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Widowhood and Poverty in Rural India: Some Inferences from Household Survey Data

Jean Drèze

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P.V. Srinivasan

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Centre for Development Economics
Delhi School of Economics
Delhi 110 007 INDIA

WIDOWHOOD AND POVERTY IN RURAL INDIA

Some Inferences from Household Survey Data

by

Jean Drèze

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P.V. Srinivasan*

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 in household consumption. Even relatively small economies of scale imply that the incidence of poverty among single 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 1986-7). 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.

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 if 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.[1] 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.

Table 1 gives the number and percentage of households of different types, based on the National Sample Survey data for 1986-7.[2] Some preliminary observations follow: (1) among all rural households, 20 per cent include at least one widow; (2) among households with at least one widow, 10 per cent are single widows, another 16 per cent 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 a 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).[3] The head-count ratio is 63.4 for the rural population as a whole, but varies considerably between different groups, from 14.5 per cent for single males to 68.2 per cent 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,

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[1] In the sample under consideration, eight per cent of these households have more than one widow.

[2] In Table 1 and all other tables, the figures presented refer specifically to rural areas.

[3] 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, Greer and Thorbecke (1984), Foster and Shorrocks (1991), Ravallion (1994).

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)	1,409 (3.2)
extended	5,069 (11.5)	1,188 (2.7)	151 (0.3)	6,408 (14.6)
Without widow	33,815 (76.9)	0 (0)	1,491 (3.4)	35,306 (80.3)
Total	39,373 (89.5)	2,964 (6.7)	1,645 (3.7)	43,982 (100.0)

[a] Percentage of all households in brackets (rounded to the nearest decimal).

Source: National Sample Survey, 42nd round (1986-7), special tabulation.

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

Household type	Sample size	Per-capita expenditure (Rs/month)[a]		Poverty indices[b]		
				P_0	P_1	P_2
1. ALL HOUSEHOLDS	43982	108.6	(.58)	63.4	17.2	6.4
2. Male-headed	39373	108.2	(.59)	63.8	17.3	6.4
3. Female-headed	4609	114.5	(.55)	57.7	15.8	6.1
4. Widow-headed	2964	112.8	(.55)	58.3	16.8	6.7
5. Other female-headed	1645	116.9	(.54)	56.9	14.5	5.2
6. SINGLE-PERSON HOUSEHOLDS	2281	190.4	(.61)	22.2	5.6	2.2
7. Single male	1213	216.2	(.59)	14.5	3.6	1.5
8. Single female	1068	161.1	(.58)	31.0	7.9	3.0
9. Single widow	859	154.5	(.57)	33.1	8.3	3.0
10. Single widower	283	185.5	(.81)	24.0	5.5	2.0
11. HOUSEHOLDS WITHOUT WIDOW	35306	109.3	(.60)	62.8	17.0	6.3
12. HOUSEHOLDS WITH WIDOW	8676	105.9	(.48)	65.4	18.2	6.9
13. Male-headed	5558	104.0	(.46)	67.5	18.6	7.0
14. Widow-headed	2964	112.8	(.55)	58.3	16.8	6.7
15. Extended	6408	103.7	(.46)	67.3	18.7	7.0
16. Nuclear	1409	115.8	(.52)	55.4	15.4	6.0
17. Nuclear; male-headed	489	117.9	(.40)	52.8	13.2	5.0
18. Nuclear; widow-headed	917	114.5	(.58)	56.9	16.6	6.7
19. Extended; male-headed	5069	103.3	(.46)	68.2	18.9	7.1
20. Extended; widow-headed	1188	105.8	(.49)	62.7	18.1	7.2

[a] Coefficient of variation in brackets.

[b] The P_α poverty index proposed by Foster, Greer and Thorbecke (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 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 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 Rs. 112 per capita per 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 in Minhas et al. (1991).

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 (see Appendix Tables A1 and A2 for details).

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, 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.[4] Similarly, the relatively low incidence of poverty among single widows, e.g. in terms of the head-count ratio (33.1 per cent for this group, compared with 63.4 per cent 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

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[4] 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.

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.[5] For instance, if the weights given to adult males, adult females and children are 1, .8 and .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".

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.

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 and children (.7 and .4, respectively), that significant "rank reversals" -- compared with the first column -- are common. Comparing, say, the first and third columns, we find that the ranks of different household types are, on the whole, remarkably stable. There is some "compression" of the scale in the third column, in the sense that inter-group contrasts in the head-count ratio look less sharp than in the first column, but in most cases the rank of a household group in the scale of head-count ratios is very close to the corresponding rank in the first column.[6]

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

[6] The "compression effect" essentially reflects a positive correlation between APCE and the adult-children ratio (in particular, the fact that single-person households have a relatively high rank in the scale of per-capita expenditure).

