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Constructing the Poverty Profile:

An Illustration of the Importance of Allowing for Household Size and Composition in the Case of Vietnam

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Young Lives
An International Study of Childhood Poverty

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Abstract

The calculation of income-poverty profiles should allow for household size and composition, but rarely does so. Failure to do so means that the poverty profile will be distorted. The appropriate adjustments are straightforward, requiring simple assumptions which, whilst arbitrary, are better than ignoring the problem. Not making these adjustments not only distorts the relationship between household size and poverty, but all aspects of the poverty profile correlated to household size. We show that in the case of Vietnam if the adjustments are not made, rural poverty is under-stated as is poverty amongst those with little education, minority ethnic groups and female-headed households. Relatively far fewer children live in poverty than is suggested when the appropriate data adjustments are not made.

1 Introduction

The last decade has seen a dramatic increase in the availability of income and expenditure household surveys. A major use of these surveys has been to construct income-poverty profiles by comparing household expenditure with a poverty line for that country.[1] The analysis of household budgets is well over a century old, dating back at least to the work of Engel in mid-nineteenth century Germany. An issue which immediately arises in conducting such analysis is how to make comparisons between households of different sizes and composition (i.e. members of differing ages). Although these issues are recognised as being of great importance, there is not yet any consensus on how they may be satisfactorily dealt with. A common way around this problem has thus been to ignore it altogether. The argument for ignoring the problem is to avoid making 'arbitrary assumptions'. But it is impossible to escape making choices. The attempt to do so is to fall back on implicit assumptions which are just as arbitrary.

All this would not matter if results were robust in the face of differing assumptions, but they are not. Lanjouw and Ravallion (1995) have shown that the relationship between poverty and household size can disappear once household size is allowed for by recognising the possibility of economies of scale in consumption. What they do not go on to illustrate, but potentially more problematic, is that the poverty profile is consequently distorted for all population characteristics associated with household size. In this paper we use data from two Vietnamese household surveys to show that many common poverty correlates are themselves correlated with household size. Misleading results linking household size and poverty do indeed affect other aspects of the poverty profile.

Section 2 lays out in simple fashion the underlying conceptual issues of adult equivalence and economies of scale, with some discussion of estimation and application. Section 3 shows the correlation between various population characteristics and household size in Vietnam, and thus the change to the poverty profile once household size and composition are allowed for. Section 4 concludes.

1 Income poverty is poverty defined with reference to income or, more usually, expenditure. Poverty has other dimensions such as poor health or education, and social and political exclusion. These dimensions of poverty, which may be less amenable to quantitative analysis, are vital components of the poverty profile, but fall outside the scope of this paper.

2. Adjusting for household size and composition

The identification of a person as being poor or not is based on a comparison of their income or expenditure against the poverty line, z. Two important issues, which we do not dwell on here, are to adjust the poverty line for price differences across time and space, that is

$$z = z(p_{r,t}) \quad (1)$$

where p is the price level in area r at time t.

Spatial price indices are made for rural and urban areas and for different regions of the country. Many items, most notably food, which accounts for a large proportion of the expenditure of the poor (typically around 70 per cent in low-income countries), are much cheaper in rural areas. Hence, as shown by the examples in Table 2.1, the rural poverty line can be substantially less than that for urban areas, the rural line being only a little over half the urban one in the case of Peru. But prices may be quite differentiated within rural areas, particularly comparing road and off-road communities. Prices also vary between region so that the poverty line may be region specific, though it is useful to distinguish rural and urban areas within regions. The cost of goods also depends on the source of supply, with the poor often having to pay more. For example, the poor in urban areas often pay substantial amounts for water from vendors whereas the better off have subsidised piped water.[2]

TABLE 2.1 RURAL VERSUS URBAN POVERTY LINES

	INDONESIA (1990)	BANGLADESH (1995/6)A	PERU (1997)B
Rural	13,295	349.57	1,037
Urban	20,614	455.86	1,968
Ratio rural to urban	0.64	0.77	0.53

Notes: a price indices calculated by region. Poverty lines shown are for Dhaka and one rural region; b for Lima and rural Sierra.
Sources: World Bank (1993), and World Bank (1999a and b).

2 Sometimes in urban areas, as is more usually the case in rural areas, poor women and children spend a considerable portion of each day (up to three hours) collecting water.

Inflation means that prices increase over time and this fact must be allowed for in adjusting either the poverty line or expenditures to make poverty comparisons across time, i.e. using data from different surveys. Price changes should also be taken into account for data collected by a single survey if the survey period covers several months. Price adjustments need also to allow for seasonal variations in prices, for which purpose country or region specific seasonal deflators may be available.

Data are collected at the household level so that we have data on total household consumption (E), not individual consumption. It is easy enough to divide E by household size (HHS) to get per capita consumption (ei) for household i:

$$e_i = \frac{E_i}{HHS_i} \qquad (2)$$

which could then be compared with the poverty line. However, this procedure allows for neither the size nor composition of the household.

Dealing first with composition, the consumption requirements of children are less than those of adults. More controversially, those of women are less than those of men.[3] Hence a given level of expenditure spent on children yields higher welfare, or equivalently, the poverty line for children should be set at a lower level than that for adults. The rationale here is clear if the poverty line is calorie based. A child's daily calorific requirements are a fraction of those of an adult, so that the poverty line for a child should also be a fraction of that for an adult. Adult equivalence scales (AES) are scales of these fractions which may be derived in two ways. The most common is based on calorific requirements. The second approach is econometric, estimating child costs through the analysis of household expenditure data.

3 Women's 'normal' calorific intake is less than that of men. But the 'normal' situation may be thought not to apply when women are responsible for tasks requiring heavy labour in agriculture and load-carrying (including water). However, as shown below, calorific norms suggest that a woman engaged in heavy work still only has the same requirement as man engaged in light work. A second argument is the greater requirements of pregnant and lactating women, which may be a sufficiently large effect to deserve attention in countries with high fertility rates.

Nutritionists define standard calorific requirements for individuals of different age, sex and occupation (workload). These standard intakes are obtained through the observation of samples of healthy individuals. However, there is no general consensus on the way standard requirements should be measured,[4] so that quite different calorific requirements can be used to set poverty lines. A review of World Bank poverty assessments for Africa found that requirements varied from a low of 1,700 calories per day in urban areas of Ethiopia to a maximum of 2,700 calories per adult equivalent in the Gambia and 2,500 calories in Lesotho (Hanmer, Pyatt and White 1999). One of the most widely used analyses of energy intakes is a study by WHO (1985)[5] which gives the daily calorie consumption shown in Table 2.2.

