married men living with a widowed mother and other family members). The incidence of poverty is much lower than average for every type of single-person household (including single widows), a little above-average for households with a widow, and, within that group, particularly high among male-headed and 'extended' households. In most cases, the difference in APCE between two household types is statistically significant; similarly with differences in the head-count ratio. [6]

In some ways, the figures presented in Table 2 are somewhat counter-intuitive. For instance, APCE is a little *higher*, and the head-count ratio a little *lower*,

[4] In Table 1 and all other tables, the figures presented refer specifically to *rural* areas. Rural–urban contrasts may be of interest on their own, but they are beyond the scope of the present study. A related issue is that there may be a link between marital status and rural–urban migration, with significant implications in terms of the concerns of this paper. For instance, it is plausible that seasonal migration of male laborers plays some role in protecting married women from extreme poverty, while most widows are deprived of a similar opportunity. These issues, too, deserve further investigation, but they do not detract from the value of the basic exercise of assessing the economic condition of widows in rural areas.

[5] The poverty measures P_0, P_1 and P_2 presented in Table 2 refer to different versions of the 'Foster–Greer–Thorbecke' index of poverty. More precisely, P_0 is the familiar 'head-count ratio', P_1 is the 'poverty gap index', and P_2 is the 'squared poverty gap index'. On the definitions and properties of these different poverty measures, see, e.g., Foster (1984), Foster et al. (1984), Foster and Shorrocks (1991), Ravallion (1994).

[6] For details of the test statistics, see Drèze and Srinivasan (1995); on the theoretical basis of these tests, see Kakwani (1990).

Table 2
Average per-capita expenditure and poverty indices for different household types

Household type	Sample size	Per-capita expenditure (Rs/month)		Poverty indices[b]		
				P_0	P_1	P_2
1. All households	43,982	108.6	(0.58)	63.4	17.2	6.4
2. Male-headed	39,373	108.2	(0.59)	63.8	17.3	6.4
3. Female-headed	4609	114.5	(0.55)	57.7	15.8	6.1
4. Widow-headed	2964	112.8	(0.55)	58.3	16.8	6.7
5. Other female-headed	1645	116.9	(0.54)	56.9	14.5	5.2
6. Single-person households	2281	190.4	(0.61)	22.2	5.6	2.2
7. Single male	1213	216.2	(0.59)	14.5	3.6	1.5
8. Single female	1068	161.1	(0.58)	31.0	7.9	3.0
9. Single widow	859	154.5	(0.57)	33.1	8.3	3.0
10. Single widower	283	185.5	(0.81)	24.0	5.5	2.0
11. Households without widow	35,306	109.3	(0.60)	62.8	17.0	6.3
12. Households with widow	8676	105.9	(0.48)	65.4	18.2	6.9
13. Male-headed	5558	104.0	(0.46)	67.5	18.6	7.0
14. Widow-headed	2964	112.8	(0.55)	58.3	16.8	6.7
15. Extended	6408	103.7	(0.46)	67.3	18.7	7.0
16. Nuclear	1409	115.8	(0.52)	55.4	15.4	6.0
17. Nuclear; male headed	489	117.9	(0.40)	52.8	13.2	5.0
18. Nuclear; widow headed	917	114.5	(0.58)	56.9	16.6	6.7
19. Extended; male headed	5069	103.3	(0.46)	68.2	18.9	7.1
20. Extended; widow headed	1188	105.8	(0.49)	62.7	18.1	7.2

[a]Coefficient of variation in brackets.

[b]The P_α poverty index proposed by Foster et al. (1984) is defined as $P_\alpha = 1/n \sum_1^q ((z-x_i)/z)^\alpha$ where n is the population size, q is the number of persons below the poverty line, x_i is per-capita expenditure for individual i, and z is the poverty line. P_0 is simply the head-count ratio, i.e., the proportion of people below the poverty line. P_1 is the 'poverty gap' index, which indicates the normalized aggregate 'distance' of the poor from the poverty line. P_2, the 'squared poverty gap' index, is a distribution-sensitive weighted-average of individual poverty gaps.