Table 3: The head-count ratio and equivalence scales

Household type	Equivalence scales[a] (1,1,1)		(1, 1,.6)		(1,.8,.6)		(1,.7,.4)	
1. ALL HOUSEHOLDS	63.4	(6)	44.4	(7)	36.8	(6)	22.5	(8)
2. Male-headed	63.8	(5)	44.8	(6)	37.4	(5)	22.9	(7)
3. Female-headed	57.7	(11)	39.1	(14)	29.5	(14)	17.7	(15)
4. Widow-headed	58.3	(9)	43.9	(8)	33.0	(10)	21.1	(11)
5. Other female-headed	56.9	(13)	31.4	(15)	23.9	(16)	12.0	(17)
6. SINGLE-PERSON HOUSEHOLDS	22.2	(19)	22.2	(19)	14.2	(20)	11.4	(18)
7. Single male	14.5	(20)	14.5	(20)	14.5	(19)	14.5	(16)
8. Single female	31.0	(17)	31.0	(17)	15.8	(18)	9.4	(20)
9. Single widow	33.1	(16)	33.1	(16)	16.9	(17)	10.0	(19)
10. Single widower	24.0	(18)	24.0	(18)	24.0	(15)	24.0	(5)
11. HOUSEHOLDS WITHOUT WIDOW	62.8	(7)	43.2	(10)	36.4	(8)	22.2	(10)
12. HOUSEHOLDS WITH WIDOW	65.4	(4)	48.7	(4)	38.7	(4)	23.7	(6)
13. Male-headed	67.5	(2)	50.4	(2)	40.6	(2)	24.6	(2)
14. Widow-headed	58.3	(9)	43.9	(8)	33.0	(10)	21.1	(11)
15. Extended	67.3	(3)	50.1	(3)	40.0	(3)	24.5	(3)
16. Nuclear	55.4	(14)	40.8	(12)	32.9	(12)	20.7	(13)
17. Nuclear; male-headed	52.8	(15)	39.2	(13)	33.9	(9)	22.4	(9)
18. Nuclear; widow-headed	56.9	(12)	41.7	(11)	32.3	(13)	19.6	(14)
19. Extended; male-headed	68.2	(1)	51.1	(1)	41.0	(1)	24.8	(1)
20. Extended; widow-headed	62.7	(8)	46.9	(5)	36.4	(7)	24.3	(4)

[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).

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, e.g. due to the role of collective goods in household consumption), then poverty comparisons based on the head-count ratio will tend to "exaggerate" the extent of poverty among larger households, in comparison with smaller ones.[7]

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. When $\Theta = 1$, 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

[7] Recent work based on Pakistan data does suggest that economies of scale in consumption may be important in developing countries (see Lanjouw and Ravallion, 1993). For a discussion of various sources of scale economies in household consumption, see also Nelson (1988).

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.[8] 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 Rs 112 per month.[9]

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 whole approach. The first column ($\Theta = 1$) corresponds to the familiar case where 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 .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

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

[9] 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 Rs 112 per 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	.8	.6	.4	.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.

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 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 $\Theta = .8$ (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, and (3) single widows.

Figures 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 Figure 1 that 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 Figure 2 indicates, there are other important cases of rank reversal taking place around the point where $\Theta = .8$. 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 .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 .8.

It is worth noting, from Figure 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.