TABLE 2.2 CALORIES INTAKE FOR PERSON OF DIFFERENT AGE AND SEX

AGE	MALE			FEMALE		
1	820			820		
1–2	1,150			1,150		
2–3	1,350			1,350		
3–5	1,550			1,550		
5–7	1,850			1,750		
7–10	2,100			1,800		
10–12	2,200			1,950		
12–14	2,400			2,100		
14–16	2,650			2,150		
16–18	2,850			2,150		
	WORKLOAD			WORKLOAD		
	LIGHT	MEDIUM	HEAVY	LIGHT	MEDIUM	HEAVY
18–30	2,600	3,000	3,550	2,000	2,100	2,350
30–60	2,500	2,900	3,400	2,050	2,150	2,400
>60	2,100	2,450	2,850	1,850	1,950	2,150

Source: WHO (1985)

4 See Osmani (1992) for a review of the problems related to the identification of calorific standards.

5 See Ravallion (1992), Lipton and Ravallion (1995) and World Bank (2000).

From Table 2.2, the recommended calorific intake for an average adult male is close to 2,800 calories per day.[6] Adult equivalence scales are derived by dividing the recommended calorific intake for a person of a given age and sex by 2,800. Thus, for example, an average child of age between 1 and 14 requires 65 per cent of the calories required by a male adult. Given the range of calorie requirements between infants and teenagers, it is generally useful to work with narrower age bands. For example, children in the age 0 to 5 require 43 per cent of the calories required by an adult, those in age 5 to 10 require 70 per cent and those from 11 to 15 require 82 per cent. The scales should also be gender differentiated. The requirements of an average adult female are 75 per cent those of the average adult male, rising to 82 per cent for women engaged in heavy work.

The appeal of calorie-based scales is clear for poverty lines based on food expenditure alone. But no household consumes only food. Hence the use of these scales assumes that non-food goods are consumed by each family member proportionally to the consumption of food. The validity of this assumption has not been tested.[7]

Econometric methods derive equivalence scales from the data. But there is no consensus on how to do so. The methods developed by Engel and Rothbarth are the oldest and most commonly used. Other methods include complete demand systems and subjective scales.[8] The Engel and Rothbarth procedures measure the cost to a reference childless household of maintaining the same welfare level once a child is added to that household. This amount is called 'the cost of the child' and can thus be used to derive equivalence scales.[9] In the Engel method welfare is defined with reference to food share (households with the same food share being deemed to have the same level of welfare). With Rothbarth's method, two households are equally well-off when they

6 Calculated as the simple average of the nine adult male requirements in the table.

7 The importance of the assumption increases as the food share declines. In middle income countries those identified as poor have a food share of about half, and this share falls to one third or less in high income countries.

8 Detailed surveys of the methods used to calculate econometric equivalence scales can be found in Van Praag and Warnaar (1997), Deaton (1997) and Deaton and Mullebauer (1986).

9 An alternative interpretation, which we pursue in a separate paper, is to use the results to analyse expenditure per child amongst different population groups.

are able to consume the same proportion of adult goods (like clothes, alcohol or tobacco). More recent studies estimate complete demand systems. As for Engel's method, these papers are based on equating food share but correct for a bias in the coefficients when only the food share equation is estimated (e.g. Lancaster, Ray and Valenzuela 1999).

TABLE 2.3 SELECTED ESTIMATES OF EQUIVALENCE SCALES

AUTHOR	METHOD	COUNTRY	YEAR	EQUIVALENCE SCALE	CHILD COST
Deaton (1997)	Engel	Pakistan	84–5	1.34	0.68
Deaton and Muellbauer (1986)	Engel	Sri Lanka	69–70	1.41	0.82
	Rothbarth	Sri Lanka	69–70	1.12	0.24
Deaton, Ruiz-Castillo and Thomas (1989)	Rothbarth	Spain	80–1	1.22	0.44
Gronau (1991)	Rothbarth	USA	72	1.18	0.36
Lancaster, Ray and Valenzuela (1999)	Engel	Thailand	88–9	1.17	0.34
	Engel	Peru	94	1.18	0.36
	Engel	Philippines	88–9	1.21	0.42
	Engel	India	83	1.18	0.36
	Engel	Tanzania	93–4	1.17	0.34
	Engel	South Africa	94	1.16	0.32
	Engel	Italy	93	1.22	0.44
	Engel	Australia	93–4	1.18	0.36
	Demand system	Thailand	88–9	1.20	0.40
	Demand system	Peru	94	1.36	0.72
	Demand system	Philippines	88–9	1.29	0.58
	Demand system	India	83	1.13	0.26
	Demand system	Tanzania	93–4	1.11	0.22
	Demand system	South Africa	94	1.17	0.34
	Demand system	Italy	93	1.11	0.22
	Demand system	Australia	93–4	1.15	0.30
Muellbauer (1977)	Barten	UK	68–73	1.14	0.28
Phipps (1998)	Demand system	Canada	78,82,86,92	1.16	0.32
Subramanian and Deaton (1991)	Engel	Maharashtra (India)	83	1.27	0.54
	Rothbarth	Maharashtra (India)	83	1.11	0.22

Table 2.3 shows results obtained using these methods for a variety of countries. The list is not exhaustive of all studies conducted on equivalence scales, but correctly represents the dominance in the use of Engel's and Rothbarth's methods. The equivalence scales are shown as percentage increases in costs using a childless couple as reference household. Child cost is the adult equivalent expenditure for the child. An average child cost was calculated for those studies where equivalence scales were estimated for different age and sex categories.

The table shows large variations in the values of the estimated scales. In general because different methodologies are applied to different countries, we do not know whether the value of the scale is a product of the peculiar characteristics of the country or of the methodology used. But where different methods are applied to the same countries, then Engel's estimates are larger than demand system estimates (though not always) which in turn are slightly larger than those obtained through Rothbarth's method[10]. Restricting the attention to developing countries only, the cost of a child in adult equivalents ranges from a minimum of 22 per cent to a maximum of 82 per cent, with an average value of 43 per cent. These figures are sensitive to the particular methodology used for their estimation, but seem to be plausible.

