Pergamon

World Development Vol. 31, No. 3, pp. 441–453, 2003

Printed in Great Britain
www.elsevier.com/locate/worlddev
0305-750X/03/$ - see front matter
doi:10.1016/S0305-750X(02)00215-2

Do Monetary and Nonmonetary Indicators Tell the Same Story About Chronic Poverty? A Study of Vietnam in the 1990s

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Summary. — This paper investigates whether monetary and nonmonetary indicators tell the same story about chronic poverty using a unique panel data from Vietnam in the 1990s. Defining chronic poverty as occurring when an individual is monetarily poor, stunted, malnourished or out of school in both waves of the panel, the overlap and correlation between subgroups of the chronically poor are shown to be modest. Some, but not all, nonmonetary indicators are more persistent and complement monetary indicators of chronic poverty. Taking account of the multiple dimensions of chronic poverty cannot be a simple additive exercise.

Key words — Asia, Vietnam, monetary poverty, malnutrition, school enrollments

1. INTRODUCTION

Most quantitative studies of chronic poverty have focused on tracking monetary indicators of poverty, such as whether income or expenditure is below a predetermined poverty line. [1] Yet it is now commonly accepted that poverty is multidimensional, and that the conventional poverty-lines approach misses many of the wider aspects of poverty and ill-being. In the case of chronic poverty, whose defining feature is its long duration, the multidimensionality and severity of poverty are likely to reinforce one another (Hulme, Moore, & Shepherd, 2001). While it is not possible to capture all of the different dimensions of poverty in conventional household surveys, information on some of the key nonmonetary indicators of poverty (such as education, anthropometric status, morbidity and mortality) are often collected. Previous studies have shown, in a static context, that monetary and nonmonetary indicators of poverty are poorly correlated in many developing countries (Sahn & Stiffel, 2000; UNDP, 2001). It is not known however, whether this is because static monetary poverty is a poor indicator of long-term poverty or because of divergences (possibly dynamic) between monetary and nonmonetary indicators of chronic poverty. This paper investigates the issue using household survey panel data from Vietnam in the 1990s.

2. METHODS

When analyzing poverty in a multidimensional context, it is important to decide whether to model poverty itself or the underlying welfare measure. In the static (cross-sectional) context, analyzing poverty itself usually corresponds to comparing a continuous welfare (such as income or height for age) to some predetermined minimum cut-off (such as the poverty line or the z-score in the reference population), constructing a dichotomous indicator (of monetary poverty or malnutrition) based on this, and then aggregating over all individuals in the population. Following Lipton (1983), moderate and extreme poverty or mild, moderate and severe malnutrition might also be distinguished. But, this direct approach effectively censors (or throws away) most information on the level of welfare measure, and is roundly criticized by some poverty analysts

* The authors thank (without implicating!) David Hulme, Andy McKay, and two anonymous referees for helpful comments on an earlier version of this paper.

(e.g., Ravallion, 1995). It is also likely that measurement error in the welfare measure may create misclassifications and "false transitions" between discrete poverty states in a panel data context (Deaton, 1997). At the same time, modeling a continuous welfare measure itself may be criticized for not paying explicit attention to those below the "poverty line" of "minimum cut-off," and for giving excessive weight to outliers. [2]

In this paper, which is primarily descriptive, we adopt the direct approach to modeling poverty. We construct discrete indicators of monetary and nonmonetary poverty, and examine the persistence of strength of association between these indicators using transition matrices for two different years. The underlying continuous measures are divided into subgroups reflecting the duration and intensity of poverty using absolute cut-offs without explicit consideration of measurement error. For monetary poverty, these cut-offs are the poverty lines needed to obtain 2,100 calories per person per day, with and without a modest allowance for essential nonfood expenditures. For nutritional poverty among children, we use cut-offs based on −2 or −3 standard deviations of the US reference population to determine whether children are moderately or severely stunted. For malnutrition among adults we use the cut-offs for determining mild and moderate chronic energy deficiency using the body mass index (BMI) adopted by the World Health Organization and other international organizations. For school enrollments, which are inherently dichotomous, no explicit cut-offs are required and we simply classify primary and lower secondary school age children by whether they have been attending the appropriate level of school.

We examine the extent to which monetary and nonmonetary measures of poverty tell the same story in several ways. First, we calculate a chi-squared test for the independence of two categorical distributions, using the observed frequencies of monetary poverty as the expected frequencies against which to compare the frequencies of nonmonetary poverty. This requires that the samples for which the frequencies of monetary and nonmonetary poverty are calculated be identical, which usually requires some restriction of the panel. For example, when we compare monetary poverty and educational enrollments, we restrict the sample to those children in the panel of primary or lower secondary school age. Second, to compare the persistence of the different dimensions of poverty, we adapt the immobility measure suggested by Scott and Litchfield (1994):

$$I = \frac{\mathrm{trace}(M)}{N}$$

where M refers to the square transition matrix, $\mathrm{trace}(M)$ is the sum of the cell frequencies along the leading diagonal, and N is the number of individuals in the panel. The immobility measure varies between zero when there is complete mobility and one when there is complete immobility. [3] Third, we examine whether the various subgroups of the chronically poor overlap. To what extent, for example, are those adults who are malnourished in the two waves of our panel also living in monetary poverty in both of these years? To do this we calculate indices of the different dimensions of chronic poverty, and assess their correlation using Spearman rank correlation coefficients.