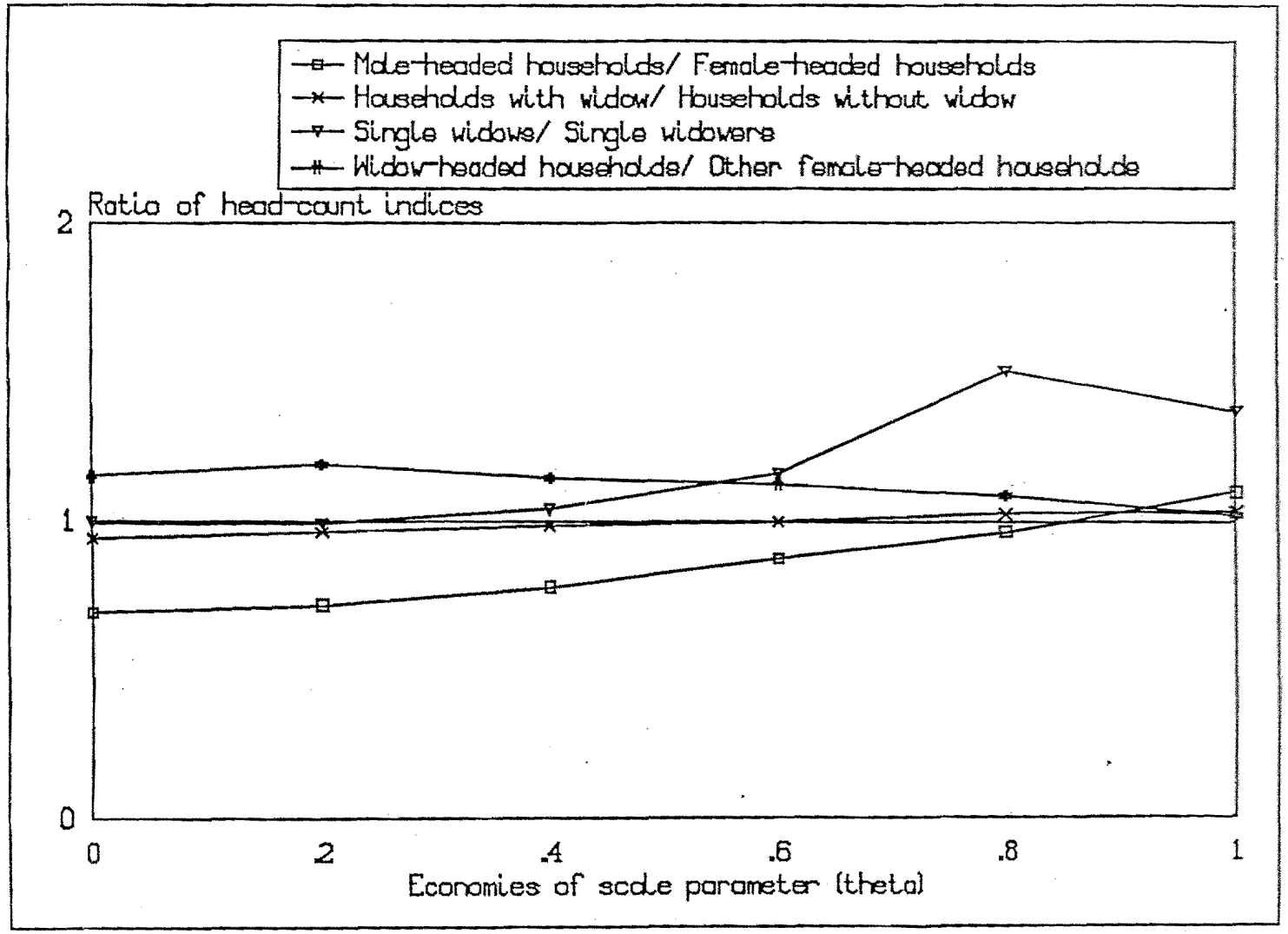

Figure 1: Economies of scale and the head-count index: selected comparisons between pairs of household types

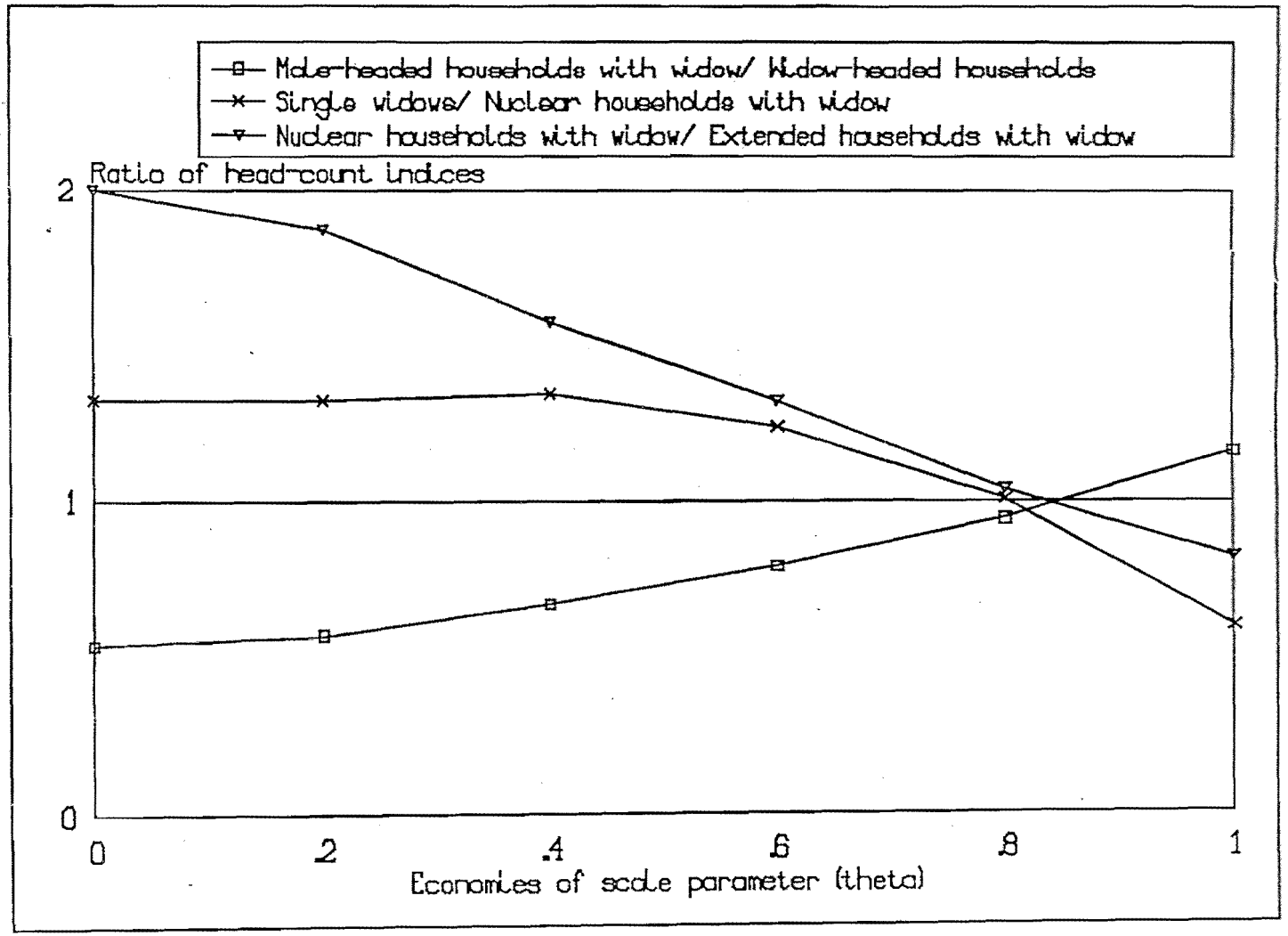

Figure 2: Economies of scale and the head-count index: further pair-wise comparisons (households with widow)