Note: The all-India poverty line (rural) is taken to be Rs112 per capita/month. State-specific poverty lines (which take into account differences in the cost of living between different states) were constructed using the state-specific price indices given by Minhas et al. (1991).

among female-headed households as compared with male-headed households. This is in contrast with the common notion that female-headed households are particularly vulnerable to poverty. [7] Similarly, the relatively *low* incidence of poverty

[7] See, e.g., Visaria and Visaria (1985) and Agarwal (1986). Earlier studies of the relationship between female-headedness and poverty in rural India based on household consumption data yield mixed results. Overall, there seems to be no strong evidence of a greater incidence of poverty among female-headed households, in terms of standard poverty indices such as the head-count ratio (see Drèze, 1990, for further discussion). This is in sharp contrast with extensive indications of high levels of deprivation among female-headed households from informal field-based studies.

among single widows, e.g., in terms of the head-count ratio (33.1% for this group, compared with 63.4% for the population as a whole), may seem somewhat surprising. Interestingly, the *ranking* of single-person household types in the scale of poverty is more or less as expected: single widows are the poorest, followed by single women, single widowers, and single men, in that order. But the low incidence of poverty among single-person households, including single widows, does seem to require further scrutiny. So does the fact that, based on the evidence presented in Table 2, it seems very hard to identify any major economic disadvantage of widows (whether they live in single, nuclear or extended households) compared with the rest of the population.

4. The issue of equivalence scales

The figures in Table 2 are all based on taking average per-capita consumption expenditure (APCE) as an indicator of household economic status. An obvious flaw in this procedure is that it ignores differences in household composition between different groups. In particular, it does not take into account differences in consumption needs relating to the age and sex composition of different households, e.g., the fact that the consumption needs of children can typically be met at lower cost than those of adults.

The simplifying assumptions involved in taking APCE as an indicator of economic status may not matter very much when we are comparing household groups with roughly similar demographic characteristics (e.g., when we compare poverty levels in different states of India). In the present context, however, there *are* systematic differences of composition between the different household groups of interest. We cannot, for instance, legitimately ignore the fact that single-person households consist entirely of adults, while households in other groups typically include children as well as adults.

A standard way of addressing this issue of household composition is the use of 'equivalence scales', which give different weights to household members in different age and sex groups. [8] For instance, if the weights given to adult males, adult females and children are 1, 0.8 and 0.5, respectively, then a household consisting of two adult males, one adult female and four children is considered to consist of 4.8 (male) 'adult equivalents'. How the 'correct' weights are to be derived in the first place remains, of course, a complex and largely unresolved issue (see, e.g., Deaton and Paxson, 1995). Instead of going into that issue, it may be of interest to consider how sensitive the results presented in Table 2 are to different choices of 'equivalence scales'.

[8] On the theory of equivalence scales, see, e.g., Deaton and Muellbauer (1980, 1986).

Table 3
The head-count ratio and equivalence scales

Household type	Equivalence scales[a]			
	(1,1,1)	(1, 1, 0.6)	(1, 0.8, 0.6)	(1, 0.7, 0.4)
1. All households	63.4 (6)	63.2 (7)	62.9 (6)	63.8(7)
2. Male-headed	63.8 (5)	63.6 (6)	63.5 (5)	64.5 (5)
3. Female-headed	57.7 (11)	57.4 (14)	54.3 (14)	52.7 (14)
4. Widow-headed household size (HHS)	58.3 (9)	61.9 (9)	58.2 (9)	58.6 (11)
5. Other female-headed HHS	56.9 (13)	50.1 (15)	48.2 (15)	43.0 (16)
6. Single-person households	22.2 (19)	29.7 (19)	27.0 (19)	35.4 (19)
7. Single male	14.5 (20)	17.8 (20)	24.1 (20)	34.3 (20)
8. Single female	31.0 (17)	42.8 (17)	30.9 (18)	37.2 (18)
9. Single widows	33.1 (16)	46.0 (16)	33.4 (17)	40.3 (17)
10. Single widower	24.0 (18)	30.4 (18)	39.9 (16)	46.3 (15)
11. Households without widow	62.8 (7)	62.2 (8)	62.4 (8)	63.6 (8)
12. Households with widow	65.4 (4)	67.3 (4)	65.0 (4)	65.0 (4)
13. Male-headed	67.5 (2)	69.0 (2)	67.0 (2)	67.2 (2)
14. Widow-headed	58.3 (9)	61.9 (9)	58.2 (9)	58.6 (11)
15. Extended	67.3 (3)	68.8 (3)	66.6 (3)	66.3 (3)
16. Nuclear	55.4 (14)	59.3 (11)	57.0 (12)	59.2 (10)
17. Nuclear; male headed	52.8 (15)	59.3 (11)	57.7 (11)	64.4 (6)
18. Nuclear; widow headed	56.9 (12)	59.3 (11)	56.5 (13)	55.8 (13)
19. Extended; male headed	68.2 (1)	69.5 (1)	67.6 (1)	67.4 (1)
20. Extended; widow headed	62.7 (8)	65.9 (5)	62.9 (6)	62.9 (9)

[a]The equivalence scales are written as triplets indicating the weights for 'adult male', 'adult female', and 'child', in that order.
Note: In brackets, the ranking of household groups in descending order of the head-count ratio (i.e., the poorest group has rank 1, and the least poor group has rank 20).