Finally, recognizing the problems introduced by censoring continuous welfare measures, we also examine the correlation of the underlying continuous welfare measures (real per capita expenditures, children's height for age z-scores, and the BMI among adults).

3. DATA

The data used in this paper are taken from the two waves of the Vietnam Living Standards Surveys (VLSS), a conventional household survey patterned after the World Bank's Living Standard Measurement Surveys. The first VLSS was undertaken between October 1992 and October 1993 with a sample of 4,800 households drawn from a self-weighting sample stratified according to rural-urban location located in 150 communes. The second VLSS was undertaken between December 1997 and December 1998 from a sample of 5,999 households drawn from 10 sampling strata and 194 communes. Two principles underlay the sampling for the second VLSS (hereafter VLSS98). First, as many of the households that were sampled in the first VLSS were reinterviewed as possible. When households moved within the commune they were followed, but if they moved outside the commune they were replaced by other households from that commune. Second, the number of households in each of 10 sampling strata were "topped-up" to ensure that their sample size was large enough for analysis to be conducted at the strata level. This required oversampling in thinly populated strata such as the Central Highlands, and undersampling in densely populated strata such as Hanoi and Ho Chi Minh City and the rural Red River Delta.

Three questionnaires (covering household, community/commune and market prices) were administered in the two rounds of the VLSS. Although there are some differences in the questionnaires (for example, the questions on patterns of illness and expenditure on tobacco products), the information from the two surveys are usually comparable. Special attention was paid to constructing household expenditure aggregates that were comparable across surveys, which is vital in analyzing changes in monetary poverty. Comprehensive and comparable information was also collected for all individuals within the household on topics such as education and nutrition. [4] Unusually, anthropometric information was collected from all household members (with the exception of individuals who were too unwell to be measured) in both surveys.

The panel component to the VLSS allows 4,272 of the 4,799 households interviewed in 1992–93 to be tracked to 1997–98. [5] At the individual level, 17,322 of the 24,067 individuals contained in these households are present in both surveys. The higher attrition rate for the individual versus the household panel (28% versus 11%) is because many individuals died, migrated, or split-off from their original households (usually because of marriage or its dissolution) in the five years between the two surveys. Since the panel component is central to the analysis conducted in this paper it is important to recognize that the panel design of the study comes with some drawbacks. First, newly formed households are underrepresented, as it was households rather than individuals (as in panel surveys in some industrialized countries) that were followed in the VLSS. If newly formed households are more likely to have young children and be poorer than others, this will reduce the extent of reported poverty in general and among children. Second, there are higher levels of attrition in the urban than the rural strata (35% compared to 26% at the individual level). As a consequence, monetary poverty is lower and expenditure levels are higher among individuals that drop out of the panel. When combined with the fact that the sampling frame for both surveys came from the 1989 Census, when Vietnam's urban population was around 20% (compared to 25% in the 1999 Census) and the exclusion of migrants without registration certificates from the surveys, this means that urban areas are significantly underrepresented in VLSS98 and the panel. Finally, because of attrition, we do not use sampling weights for analysis of the 1997–98 data. This is consistent with the self-weighting nature of VLSS93, but means that it is not possible to draw inferences from our analysis of monetary and nonmonetary poverty at the national level in 1997–88 (as the second VLSS requires weighting to be considered nationally representative).

4. MONETARY POVERTY

Poverty in Vietnam is customarily assessed using per capita expenditure as the welfare measure (General Statistical Office (GSO), 2000; Poverty Working Group, 1999). We begin by following this practice and calculating the percentage of panel individuals whose per capita expenditures are lower than one of the two poverty lines established by the GSO and World Bank. The first of these poverty lines, the food poverty line, shows the expenditure necessary for a person with normal dietary patterns to obtain 2,100 kcals per day. We shall refer to those with per capita expenditures below the food poverty line as the "food poor." The second poverty line, the "overall" poverty line also includes a modest allowance for essential nonfood expenditures such as fuel and housing. We refer to those people with per capita expenditures between the food line and the "overall" poverty line, as moderately poor. The use of such a dual poverty line to distinguish between poverty and extreme poverty dates back to Lipton (1983) and World Bank (1984).

Table 1 presents a transition matrix showing these three categories of monetary poverty for all 17,322 individuals in the VLSS panel. Just over one-third (35%) of individuals were nonpoor (in monetary terms) in both waves of the survey, while approximately 10% were either moderately poor or food poor in both years. Just over one-fifth of individuals moved out of moderate poverty between 1992–93 and 1997–98, while another 7% escaped from food poverty. In contrast, just over 4% ($3.54 + 0.68$) of individuals fell into either moderate or food poverty over this five-year period. Finally, just over 8% of food poor individuals in 1992–93 had improved their status to moderately poor

Table 1. *Monetary poverty among all individuals in the VLSS panel (per capita expenditures)*

		1997–98		
		Nonpoor	Moderately poor	Food poor
1992–93	Nonpoor	35.73	3.54	0.68
	Moderately poor	20.14	10.63	3.86
	Food poor	7.10	8.55	9.77
		$N = 17.322$	$\chi^2 = 5237.65$	$I = 0.561$

by 1997–98, while less than 4% of individuals moved in the opposite direction. Substantial movements in and out of monetary poverty over time have been documented by household panel studies in a number of other developing countries (Baulch & Hoddinott, 2000).