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, 1993) arrives at an estimate of around 0.6 for Θ using an extended version of the Engel method. 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 the Appendix to 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, and if the utility function is separable between these two types of goods, then an upper bound for Θ is simply the share of private goods in household expenditure. The gap between this upper bound and the actual value of Θ depends on the curvature of the utility function applying to public goods. This result, too, is based on strong assumptions, but it does give a sense of the range of plausible values of Θ. It may be argued that, in rural India, the share of private goods in household expenditure is very high, if only because food accounts for almost two thirds of total current expenditure.[10] 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 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 per cent in rural India.[11] The available evidence, therefore, is not inconsistent with the possibility that rural households in India allocate, say, 15 per cent of their total expenditure to public goods, implying an upper bound 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 that has been explored in this paper.

(households with widow)

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[10] According to the 43rd round of the National Sample Survey (1987-88), rural households in India spend 63.8 per cent of current expenditure on food (see Sarvekshana, September 1991).

[11] Sarvekshana, September 1991.

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 non-linear, and (optionally) the child-adult ratio (CAR), as a rough control for household composition. 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.[12] 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.

An alternative way of approaching this issue is to replace PCE with an indicator of poverty as the dependent variable. To illustrate, Table 6 (first two columns) presents the results of a probit regression with the same variables on the right-hand side, while the dependent variable now takes value 1 if the relevant household is below the poverty line (in terms of unadjusted per-capita expenditure), and 0 otherwise. This alternative approach leads to similar conclusions.

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

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[12] 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 (1993).

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

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

* Significant at 1% level (t-ratios are given in brackets).

Table 6: Probit analysis of the probability of a household with particular characteristics being below the poverty line

Independent variables	Regression coefficients			
constant	-0.95* (-47.31)	-0.97* (-48.48)	-0.97* (-50.0)	-0.95* (-49.35)
household size (HHS)	0.21* (38.50)	0.26* (50.89)	0.21* (39.22)	0.25* (51.06)
household size squared (HHSQUARE)	-0.006* (-20.46)	-0.008* (-27.64)	-0.006* (-20.63)	-0.008* (-27.39)
child-adult ratio (CAR)	0.25* (25.74)	-	0.26* (27.11)	-
dummy for female-headed households (DF)	0.05* (2.41)	0.13* (5.99)	-	-
dummy for households with a widow (DW)	-	-	0.14* (8.66)	0.08* (5.28)
Likelihood ratio test	4982.6 (4 d.f.)	4301.6 (3 d.f.)	5052.0 (4 d.f.)	4293.6 (3 d.f.)
McFadden's r-square	0.08	0.07	0.08	0.07

* Significant at 1% level (asymptotic t-ratios in brackets).

poorer than male-headed households. Second, female-headed and male-headed households are very differently distributed in terms of household size (see Figure 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 Tables 5 and 6.

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. In Figures 4-6, we plot the head-count ratio (based on "unadjusted" per-capita expenditure) for different values of the poverty line, and for a range of household types. It can be seen from these figures that the comparative positions of different household groups in terms of head-count ratio are quite robust to the choice of poverty line. Figure 4, for instance, shows that the ranking of single-person households (single males, single females, single widows and single widowers) in terms of head-count ratio is invariant to the choice of poverty line.[13] Similarly, Figure 5 shows that the ranking of different types of household with widow (single-person, "nuclear" and "extended") does not depend on where the poverty line is placed. Finally, Figure 6 indicates that our earlier observations about the absence of substantial difference between households "with widow" and households "without widow" (see section 4) holds for all reasonable choices of poverty line.

8. CONCLUDING REMARKS

The main findings of this paper can be summarised 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 2).

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[13] 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).