Scales obtained through econometric estimation, as those shown in Table 2.3, can be used to calculate expenditure per adult equivalent (ea):

$$ea_i = \frac{E_i}{AE_i} \tag{3}$$

where AEi is the total number of adult equivalents for the household, given by:

$$AE_i = \sum_{j=1}^{N} \beta_{j,i} \tag{4}$$

where bj,i is the adult equivalent for individual j in household i.

10 A theoretical explanation for this relation on the results obtained from the application of different methods can be found in Deaton and Muellbauer (1986).

TABLE 2.4 EXPENDITURE PER ADULT EQUIVALENT OF FIVE VIETNAMESE HOUSEHOLDS ('000 OF DONG PER YEAR)[11]

HOUSEHOLD (1)	TOTAL EXPENDITURE (2)	SIZE (3)	CHILDREN (4)	AE (5) = 0.65X(4)+ (3)-(4)	EXPENDITURE PER ADULT EQUIVALENT = (2)/(5)	EXPENDITURE PER CAPITA = (2)/(3)
1	1,508.6	6	4	4.6	328.0	251.4
2	1,673.2	3	0	3.0	557.7	557.7
3	2,186.6	7	3	6.0	367.5	312.4
4	1,885.6	4	2	3.3	571.4	471.4
5	4,029.2	6	1	5.7	713.1	671.5

Note: households taken from VLSS (1998)

Table 2.4 provides an illustration of this calculation. There are five Vietnamese households (taken from Vietnamese Living Standard Survey (VLSS) 1998) of different size and demographic composition. For simplicity we use a single calorific equivalence scale based on WHO recommendations and consider each child in the age from 0 to 15 as equivalent to 65 per cent of an adult (i.e. β is 0.65 for children and 1 for adults). Calculation of expenditure per adult equivalent (ea) would be more precise if we used different values of β for each age and sex category. The last column contains per capita expenditure to show the difference with expenditure expressed in adult equivalent units. Not only is expenditure per adult equivalent higher than that per capita, but the ranking of households also changes, with the third and fourth ranked households swapping places.

The above adjustment takes care of household composition. But allowance also has to be made for household size and the economies of scale which can be realised in consumption.

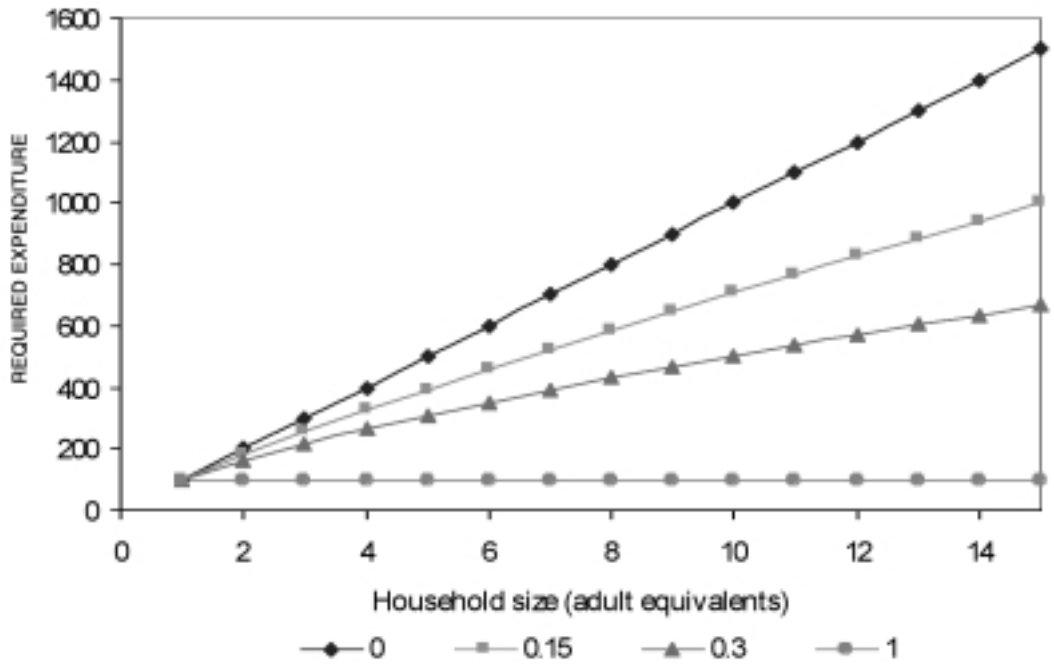
11 The average exchange rate was 11,683 dongs per dollar in 1997 and 13,268 dongs per dollar in 1998 (IMF-International Financial Statistics).

Economies of scale are the idea that two can live together more cheaply than apart since there are 'public goods' within the household. Public goods are those for which consumption by one person does not reduce the amount available for consumption by others. For example, each household only needs one set of kitchen appliances (e.g. cooking stove) not one for each member of the family. Utilities such as water (unless it is metered) and, to a slightly lesser extent, electricity are public goods, as are shared living spaces. The presence of economies of scale means that the expenditure required to maintain a given level of welfare rises less than proportionately than household size. Thus expenditure per adult equivalent adjusted for economies of scale is given by:

$$es_i = \frac{E_i}{(AE_i)^{1-\alpha}} \qquad (5)$$

where a is the economies of scale coefficient. A value of α=0 means that there are no economies of scale, so that required expenditure to maintain welfare rises proportionately with household size. On the other hand if α=1 then economies of scale are so extreme that welfare is the same for different households with the same total expenditure regardless of household size. Suppose a single person household has an income of 100, then to maintain the same level of welfare a household of two people must have a total expenditure of 200 if there are no economies of scale and 100 if α=1. Empirical estimates of α are generally in the range 0.15–0.3. Assuming the higher value means that the two person household in our example would require an expenditure of 163 (=100 x $2^{0.7}$), i.e. a 'saving' from scale economies of 19 per cent (= (200-163)/200x100). For a household of ten adult equivalents these economies would represent a saving of 50 per cent. Figure 2.1 shows the expenditure required to maintain the same level of welfare as household size increases for different values of α.

FIGURE 2.1 THE EFFECT OF DIFFERENT VALUES OF THE ECONOMIES OF SCALE COEFFICIENT ON EXPENDITURE REQUIRED TO MAINTAIN WELFARE



It is argued that economies of scale cannot be very substantial in households which spend a large proportion of their income on food. A typical figure for the poor in developing countries is that food is 70 per cent of total expenditure. Assume this figure applies to the one person household in the above example. Further assume that the remaining 30 units are spent on pure public goods.[12] The expenditure required to maintain welfare (RE) is thus given by

$$RE_i = 30 + 70\,AE_i \qquad (6)$$

12 We are also assuming that there are no economies to be realised in consumption of the private good through, for example, bulk purchase. Such economies may exist, though the most likely saving is on preparation time, freeing up time for other activities or leisure, the former would thus be reflected in higher per capita consumption.