To illustrate, Table 3 gives the head-count ratio for different household types, under different assumptions about equivalence scales. The first column, where each person in a household gets the same weight, gives the ordinary head-count ratio, as in the 'P_0' column of Table 2. As one moves across the table to the right, the assumed equivalence scales give progressively lower weights to women and children. [9]

The main insight emerging from Table 3 is that the *ranking* of different household groups, in terms of the head-count ratio, is not very sensitive to the specification of equivalence scales for 'reasonable' values of the chosen weights. It is only in the last column, where implausibly low weights are given to women

[9] For any given equivalence scale, the poverty line is 'adjusted' based on the following normalization rule: the adjusted poverty line is simply the per-adult-equivalent expenditure of a household of *average composition* with per-capita expenditure equal to the unadjusted poverty line. This rule ensures that a household of average composition remains above or below the poverty line *irrespective* of the choice of equivalence scales.

and children (0.7 and 0.4, respectively), that significant 'rank reversals'—compared with the first column—are at all noticeable. Comparing, say, the first and the third column, we find that the ranks of different household types are, on the whole, remarkably stable.

In short, equivalence scales do not seem to be the clue to the 'counter-intuitive' results mentioned earlier. For instance, the finding that the incidence of poverty is somewhat *lower* among female-headed than among male-headed households is quite robust to different assumptions about equivalence scales (see Table 3, second and third row). Similarly, the head-count ratio is surprisingly low among single widows for any reasonable choice of equivalence scales.

5. The issue of economies of scale

The various household groups considered in Tables 1–3, aside from being different in terms of age and sex composition, are also quite different in terms of *average size*. Specifically (and aside from the obvious fact that single-person households are much smaller than average), female-headed households tend to be relatively small, and the same applies to 'nuclear' households with at least one widow. This raises the question as to whether, in assessing the incidence of poverty in different household groups, any adjustment should be made for possible 'economies of scale' in household consumption. If there are economies of scale in consumption (in the sense that, at the same level of per-capita expenditure, a larger household is able to achieve a higher level of well-being than a smaller household), then poverty assessments based on the head-count ratio will tend to 'exaggerate' the extent of poverty among larger households, compared to smaller ones. Economies of scale may exist for a variety of reasons, including the role of collective goods in household consumption, the presence of increasing returns in domestic technology (e.g., the cooking fuel required to prepare food for one person may be more than half of what is needed to cook for two persons), and the use of bulk-purchase discounts by larger households. [10]

A simple way of examining the relevance of economies of scale is to define *scale-adjusted* per-capita expenditure (say y^*) for a household of size n as:

$$y^* \equiv Y/n^{\Theta},$$

where Y is total household expenditure and Θ is a parameter varying between 0 and 1, which captures the extent of scale economies in consumption. [11] When

[10] Recent work based on Pakistan data does suggest that economies of scale in consumption may be important in developing countries (see Lanjouw and Ravallion, 1995). For a discussion of various sources of scale economies in household consumption, see also Nelson (1988).

[11] Formally, it is best to think of Θ as the elasticity of the cost function with respect to household size, as in the Appendix A.

$\Theta = 1$, there are no economies of scale, and y^* is simply per-capita expenditure. When $\Theta = 0$, y^* is equal to total household consumption; this can be thought of as a case where consumption entirely takes the form of 'public goods' which are shared within the household without any 'rivalry' (i.e., one person's consumption does not reduce anyone else's consumption). Intermediate values of Θ between 0 and 1 correspond to gradually lower levels of scale economies. A household of size n with total consumption Y is then considered as 'poor' if y^* falls below a pre-specified threshold $z(\Theta)$. For $\Theta = 1$, this is the familiar 'head-count' procedure.