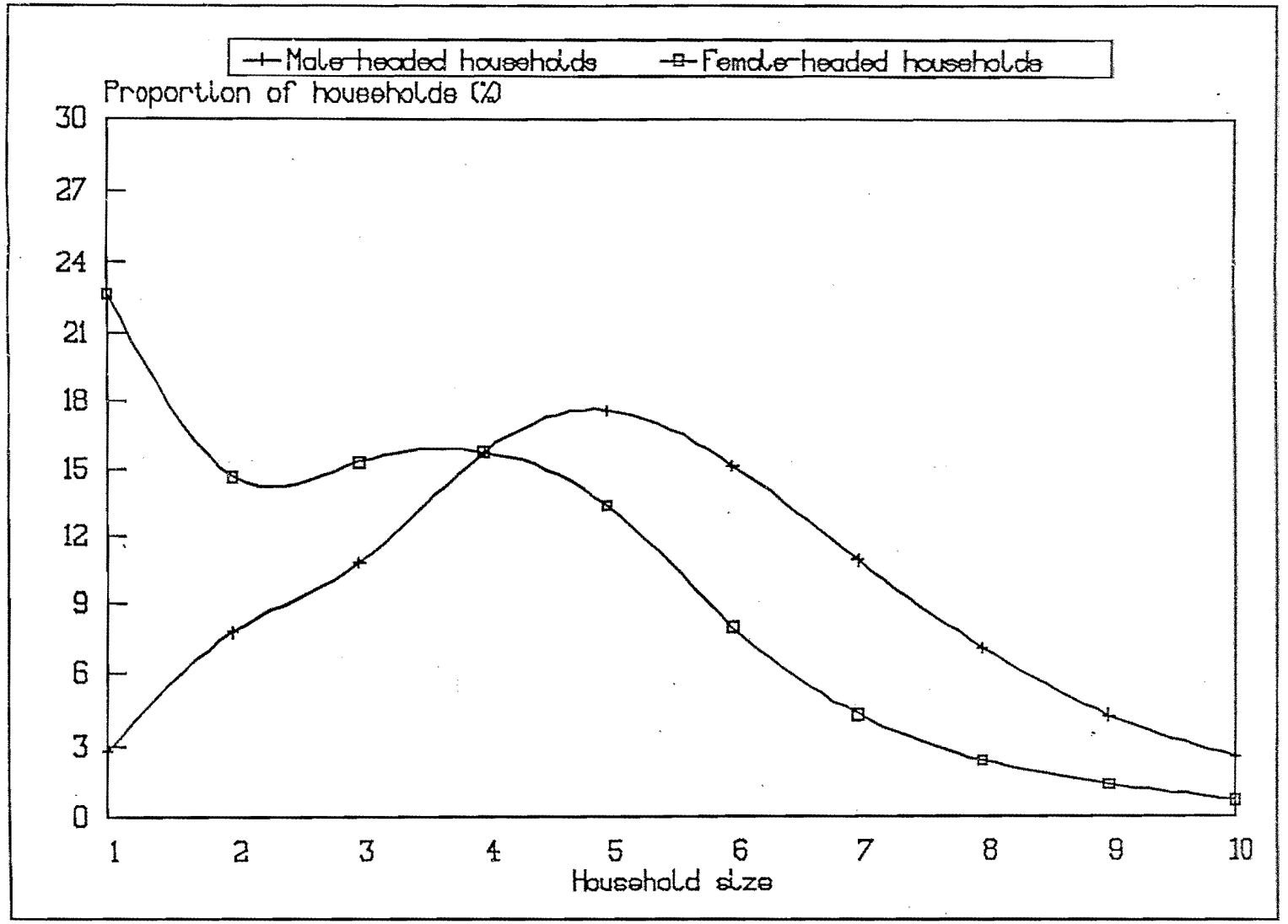

Figure 3: Distribution of male-headed and female-headed households by household size