Table 2.5 shows the total expenditure and implied savings from this formula. For a household of ten people the savings are only a little over a quarter, rather than the half implied by an economies of scale coefficient of 0.3.

But even if economies of scale are rather less, say 0.15, then the savings achieved by increasing family size can be quite substantial. It obviously follows that the 'stylised fact' from income-poverty profiles that larger households are poorer is not to be trusted unless appropriate adjustments have been made for household size and composition. This bias is present not only for the relationship between household size and poverty, but also exists for any poverty correlate which is itself correlated with household size. We examine the possibilities that such biases can be important with reference to the Vietnamese data.

TABLE 2.5 REQUIRED EXPENDITURE TO MAINTAIN WELFARE ASSUMING PURE PUBLIC AND PRIVATE GOODS

HOUSEHOLD SIZE	FOOD	PUBLIC	TOTAL	SAVING
1	70	30	100	..
2	140	30	170	15
3	210	30	240	20
5	350	30	380	24
10	700	30	730	27
15	1,050	30	1,080	28
20	1,400	30	1,430	29

3. The Vietnamese Living Standard Surveys

Description of the surveys

This paper makes use of the 1992–3 and 1997–8 Vietnam Living Standard Surveys (VLSS), conducted by Vietnam's General Statistical Office, with financial assistance from the United Nations Development Programme (UNDP) and the Swedish International Development Agency (SIDA) and technical assistance from the World Bank. Both surveys contained a number of modules in the household questionnaire covering a variety of topics including education, health, migration, fertility, agriculture, income and expenditure. The VLSS of 1992–3 surveyed a total of 4,800 households residing in 150 rural and urban communities (out of 10,000 in the country as a whole) and is nationally representative, since the probability of selection was set proportional to population size. The 1997–8 VLSS covered 6,002 households, of which 4,305 were already interviewed in the previous survey, thus creating a nationally representative panel data set. In this second survey, however, an additional number of 1,200 households were not selected proportionally to population size. Urban areas and specific regions of the country were intentionally oversampled and therefore the analysis of the full data set requires the use of sample weights. We use the data on expenditure and household demographics of 4,799 households for VLSS 1992–3 and 5,999 households for VLSS 1997–8 (some observations had to be dropped because information was incomplete).

Setting the poverty line and the treatment of household size and composition

The poverty line may be set in various ways.[13] The most common, adopted in the VLSS, is to set a lower poverty line based on the cost of acquiring a basket of food necessary to meet minimum calorific requirements. This lower line, called the food poverty line, is the cost of 'a basket of food items that is deemed to be necessary to ensure good nutritional status, [taking] into account the food consumption patterns of Vietnamese households' (World Bank 2000: 146). The upper poverty line, called the general poverty line, adds in the cost of non-food items.

The World Bank report analysing the Vietnamese data (World Bank 2000: 147 ff) explains the setting of the food poverty line as follows: 'individuals' calorific needs vary depending on their

13 See Ravallion (1998) for a discussion and Hanmer *et al.* (1999) for a review of practice in World Bank poverty assessments

age, sex and the amount and intensity of physical activity they engage in. For the purpose of constructing a poverty line, however, it is useful to take an average requirement over the entire population' (*ibid:* 147). A common figure used by the World Bank for average calorie requirements is 2,100.[14] Hence the cost of 2,100 calories, based on food consumption patterns was calculated.[15] These patterns were observed by calculating average calories from actual consumption for each expenditure quintile. This average was 2,052 for the third quintile, which is close to 2,100. So the basket of food items consumed by those in the third quintile was used to make a basket giving 2,100 calories, with an adjustment to allow for the shortfall.[16] The cost of this basket was then calculated from price data where available or, where not, the imputed prices from the survey data. For a few items for which no price data were available cost was imputed by increasing total cost proportionate to their expenditure share. All prices were first deflated to January 1993. This calculation gives a Vietnam-wide poverty line of VND 749,723 per person per year. To calculate the general poverty line the amount the third quintile spent on non-food items[17] was added to the food poverty line.

The 1998 food poverty line was derived from the 1993 line using 1998 price data, yielding a poverty line of VND 1,286,833 per person per year. The non-food component was inflated by 1.225, the Government Statistical Office (GSO) rate of inflation for non-food items over the period. Finally, regional price deflators were calculated. In 1993 these ranged from 0.9121 (rural North Central) to 1.223 for urban Southeast

The derivation of this line has taken no account of household size or composition. But it need

14 From Table 2.2 the average requirement for an adult is 2,464 calories and for a child 1,785. The average of these two (children are about half the population) is 2,124 calories; i.e. not far from the figure of 2,100.

15 Sometimes the cost of acquiring these calories in the least cost way ('the optimal bundle') is used for this calculation. But local preferences usually result in a more expensive means of acquiring calories, so that using the optimal bundle under-estimates the poverty line and so under-estimates the extent of poverty.

16 The adjustment factor was 2,100/1,969, rather than 2,100/2,052, since items for which consumption was imputed were left out of the cost for calories calculation.

17 Adjusted by factor of 2,100/2,052 for the calorie shortfall.

not do so. It is the application of the line for which such an adjustment is necessary.[18] However, these adjustments are not made. The disregard for household composition is justified on the grounds that there is 'no credible method of estimating [adult equivalence] scales' (ibid.: 146).[19] But, given that the report later acknowledges the presence of differential calorie requirements (see earlier quote), it is clear that ignoring composition effects is not justified. No mention is made of economies of scale.[20] As already suggested, ignoring household size and composition can distort the poverty profile.

The poverty profile

Ignoring household and composition will overstate poverty amongst larger households. But it will also distort the poverty profile with respect to other variables correlated with household size. Figures 3.1(a)–(f) show the correlation between household size and (a) rural/urban residence, (b) sex of head of household, (c) ethnic group,[21] (d) region, (e) education of household head and (f) proportion of household who are children. Where there is no relationship between this variable and household size for any one household size the bars will be the same height for each category (e.g. male and female-headed). This is never the case. Larger households are more likely to be rural, male-headed, from other 'other' ethnic group category, be in areas other than the Red River Delta (and more likely to be in the Mekong Delta, South-East or Central Highlands), have a head with less education and have a larger percentage of household members who are children.