A 'normalization' rule is needed to fix z for different values of Θ. We adopt the following convention:

$$z(\Theta) \equiv z(1)m^{1-\Theta},$$

where $m \equiv 5$ is the *average* household size in the rural population. [12] This convention implies that a household of average size is counted as 'poor' if and only if it has a per-capita expenditure below $z(1)$ *irrespective* of the value of Θ. For consistency with the calculations presented earlier, we set $z(1)$ at Rs112/month. [13]

Table 4 presents estimates of the 'scale-adjusted head-count ratio' (i.e., the proportion of the population with scale-adjusted per-capita expenditure below $z(\Theta)$) based on this approach. The first column ($\Theta = 1$) corresponds to the familiar case w here per-capita expenditure is taken as the relevant indicator of well-being (no economies of scale), as in Tables 2 and 3. Other columns correspond to progressively higher assumed levels of economies of scale.

As can be seen from Table 4, the ranking of different household groups is highly sensitive to different assumptions about the level of economies of scale (in contrast with our earlier finding that the ranking is relatively insensitive to different assumptions about *equivalence* scales). Even as Θ decreases from 1 to 0.8, quite a few dramatic rank reversals can be observed: nuclear widow-headed households, for instance, become the poorest group instead of the 12th poorest, and single widows become the 4th poorest group instead of the 16th. As expected (given our normalization rule), the scale-adjusted head-count ratio for a particular household group tends to be lower at higher levels of economies of scale if the household group in question has a relatively large average size, and vice-versa for 'small' households. This is why the head-count ratio among, say, nuclear widow-headed households (which are much smaller than average) rises sharply as we

[12] Strictly speaking, m is equal to 5.4 (see Table 4), but we have rounded m to the nearest digit for convenience.

[13] In other words, $z(1)$ is set at a level such that in the absence of economies of scale ($\Theta = 1$), a household of any size is counted as poor if and only if it has a per-capita expenditure below Rs112/month. This is the same poverty criterion as that used in the calculations of head-count ratios in Tables 2 and 3.

Table 4
The head-count ratio and economies of scale

Household type	Mean household size	Economies of scale parameter (Θ)[a]					
		1	0.8	0.6	0.4	0.2	0
1. All households	5.35	63.4	59.6	54.5	49.5	46.3	44.5
2. Male-headed	5.56	63.8	59.4	53.9	48.6	45.0	43.1
3. Female-headed	3.60	57.7	61.6	62.0	62.6	63.0	62.7
4. Widow-headed	3.32	58.3	63.8	65.1	66.2	67.6	66.4
5. Other female-headed	4.10	56.9	58.4	57.4	57.4	56.4	57.3
6. Single-person households	1.00	22.2	47.4	70.0	86.4	96.0	99.0
7. Single male	1.00	14.5	35.8	60.1	80.4	94.2	99.0
8. Single female	1.00	31.0	60.7	81.3	93.2	98.0	99.1
9. Single widow	1.00	33.1	63.7	84.1	94.4	98.6	99.3
10. Single widower	1.00	24.0	42.1	72.1	90.5	99.3	99.7
11. Households without widow	5.34	62.8	59.3	54.5	49.7	46.6	45.0
12. Households with widow	5.40	65.4	60.9	54.4	49.0	44.9	42.4
13. Male-headed	6.50	67.5	60.3	51.6	44.5	38.9	35.9
14. Widow-headed	3.32	58.3	63.8	65.1	66.2	67.6	66.4
15. Extended	6.41	67.3	60.6	52.1	45.4	40.2	37.1
16. Nuclear	3.51	55.4	63.1	68.4	70.8	75.0	75.7
17. Nuclear; male-headed	3.72	52.8	58.9	62.7	63.0	66.4	66.4
18. Nuclear; widow-headed	3.40	56.9	65.6	71.9	75.5	80.2	81.1
19. Extended; male-headed	6.78	68.2	60.3	51.0	43.5	37.4	34.2
20. Extended; widow-headed	4.95	62.7	62.8	58.8	57.1	56.4	53.7

[a]See text for definition and interpretation.

consider progressively higher levels of economies of scale. The rank of single-person households in terms of scale-adjusted head-count ratio is, of course, particularly sensitive to Θ.

As we noted earlier, when there are no economies of scale ($\Theta = 1$), it is hard to find much evidence of widows being particularly vulnerable to poverty, based on standard poverty indices at the household level. This conclusion, however, ceases to hold as soon as we take into account the possibility of economies of scale in household consumption. It is worth noting, for instance, that for $\Theta = 0.8$ (mild economies of scale), the three poorest household groups among all those listed in Table 4 are: (1) widow-headed nuclear households, (2) widow-headed households as a whole, (3) single widows.