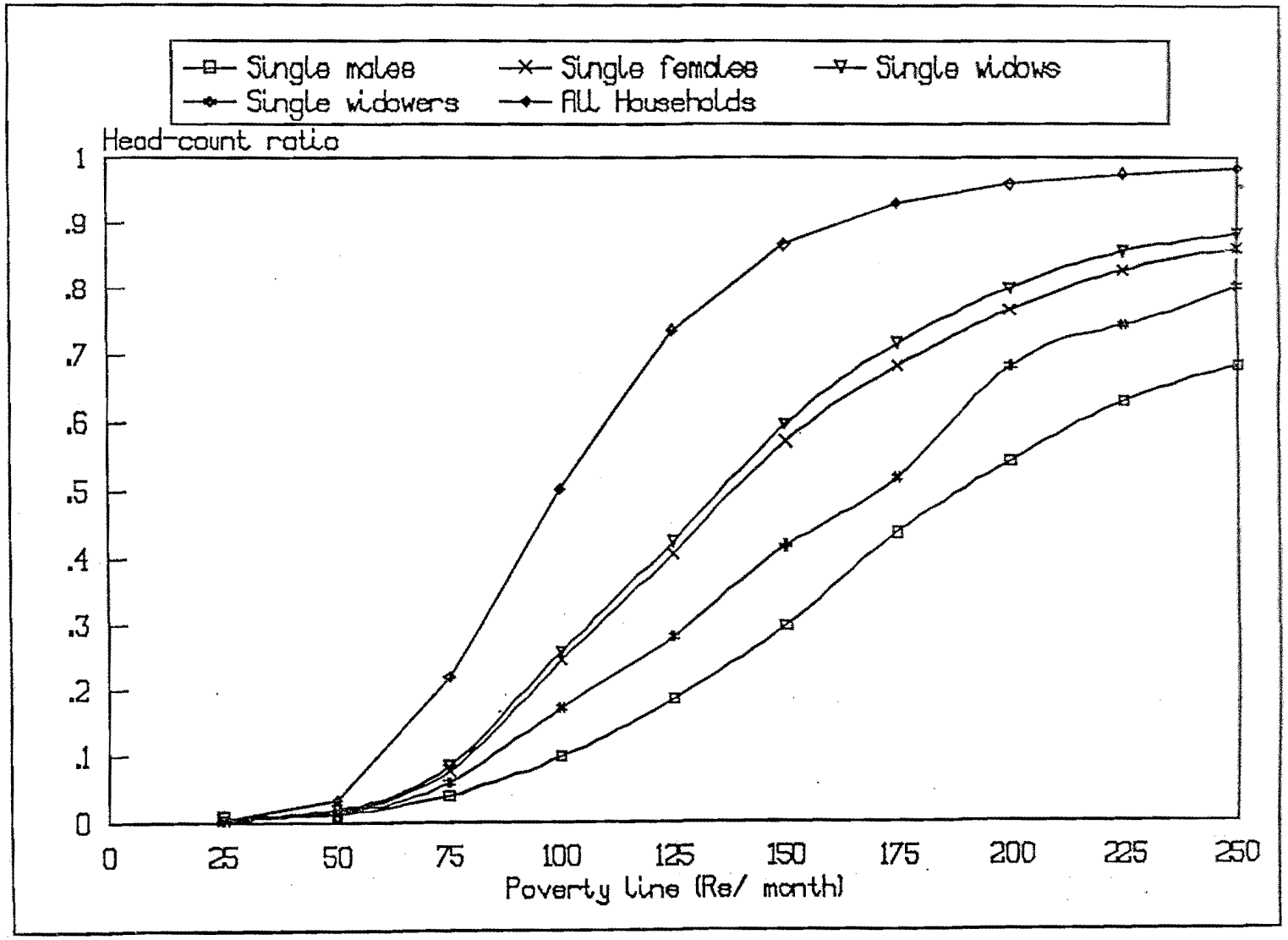

Figure 4: Head-count ratio at different levels of the poverty line: single-person households