18 But with the caveat that the calorie requirement should be that for the reference category (adult male) if equivalence scales are then to be applied. By using calories for an 'average person', as the World Bank does in Vietnam, some allowance is being made for differing calorie requirements, but assuming that all households have an identical composition.

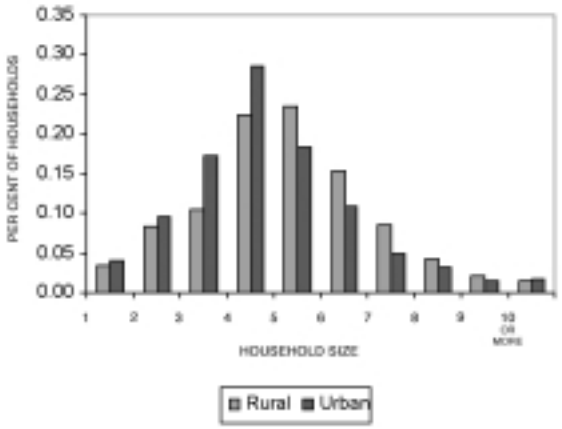
19 This stance is justified by citing Deaton's review of the literature. However, Deaton in fact concludes that 'a modified Rothbath alternative would be to choose a set of scales in line with the results that are generally obtained by the method, for example a weight of 0.40 for young children aged 0-4, and 0.50 for children aged 5 to 14. These numbers are obviously arbitrary to a degree, but there is no good evidence against them, and they are broadly consistent with a procedure that has much to commend it… Numbers like a half are as good as we have, and in my view, it is better to use such estimates to construct welfare measures than to assume everyone is equal as we do when we work with per capita measures' (Deaton 1997: 259–60, our emphasis).

20 A review of African poverty assessments by the World Bank found that most applied adult equivalence scales but none adjusted for household size (Hanmer et al. 1999).

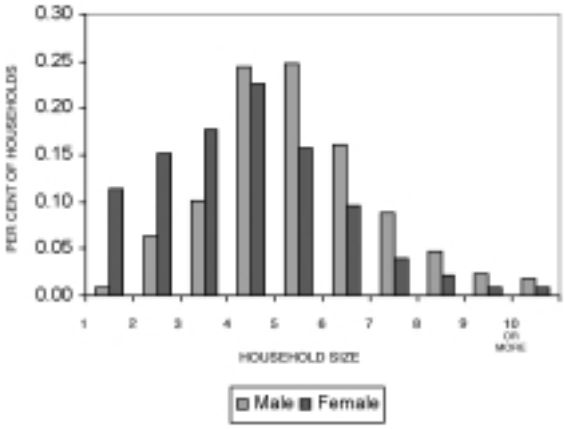
21 The groupings by ethnicity and region are data-based. That is, we combined those groups with the most similar demographic profile. The result is groupings which are not those most commonly used, though they are the most applicable for our analysis.

FIGURE 3.1 CORRELATION BETWEEN HOUSEHOLD SIZE AND OTHER CHARACTERISTICS

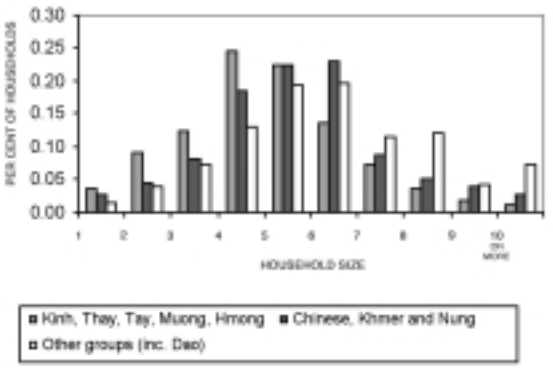
a) Rural - Urban



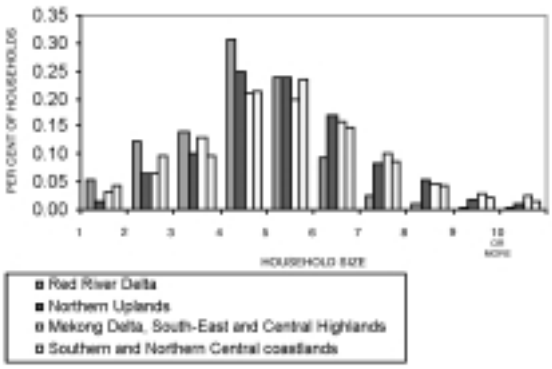
b) Male - Female head



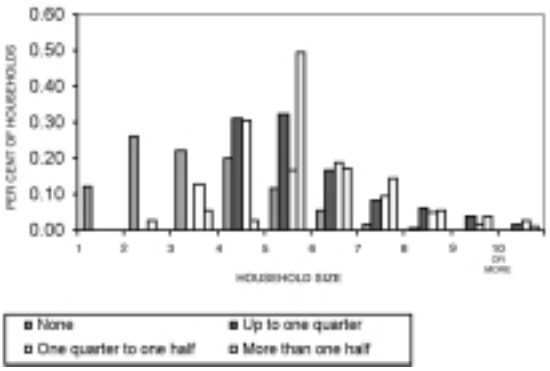
c) Ethnicity



d) Regions



e) Percentage of Children



f) Education of household head

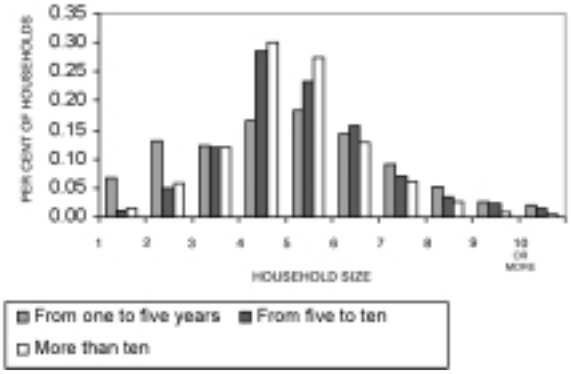


Table 3.1 illustrates the strength of these relationships more formally by comparing the mean and median household sizes of different population groups. For example, the mean size of male-headed households is 5.1 people and those headed by women 3.9. The relationship between size and the variables shown is in all cases significant at the 0.1 per cent level.