Figs. 1 and 2 present some further evidence on the issue of 'rank reversals' (changes in rankings of different household groups as we consider different levels of economies of scale). In these figures, each line plots the *ratio* of scale-adjusted head-count indices for a particular *pair* of household groups. For a particular value of Θ, the line is above the horizontal line passing through 1 if and only if, for that value of Θ, the first group is poorer (i.e., has a higher scale-adjusted head-count ratio) than the second. For instance, it can be seen from Fig. 1 that

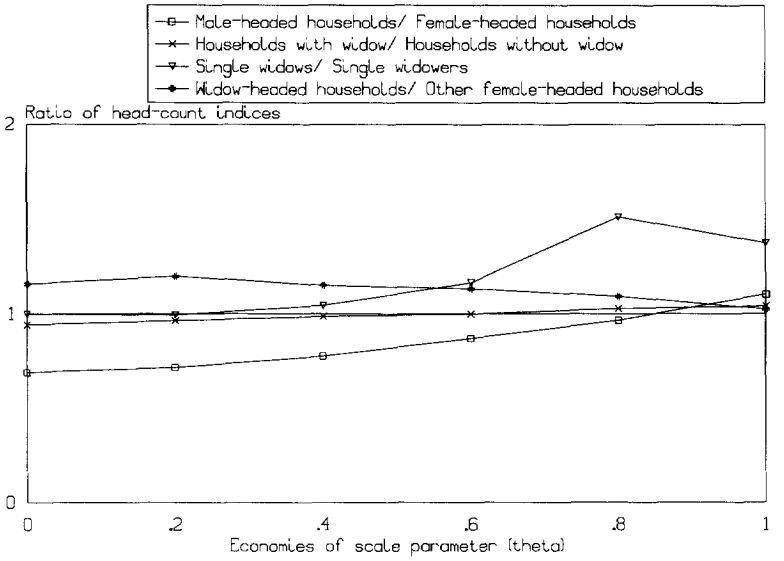

Fig. 1. Economies of scale and the head-count index: selected comparisons between pairs of household types.

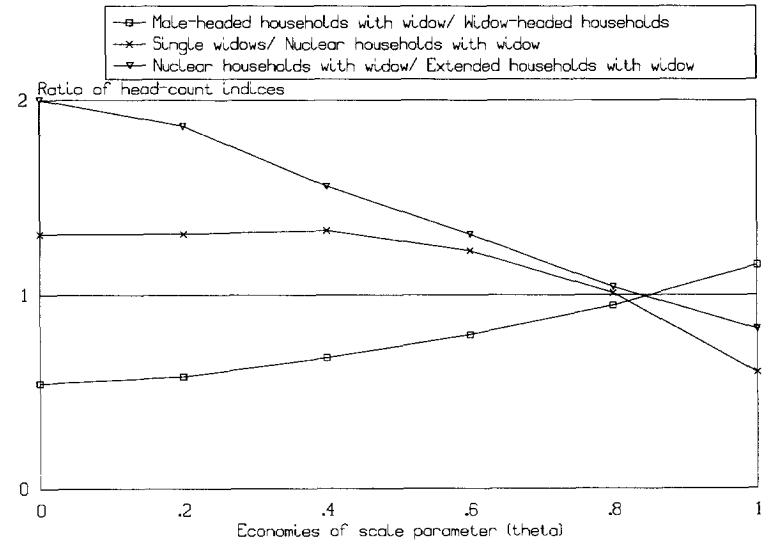

Fig. 2. Economies of scale and the head-count index: further pair-wise comparisons (households with widow).

female-headed households are poorer than male-headed households for all values of Θ *except* values very close to 1. Here again, one of our earlier findings (namely, that there is little evidence of female-headed households being poorer than male-headed households) ceases to hold as soon as we consider the possibility of economies of scale.

As Fig. 2 indicates, there are other important cases of rank reversal taking place around the point where $\Theta = 0.8$. For instance, although single widows are better off than widows living with unmarried children in terms of per-capita expenditure and unadjusted head-count ratio ($\Theta = 1$), the reverse holds for values of Θ below 0.8. Similarly, the unadjusted head-count ratio ranks male-headed households with widow as poorer than widow-headed households, but scale-adjusted figures lead to the reverse ranking for values of Θ below 0.8.

It is worth noting, from Fig. 1, that the adjusted head-count ratio is very similar among 'households with widow' and 'households without widow' for *all* values of Θ. Thus, irrespective of economies of scale, there is no evidence of widows *in general* living in poorer households than other members of the society. This finding reinforces the case for looking at particular sub-groups of widows (e.g., those living alone, or with unmarried children), as we have tried to do in this paper. There is, of course, also an issue of distribution *within* the household, and it is quite possible that widows in general do experience special deprivations as a result of intra-household discrimination, even though these deprivations are not evident in household-level poverty indicators.