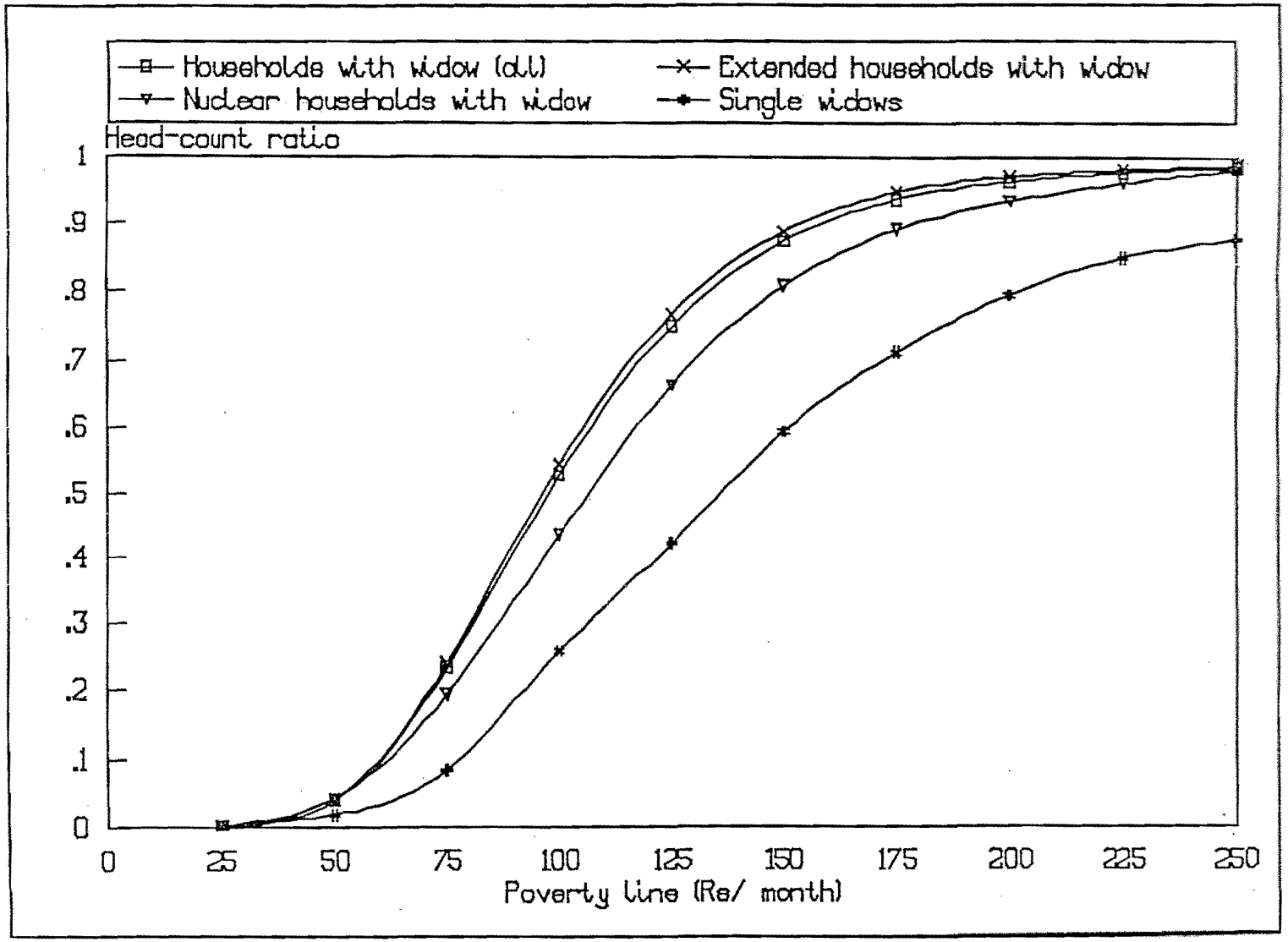

Figure 5: Head-count ratio at different levels of the poverty line: households with widow

Figure 5: Head-count ratio at different levels of the poverty line: households with widow

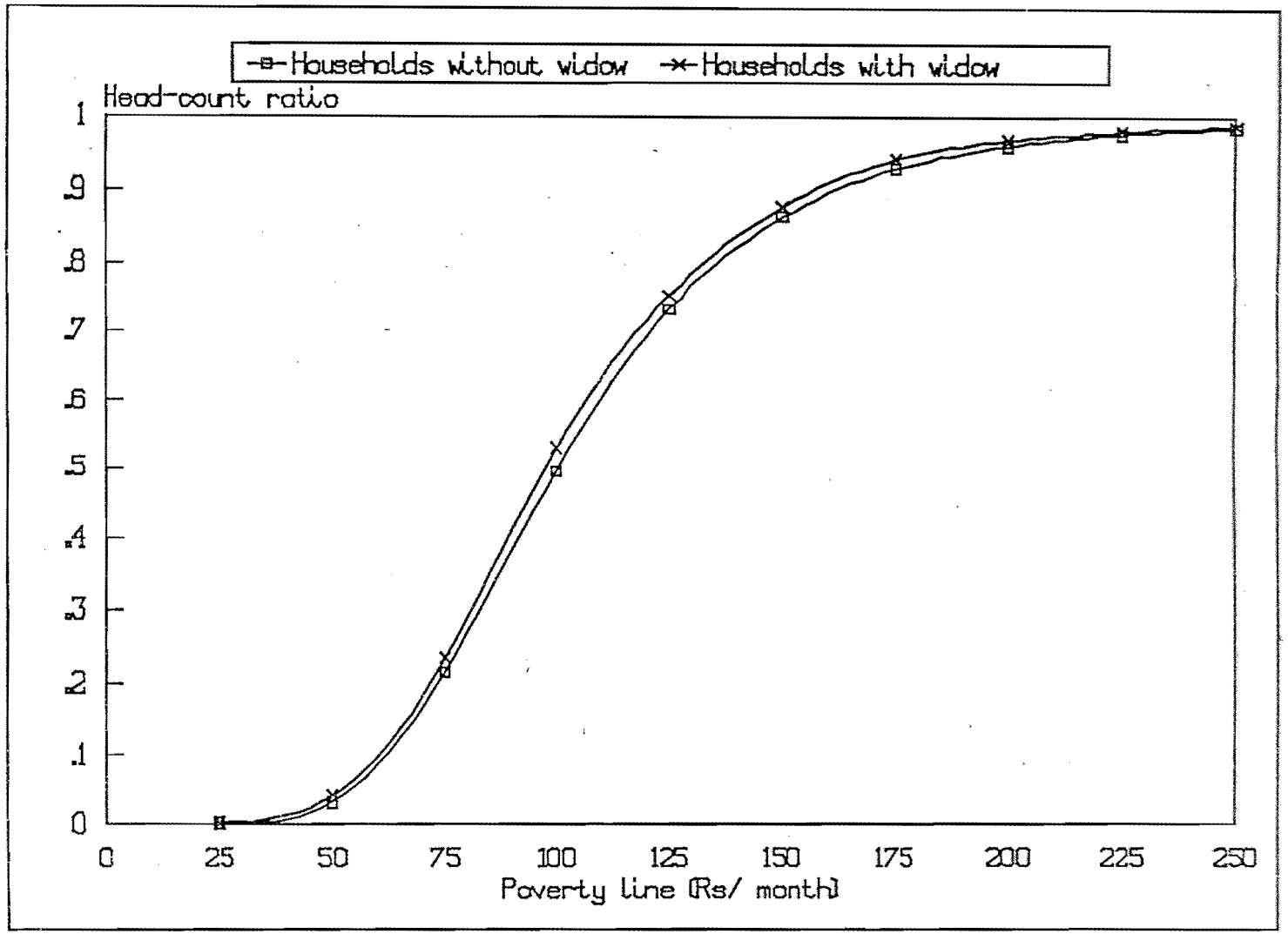

Figure 6: Head-count ratio at different levels of the poverty line: households with and without widow

(2) These observations are robust with respect to changes in "equivalence scales", within the plausible range of such scales (section 3).