TABLE 3.1 RELATIONSHIP BETWEEN HOUSEHOLD SIZE AND OTHER CHARACTERISTICS

	Mean	Median	Standard error	Chi-square statistic
Area of residence				126.0*
Rural	4.8	5		
Urban	4.4	4		
Sex of household head				680.6*
Male	5.0	5	0.03	
Female	3.8	4	0.05	
Ethnic group				210.4*
Kinh, Tay, Thai, Muong, Hmong	4.6	5	0.03	
Chinese, Khmer and Nung	5.3	5	0.11	
Other groups (including Dao)	6.0	6	0.16	
Region				335.7*
Red River Delta	4.0	4	0.05	
Northern Uplands	4.9	5	0.06	
Mekong Delta, South-East and Central Highlands	5.0	5	0.04	
Southern and Northern Central Coastlands	4.8	5	0.05	
Education (years of schooling)				415.4*
Less than five years	4.6	5	0.05	
From five to ten years	4.8	5	0.04	
More than ten years	4.6	4	0.04	
Children				2,851.0*
None	3.2	3	0.04	
Up to one-quarter of household	5.5	5	0.05	
One-quarter to one-half	5.1	5	0.04	
More than one-half	5.7	5	0.05	

Source: calculated from VLSS (1998).
*Significant at the 0.1 per cent level

To examine the impact of allowing for household size and composition on the poverty profile we made very simple assumptions.[22] In accordance with the WHO figures, the equivalence scale was

22 In a separate paper (White and Masset 2001) we estimate the appropriate values from the data. But our point here is that working with arbitrary, but commonly accepted, values is often adequate. It is certainly sufficient for our main point of the importance of these adjustments for the poverty profile.

set at 0.65 of adult expenditure for all children.[23] Two economies of scale coefficients were assumed, our first set of estimates sets *a* equal to 0.15 and the second set puts it at 0.3.[24] Table 3.2 shows that these assumptions made a difference to (reduce) the proportion of the population who are poor.[25] But it is not the percentage of the population below an ultimately arbitrary poverty line that is the main point of interest (though if the poverty line is given any credibility then the result is of some interest). Of more interest is the relative proportion from different population groups below that line (i.e. the poverty profile).

TABLE 3.2 HEADCOUNT INDEX UNDER DIFFERENT ASSUMPTIONS (PER CENT OF POPULATION BELOW POVERTY LINE)

	WORLD BANK	OUR ESTIMATES 1	OUR ESTIMATES 2
Poor	37.4	30.5	15.2
Extremely poor	15.0	10.3	3.8

Figure 3.2 shows how the different assumptions matter to the relationship between poverty and household size. When neither size nor composition are allowed for (World Bank) then there is a strong positive relationship between size and the probability of being poor. The largest households appear nearly four times more likely to be poor than households comprising only two people. By contrast this relationship virtually disappears under our second set of estimates.[26,27]

23 The minimum expenditure of an adult was obtained applying a correction factor of (2,800/2,100) to the average per capita poverty line estimated by the World Bank, where 2,800 and 2,100 are calorific requirements of an average adult male and an average male respectively.

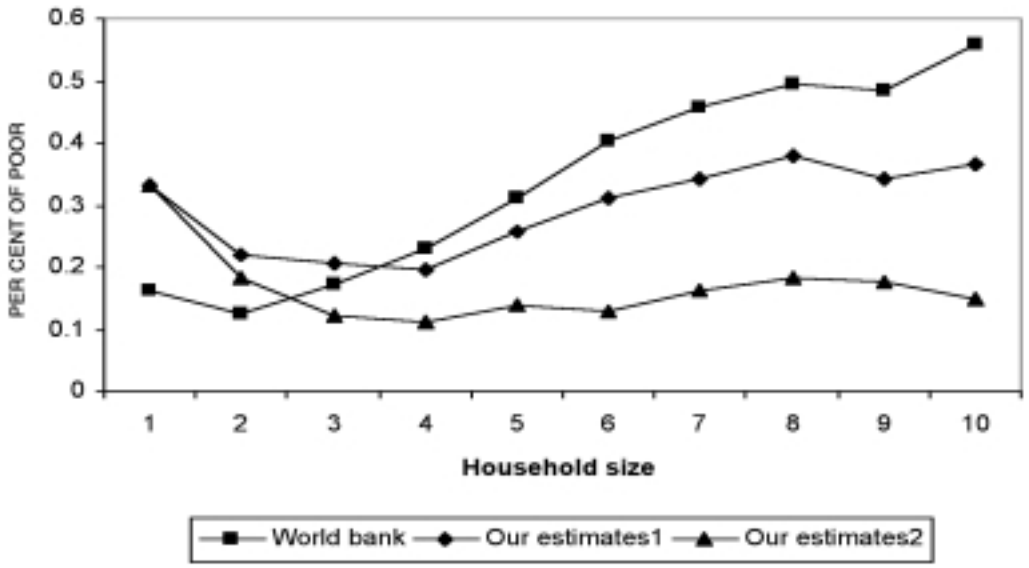
24 As for equivalence scales, there is no agreed method for estimating a. However, also as for equivalence scales, it is better to allow for economies of scale than not to do so, so the best practice is to assume reasonable values. There is not agreement on what are reasonable values (!) so we adopt a reasonable range.

25 Since the World Bank poverty line was set for an average person and not an average adult male, a strict comparison should redefine the line using the calorie requirements of an adult male. But it is not the overall level of poverty that concerns us here so much as its distribution amongst different population groups.

26 Using Pakistani data, Lanjouw and Ravallion (1995) find that the relationship between household size and poverty vanishes for a=0.4; implying that for higher values of a the relationship is reversed.

27 In contrast to the 'stylised fact' from income poverty profiles that large households are more likely to be poor, the opposite is found to be the case in much anthropological work (Booth et al. 1998).