From the preceding discussion, it is clear that the poverty ranking of different household types often depends on the precise value of Θ. Unfortunately, little is known about the extent of economies of scale in household consumption in rural India. A recent study based on Pakistan data (Lanjouw and Ravallion, 1995) arrives at an estimate of around 0.6 for Θ using an extended version of the Engel method. As discussed by the authors, this estimate should be considered as highly tentative, in view of the weak theoretical basis of that method. But even after allowing for a substantial margin of error, this estimate suggests that economies of scale in consumption in rural South Asia may well be far from negligible.

In Appendix A of this paper, we show that, if household expenditure is allocated between purely 'private' and purely 'public' goods so as to maximize average utility among identical members, then Θ is equal to the *share of private goods* in household expenditure. It may be argued that, in rural India, the share of private goods in household expenditure is high, if only because food accounts for almost two thirds of total current expenditure. [14] NSS data on current expenditure, however, are notoriously weak in terms of coverage of durable goods, which are largely 'public' goods within the household. Even then, the proportion of current

[14] According to the 43rd round of the National Sample Survey (1987–1988), rural households in India spend 63.8% of current expenditure on food (see Sarvekshana, September, 1991).

expenditure spent on 'fuel and light', 'miscellaneous goods and services' (largely consisting of items such as house rent), and 'durables', all of which involve a substantial element of publicness, is above 25% in rural India. [15] The available evidence, therefore, is not inconsistent with the possibility that rural households in India allocate, say, 15% of their total expenditure to public goods, implying a value of 0.85 for Θ. This reasoning, too, points to the possibility of substantial economies of scale in household consumption, with far-reaching implications for poverty comparisons of the type explored in this paper.

6. Poverty and female-headedness reconsidered

In our earlier comparisons of female-headed households (FHHs) and male-headed households (MHHs), we have noted that: (1) 'unadjusted' per-capita expenditure data provide no evidence of female-headed households being poorer than male-headed households, and (2) 'scale-adjusted' per-capita expenditure figures suggest that female-headed households *are* poorer than male-headed households if there are significant economies of scale. One question that still remains unanswered is how female-headed households fare compared with male-headed households for a *given* household size.

A simple answer to this question can be obtained from a linear regression of per-capita expenditure (PCE) on household size (HHS) and a dummy variable for the gender of the household head (DF = 1 for female-headed households and 0 otherwise). On the right-hand side, we also add HHS-squared, because the relationship between PCE and household size appears to be nonlinear, and (optionally) the child–adult ratio (CAR), as a rough control for household composition. [16] The results are presented in the first two columns of Table 5.

As expected, the results indicate that PCE tends to be lower among larger households, and among households with a larger child–adult ratio. [17] It also emerges that, controlling for household size (and, optionally, the child–adult ratio), PCE is significantly *lower* among female-headed households than among male-headed households. Similarly, a probit analysis of the probability of a

[15] Sarvekshana, September, 1991.

[16] A more precise way of controlling for household size and composition consists of introducing dummy variables for each possible number of adults, and another set of dummy variables for each possible number of children. This is feasible, given the large number of available observations. The basic results obtained under this alternative approach, however, are not very different from those reported in Table 5.

[17] The negative correlation between PCE and household size is a well-known feature of consumption patterns in India; see Krishnaji (1980, 1984) and Lipton and Ravallion (1995). This feature, of course, relates to *unadjusted* APCE, and the ranking of households of different sizes in terms of scale-adjusted PCE is quite sensitive to different assumptions about economies of scale; on this, see Lanjouw and Ravallion (1995).

Table 5
OLS regression of per-capita expenditure on household characteristics

Independent variables	Regression coefficients			
Constant	177.6[a] (86.2)	178.8[a] (75.9)	178.3[a] (91.2)	177.9[a] (78.9)
Household size (HHS)	−12.3[a] (−17.9)	−14.7[a] (−18.9)	−12.1[a] (−18.3)	−14.4[a] (−19.2)
Household size squared (HHS-squared)	0.4[a] (9.1)	0.5[a] (9.4)	0.4[a] (9.2)	0.5[a] (9.4)
Child-adult ratio (CAR)	−11.0[a] (−23.2)	–	−11.8[a] (−26.3)	–
Dummy for female-headed households (DF)	−3.6[a] (−3.0)	−7.0[a] (−5.9)	–	–
Dummy for households with a widow (DW)	–	–	−7.7[a] (−10.3)	−5.3[a] (−6.9)
$\bar{R}^2$	0.09	0.08	0.10	0.08

[a]Significant at 1% level (t-ratios are enclosed in parenthesis).

household falling below the poverty line (with the same independent variables as in Table 5, and the dependent variable taking value 1 if the relevant household is below the poverty line and 0 otherwise) indicates that, for a given household size and child–adult ratio, female-headed households are more likely to be poor than male-headed households (see Drèze and Srinivasan, 1995, for details).