(3) Even for a given household size and child-adult ratio, female-headed households are no poorer than male-headed households in terms of average per-capita expenditure and unadjusted head-count ratios. If anything, it is the reverse (section 5).

(4) 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 4).

(5) The basic results summarised in the preceding paragraphs are not very sensitive to the choice of poverty line (section 6).

Before saying good-bye, 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 inter-personal 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 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.

To illustrate, demographic studies indicate that mortality rates among widows in India are almost twice as high as among married women of the same age.[14] This is a direct and telling indication of the deprivation of widows in Indian society. The consumer-expenditure approach, used in this paper, would require much refinement to yield similarly sharp insights into the living conditions of widows in rural India.

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[14] See Mari Bhat (1994); this study corroborates similar results for Bangladesh (Rahman et al., 1992).

References

Agarwal, Bina (1986), "Women, Poverty and Agricultural Growth in India", Journal of Peasant Studies, 13.

Atkinson, Anthony B. (1987), "On the measurement of poverty", Econometrica, 55.

Deaton, Angus, and Muellbauer, John (1980), Economics and Consumer Behaviour (Cambridge: Cambridge University Press).

Deaton, Angus, and Muellbauer, John (1986), "On Measuring Child Costs: With Applications to Poor Countries", Journal of Political Economy, 94.

Deaton, Angus, and Paxson, Christina (1995), "Measuring Poverty among the Elderly in India", mimeo, Research Program in Development Studies, Princeton University.

Drèze, Jean (1990), "Widows in Rural India", Discussion Paper No. 26, Development Economics Research Programme, STICERD, London School of Economics.

Foster, James (1984), "On Economic Poverty: A Survey of Aggregate Measures", Advances in Econometrics, 3.

Foster, J., Greer, J., and Thorbecke, E. (1984), "A Class of Decomposable Poverty Measures", Econometrica, 52.

Foster, J., and Shorrocks, A.F. (1991), "Subgroup Consistent Poverty Indices", Econometrica, 59.

Kakwani, Nanak (1990), "Testing for Significance of Poverty Measures: With Application to Cote d'Ivoire", School of Economics Discussion Paper No. 90/3, University of New South Wales.

Krishnaji, N. (1980), "Agrarian Structure and Family Formation: A Tentative Hypothesis', Economic and Political Weekly, Review of Agriculture, March.

Krishnaji, N. (1984), "Family Size, Levels of Living and Differential Mortality in Rural India", Economic and Political Weekly, February 11.

Lanjouw, Peter, and Ravallion, Martin (1993), "Are Larger Households Really Poorer", mimeo, Policy Research Department, World Bank, Washington DC.

Lipton, Michael, and Ravallion, Martin (1995), "Poverty and Policy", in Behrman, Jere R., and Srinivasan, T.N. (eds.), Handbook of Development Economics, vol. 3 (Amsterdam: North-Holland).

Mari Bhat P.N. (1994), "Widows and Widowhood Mortality in India", paper presented at a conference on Widows in India held at the Indian Institute of Management, Bangalore, March 1994; to be published in the proceedings of the conference, edited by Marty Chen.

Minhas, B.S., Jain, L.R., and Tendulkar, S.D. (1991), "Declining Incidence of Poverty in the 1980s: Evidence versus Artifacts", Economic and Political Weekly, July 6-13.

Nelson, Julie A. (1988), "Household Economies of Scale in Consumption: Theory and Evidence', Econometrica, 56.

Rahman, Omar, Foster, Andrew, and Menken, Jane (1992), "Older Widow Mortality in Rural Bangladesh", Social Science and Medicine, 34.

Ravallion, Martin (1994), Poverty Comparisons (Chur, Switzerland: Harwood Academic Press).

Visaria, Pravin, and Visaria, Leela (1985), "Indian Households with Female Heads: Their Incidence, Characteristics and Levels of Living", in Jain, Devaki, and Banerjee, Nirmala (eds.), Tyranny of the Household: Investigative Essays in Women's Work (New Delhi: Vikas).

Appendix

A note on economies of scale in household consumption

Suppose household consumption consists entirely of "purely private" and "purely public" goods. Assuming "separability" between these two goods, we may write the utility of a household member as

$$y \equiv a.(Y/n) + U((1-a).Y) \quad (1)$$

where a is the proportion of total household expenditure spent on private goods, Y is total household expenditure, and U is a utility function. The first-order condition for optimal choice of a is:

$$U' = 1/n \quad (2)$$

Now Θ, the elasticity of y with respect to n, is simply:

$$\Theta \equiv -(\delta y/\delta n)(n/y) = a.Y/n.y = a.Y/[a.Y + n.U((1-a).Y)] \quad (3)$$

By concavity of U (and under the normalization U(0)=0):[15]

$$U((1-a).Y) > U(0) + (1-a).Y.U'((1-a).Y) = (1-a).Y/n \quad (4)$$

Hence:

$$\Theta < a.Y/[a.Y + (1-a).Y] = a \quad (5)$$

In other words, an upper bound for Θ is simply the proportion of household expenditure spent on private goods.

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[15] Note that the concavity assumption is not restrictive: U is concave if and only if y is a quasi-concave function of private-good and public-good consumption.

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