FIGURE 3.2 HEADCOUNT INDEX BY HOUSEHOLD SIZE (GENERAL POVERTY LINE)[28]

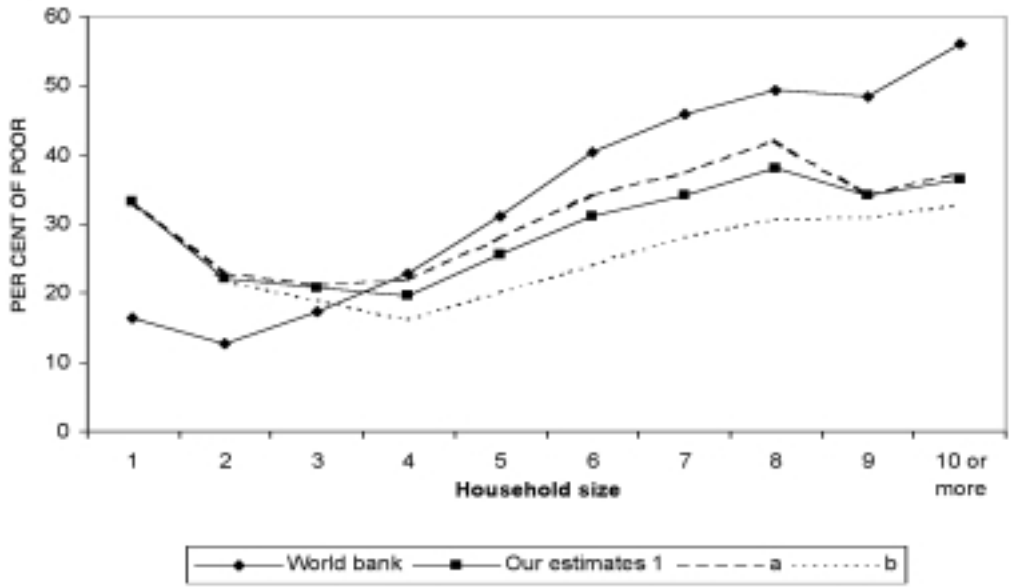


We can judge the robustness of this result by modifying the coefficients (β s) used in the calculation of adult equivalents (AE). The adoption of a coefficient 0.65 of adult expenditure for children implicitly assumes that all household members consume different goods (for example food and non-food goods) in the same proportions. However, some goods (other than food) may be allocated on a per capita basis inside the household, or children's consumption is disproportionately directed to food. Imagine two extreme cases. In the first case, children consume 65 per cent of adult food expenditure as predicted by WHO calorific scales, but non-food goods are equally distributed between family members. In the second case children consume only food, and non-food goods are exclusively consumed by adults. Given an average food share in total household expenditure of 72 per cent, these cases lead to child expenditures of 75 per cent and 47 per cent of an adult respectively[29].

28 Note that in 1997–98 only a small percentage of households (6 per cent) had more than eight members.

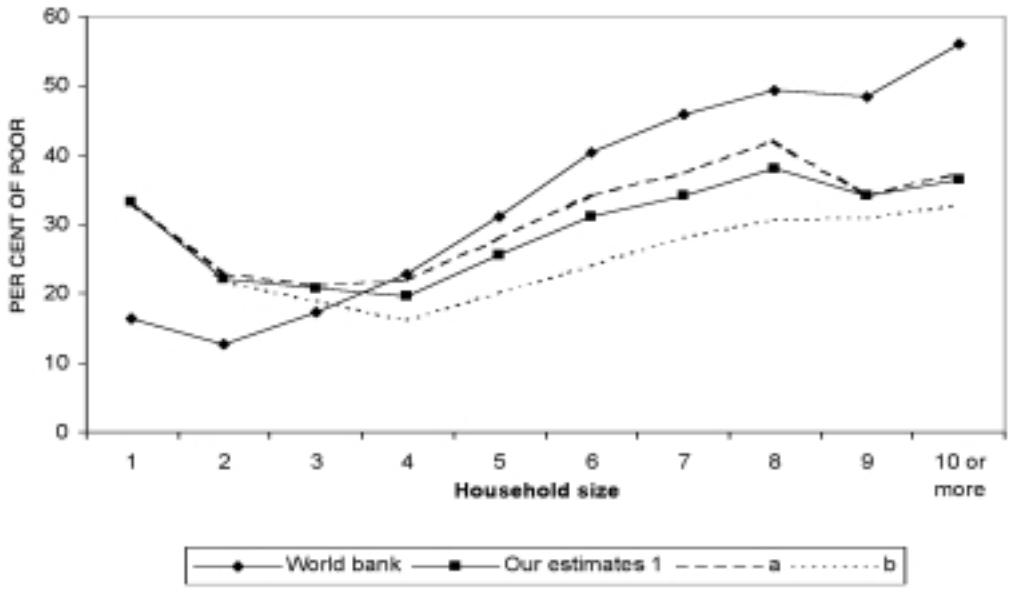
29 The food share was obtained as the ratio between the food poverty line and the general poverty line estimated by the World Bank, which in turn were obtained by looking at the average consumption of the third Vietnamese expenditure quintile in 1993.

FIGURE 3.3 HEADCOUNT BY HOUSEHOLD SIZE WITH UPPER AND LOWER BOUNDS (α = 0.15)



The correction for these coefficients produced an upper and a lower bound for the plot of the poor headcount index against household size. The results are presented in Figures 3.3 and 3.4. The first case, with an AE of 0.75, is represented by the dotted line a. The number of poor households increases (compared to the 'base case' of AE = 0.65) if children consume the same amount of non-food goods as adults do. The number of poor households decreases, as depicted by line b (AE = 0.47), if children's consumption is limited to food. However, the changes are small relative to those using the 'base assumption' compared to the discrepancy between our estimates and those obtained using the World Bank methodology, especially when the higher economies of scale coefficient is used.

FIGURE 3.4 HEADCOUNT BY HOUSEHOLD SIZE WITH UPPER AND LOWER BOUNDS (α = 0.30)



The distance between the lower and upper bound of the headcount index is inversely correlated to the share of food expenditure in total household expenditure. This distance decreases as the food share gets larger, thus rendering estimates more consistent in countries where average food share is large. The position of the headcount index between the two bounds depends on the assumption made with respect to child consumption. While some would argue that in developing countries the share of expenditure that children devote to food is larger than adults', others might maintain that children expenditures in health and education can be very large.

Given the absence of a clear relationship between poverty and the number of family members, we expect differences in the poverty profile to emerge with respect to variables correlated with household size. Tables 3.3 and 3.4 present these results. Table 3.3 shows the headcount for the

various population groups under the three sets of assumptions and Table 3.4 the contribution to poverty of each group (i.e. the share of the poor with that characteristic).