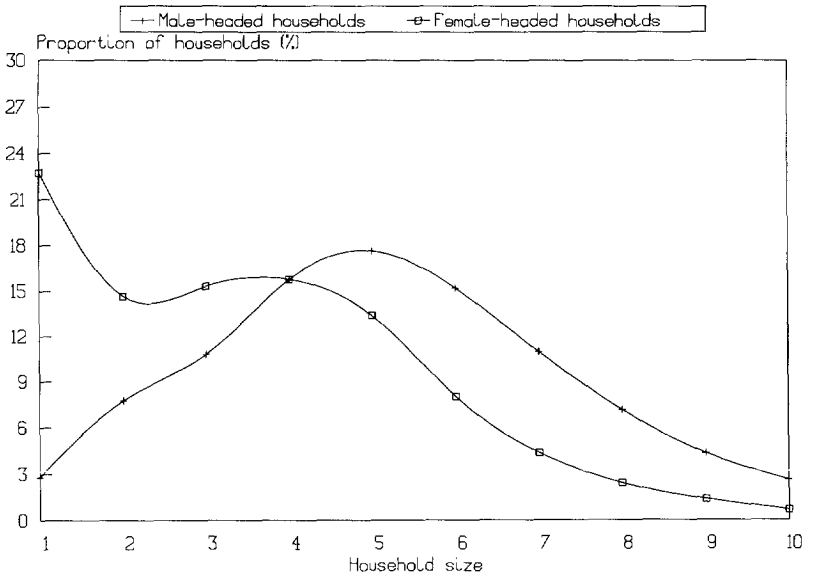

Fig. 3. Distribution of male-headed and female headed households by household size.

In short, the following considerations are important in assessing the relationship between poverty and female-headedness. First, for a *given* household size, female-headed households do appear to be poorer than male-headed households. Second, female-headed and male-headed households are very differently distributed in terms of household size (see Fig. 3); specifically, female-headed households tend to be much smaller than male-headed ones. Third, the comparative incidence of poverty among female-headed and male-headed households as a whole (*without* controlling for household size) depends crucially on the extent of economies of scale.

Similar remarks apply in comparisons of households with widow and households without widow. The corresponding regression results are presented in the last two columns of Table 5.

7. Sensitivity to the poverty line

Poverty comparisons are sometimes quite sensitive to the choice of poverty line. To deal with this possibility, we briefly examine how robust the earlier comparisons are with respect to different specifications of the poverty line. Some indications on this can be obtained by plotting the head-count ratio (based on adjusted or unadjusted per-capita expenditure, as appropriate) for different values of the poverty line, and for different household types. To illustrate, Fig. 4 plots the head-count ratio of single-person households for different poverty lines. It can be

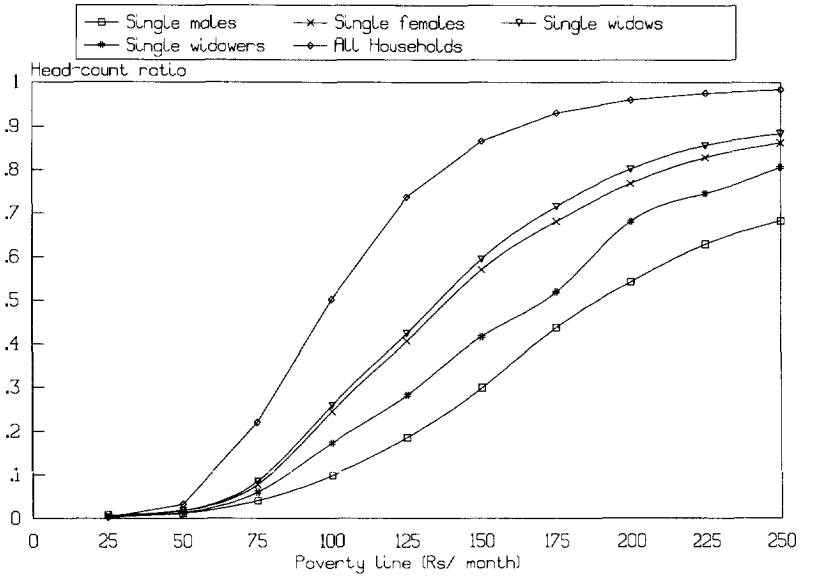

Fig. 4. Head-count ratio at different levels of the poverty line: single person households.

seen that the ranking of single males, single females, single widows and single widowers in terms of head-count ratio is invariant to the choice of poverty line. [18] Similarly, the ranking of different types of household with widow (single-person, 'nuclear' and 'extended') does not depend on where the poverty line is placed. Most of the important comparisons made earlier in this paper also turn out to be quite robust to the choice of poverty line [19].

8. Concluding remarks

The main findings of this paper can be summarized as follows.

(1) Standard comparisons based on average per-capita expenditure or head-count ratios yield no evidence of widows living in particularly poor households, or of female-headed households being significantly poorer than male-headed households (Section 3).

(2) These observations are robust with respect to changes in 'equivalence scales', within the plausible range of such scales (Section 4).

(3) Most of these poverty comparisons, however, are sensitive to economies of scale. For instance, given their small average size, female-headed households look increasingly deprived in comparison with other households as one considers progressively higher levels of economies of scale. Similarly with, say, single widows and nuclear households headed by a widow. Even relatively small economies of scale lead to substantial changes in the ranking of different household groups in terms of the head-count ratio (Section 5).

(4) For a *given* household size and child–adult ratio, female-headed households are poorer than male-headed households, even in terms of average per-capita expenditure and unadjusted head-count ratios (Section 6).

(5) The basic results summarized in the preceding paragraphs are not very sensitive to the choice of poverty line (Section 7).

We should recall that the approach used in this paper has some inherent limitations. Aside from the standard difficulties involved in using consumer expenditure as an index of well-being (e.g., connected with interpersonal variations in needs and characteristics), it is difficult to dismiss the specific problem of intra-household distribution in this particular context. Our enquiry has essentially

[18] It is, thus, possible to make robust statements about the comparative incidence of poverty in these different groups based on 'first-order dominance' criteria. On the notion of stochastic dominance and its applications, see Atkinson (1987) and Ravallion (1994).

[19] It is worth noting that our earlier observations about the *absence* of substantial difference between households 'with widow' and households 'without widow' (see Section 5) also hold for all reasonable choices of poverty line. See Drèze and Srinivasan (1995), where more detailed sensitivity exercises are presented.

consisted of asking whether widows, or female household heads, tend to live in *households* with particularly low expenditure levels. The answers have some informational value, but they may not tell us a great deal about the *individual* well-being of the persons concerned. For this and other reasons, it is important to supplement the consumer–expenditure approach used in this paper with other types of enquiry, such as demographic analysis and anthropological case-studies.

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Appendix A

[20]

Suppose household consumption consists entirely of 'purely private' and 'purely public' goods, indexed by 1 and 2, respectively. Let $c(u, p_1, p_2)$ be the cost function for a household of size one, where p_1 and p_2 denote the unit costs of the private and public goods, respectively, and let $x_1(.)$, $x_2(.)$ denote the corresponding compensated demands. Now consider a household consisting of n identical individuals receiving identical treatment. This household may be thought of as a household which effectively faces price $n \cdot p_1$ for the private good, i.e., it costs $n \cdot p_1$ units of income to give each household member one unit of the private good. The effective cost of the public good for this household, of course, is still p_2. In other words, we may write the cost function for this household, say $C(u, p_1, p_2; n)$, as:

$$C(u, p_1, p_2; n) \equiv c(u, n \cdot p_1, p_2), \tag{1}$$

where u is the utility of each household member. By the same reasoning, total consumption of the private good in the size n household, X_1, may be written as:

$$X_1(u, p_1, p_2; n) \equiv n \cdot x_1(u, n \cdot p_1, p_2). \tag{2}$$

Differentiating Eq. (1) with respect to n, and applying Shephard's Lemma, we obtain:

$$\delta C/\delta n \equiv p_1.(\delta c/\delta p_1) \equiv p_1.x_1. \tag{3}$$

[20] We are grateful to Angus Deaton for drawing our attention to the scope for improvement of an earlier result.

It follows that Θ, the elasticity of the cost function with respect to n, is simply the share of the private good in total consumption for the household in question:

$$\Theta \equiv (\delta C/\delta n)(n/C) \equiv (p_1 \cdot X_1)/C. \quad (4)$$

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