TABLE 3.3 POVERTY HEADCOUNT (FOOD POVERTY LINE) WITH DIFFERENT ASSUMPTIONS

	World Bank No AE and $\alpha = 0$	Our estimates (1) $\alpha = 0.15$	Our estimates (2) $\alpha = 0.3$
Area of residence			
Rural	18.5	12.9	4.9
Urban	2.5	1.6	0.2
Sex of household head			
Male	16.2	10.7	3.8
Female	10.6	9.1	3.8
Ethnic group			
Kinh, Tay, Thai, Muong, Hmong	12.6	8.2	2.7
Chinese, Khmer and Nung	16.7	12.9	3.5
Other groups (including Dao)	63.8	53.4	29.2
Region			
Red River Delta	7.4	5.5	2.3
Northern Uplands	29.1	21.0	6.8
Mekong Delta, South-East and Central Highlands	10.0	6.3	2.5
Southern and Northern Central Coastlands	18.3	12.6	5.0
Education			
Less than five years	20.1	14.7	6.8
From five to ten years	12.6	8.9	2.3
More than ten years	9.6	5.1	1.0
Children			
None	4.0	6.9	3.0
Up to one-quarter of household	8.1	6.9	2.5
One-quarter to one-half	16.5	10.6	3.6
More than one-half	33.5	18.3	7.1

Source: calculated from VLSS (1998)

Some important changes emerge in the poverty profile. Poverty is an even more overwhelmingly rural phenomenon than the unadjusted data suggest. Whereas the unadjusted data suggest that male-headed households are disproportionately poor (so female-headed households are less likely to be poor than average), this finding disappears in our second set of estimates. The most dramatic shifts in the poverty profile occur with respect to education level and ethnic group. The least educated account for nearly three-quarters of the poor rather than just over half. In addition, other ethnic groups have a much higher relative poverty headcount in the adjusted data than the unadjusted ones.

TABLE 3.4 CONTRIBUTION TO POVERTY (FOOD POVERTY LINE) WITH DIFFERENT ASSUMPTIONS

	World Bank No AE and $\alpha = 0$	Our estimates (1) $\alpha = 0.15$	Our estimates (2) $\alpha = 0.3$
Area of residence			
Rural	96.3	96.6	98.8
Urban	3.7	3.4	1.2
Sex of household head			
Male	84.7	81.0	78.6
Female	15.3	19.0	21.4
Ethnic group			
Kinh, Tay, Thai, Muong, Hmong	76.0	71.5	63.3
Chinese, Khmer and Nung	6.6	7.4	5.4
Other groups (including Dao)	17.4	21.2	31.2
Region			
Red River Delta	9.8	10.4	12.0
Northern Uplands	34.8	36.5	31.7
Mekong Delta, South-East and Central Highlands	25.4	23.1	24.4
Southern and Northern Central Coastlands	30.0	30.0	32.0
Education			
Less than five years	56.2	59.4	73.8
From five to ten years	27.1	27.6	19.6
More than ten years	16.7	13.0	6.6
Children			
None	5.4	13.3	15.4
Up to one-quarter of household	11.6	14.3	14.1
One-quarter to one-half	47.1	43.9	40.7
More than one-half	36.0	28.5	29.8

Source: calculated from VLSS (1998).

A final area of interest is to look at poverty amongst different age groups. Since the data are collected at household level the usual way of presenting income poverty is as the percentage of people in an age group (e.g. children) living in poor households. Table 3.5 shows these figures for three age bands under the different assumptions. As shown in the bottom part of the table, children are disproportionately poor (i.e. have a higher headcount than adults), but that this disproportionately is rather less in the adjusted data – being only 1.5 times as likely to be poor as adults rather than 1.75. Childless households triple their contribution to poverty in the adjusted data (Table 3.4). The adjustment also increases the relative degree of poverty amongst the elderly. The headcount for the elderly is about the same as that for adults in the unadjusted data, but is from 5 per cent to 15 per cent in the adjusted figures.

TABLE 3.5 PERCENTAGE OF DIFFERENT AGE GROUPS LIVING IN POOR HOUSEHOLDS

	World Bank No AE and $\alpha = 0$	Our estimates (1) $\alpha = 0.15$	Our estimates (2) $\alpha = 0.3$
Headcount			
Food poverty line			
Children (0–14)	21.0	12.7	4.6
Adults (15–54)	12.2	9.0	3.4
Elderly (>54)	11.5	10.8	3.8
General poverty line			
Children (0–14)	47.3	35.6	18.0
Adults (15–54)	32.7	28.0	13.7
Elderly (>54)	32.1	29.5	15.9
Number of people (millions)			
Food poverty line			
Children (0–14)	5.1	3.1	1.1
Adults (15–54)	5.7	4.2	1.6
Elderly (>54)	0.6	0.5	0.2
General poverty line			
Children (0–14)	11.6	8.7	4.4
Adults (15–54)	15.2	13.0	6.4
Elderly (>54)	1.6	1.5	0.8
Proportionality (headcount relative to that for adults)			
Food poverty line			
Children (0–14)	1.73	1.4	1.34
Adults (15–54)	1.00	1.00	1.00
Elderly (>54)	0.95	1.19	1.11
General poverty line			
Children (0–14)	1.44	1.27	1.31
Adults (15–54)	1.00	1.00	1.00
Elderly (>54)	0.98	1.06	1.16

Source: calculated from VLSS (1998).

4. Conclusions

Empirical studies based on household surveys in developing countries have virtually always found a strong negative correlation between family size and per capita expenditure. As a consequence, according to these studies, poverty tends to increase with household size. But the finding that large households are poorer is in fact implicit in the methodology used to assess poverty. It is based on the rather implausible assumptions that all individuals consume the same amount of goods and that two or more persons living together consume the same as if they were living separately.

In this study we adjust the expenditure data of the Vietnamese living standard survey of 1997–8 in order to take into account different consumption needs of individuals of different sex and age, and the existence of economies of scale in consumption. The adjustments made are somewhat arbitrary but plausible. After these corrections, the absolute number of Vietnamese poor, and of poor children in particular, decreases substantially. More importantly, the positive correlation between poverty and household size becomes much weaker. Large families are not necessarily poorer, and a larger number of poor are found among single-person households.

Moreover, given the positive correlation existing in Vietnam between household size and important categorical variables (like gender, education, geographic location, etc.), the use of equivalence scales and the adjustment for economies of scales alter the whole poverty profile of the country. In particular, a larger proportion of rural, less educated and female-headed households is found to be poor. Also, the incidence of poverty in ethnic groups other than the dominant Khin majority appears to be larger than is estimated by the unadjusted data.

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