The chi-squared statistic reported firmly rejects the hypothesis that monetary poverty in 1997–98 is independent of monetary poverty in 1992–93 (and vice-versa). Nevertheless more than half of panel individuals did not change their monetary poverty status between 1992–93 and 1997–98, as indicated by sum of the cells on the leading diagonal of the transition matrix. This is reflected in the 0.561 value of the immobility index. Note, however, that the number of individuals below the leading diagonal of the transition matrix (36%) is much higher than those above the diagonal (8%). This is consistent with the large reduction in poverty that occurred in Vietnam during the 1990s (Haughton, Haughton, & Nguyen, 2001; Poverty Working Group, 1999).

In order to discover who are the chronically poor, it is useful to construct a poverty profile from the bottom right-hand cell of this transition matrix (column 3 of Appendix A). Of the 1,692 individuals who were food poor in both years of the panel, 98% live in rural areas. Those living in the Northern Uplands and Central Highlands are more likely to be chronically food poor, while those living in the Red River Delta, Mekong Delta or the Southeast are less likely to be so. The geographic distribution of chronic food poverty reflects both well-known disparities in living standards between mountainous and lowland areas in Vietnam (Poverty Working Group, 1999) and the influence of remoteness and ethnicity. Those living in communes without an all weather road or waterway are twice as likely to be in chronic food poverty as the general population. This is consistent with the positive relationship that has been posited between chronic poverty and living in a remote rural areas (Bird, Hulme, Moore, & Shepherd, 2002). Some 43% of the chronically food poor come from ethnic minority groups (who live predominantly in mountainous areas) compared to 14% of the general population. [6] Living in a household with an illiterate head or with seven or more members (in 1992–93) almost doubles an individual's chances of living in chronic food poverty, while having no irrigated land is also important. Females are, however, no more likely to be chronically food poor than males.

The use of per capita expenditures to measure monetary poverty is, of course, problematic (Deaton, 1997). Welfare measurements based on per-capita expenditure assume that household resources are equally distributed between household members, independently of the age and gender of individuals. But, individuals of different age have different consumption needs and, in general, children are likely to consume less than adults. Even assuming that needs are similar or known for each household member, there is no compelling reason to assume that expenditure will be equally distributed between household members or according to their specific needs. On the contrary, there is evidence that in some areas of the world (South Asia in particular) the intrahousehold resource allocation tends to favor men against women and boys against girls (Das Gupta, 1987; Harriss, 1995). In these circumstances, per-capita measurements are not fully reliable as indicators of welfare of individuals.

Although household surveys might be improved in order to measure directly individual consumption, there are methodological problems that would make this difficult. In particular, households consume some goods jointly or communally (e.g., preparation of meals, listening to the radio), making it impossible to define the share consumed by each individual. One possible way to overcome this problem is to use Rothbarth's method to identify the intrahousehold allocation between adults and children (and between children of different gender). Rothbarth's method focuses on adult goods (goods that are exclusively consumed by adults, like tobacco, for example) and estimates the "cost of a child" (possibly disaggregated by age and sex) as the increase in household resources necessary to restore the level of consumption of adult goods existing before the child was born. [7]

Accordingly White and Masset (2002) jointly estimated child costs (effectively a truncated equivalence scale) and household economies of scale for Vietnam using the Rothbarth method and the two VLSS. The most plausible of their various estimates show the cost of an average child under 14 (β) as 0.43 of an adult with household economies of scale (α) at 0.5. [8] They also find statistical differences in consumption expenditures between male and female children are usually statistically insignificant. Using White & Masset's estimates to compute adult equivalent expenditures, and scaling the above poverty lines appropriately, gives the following transition matrix of equivalized monetary poverty.

This transition matrix reveals a somewhat different picture of movements in and out of monetary poverty than that based on crude per capita expenditures. Again the null hypothesis that monetary poverty in 1992–93 and 1997–98 are independent of one another is firmly rejected by a chi-squared test. Poverty among children is, however, lower when equivalized rather than per capita expenditures being used to categorize monetary poverty. Poverty among large households (who according to White & Masset's estimates benefit from significant economies of scale in household consumption) is considerably lower. As a consequence, the percentage of individuals who are nonpoor in both surveys rises from 35.7% to 75.3%. Despite the corresponding reduction in the percentage of the individuals who are moderately or food poor in both years the immobility index (the sum of cells on the leading diagonal) rises to 0.791. Note, however, that the percentage of individuals who are food poor in both years, falls from 9.8% in Table 1 to just 1.1% in Table 2.

As Deaton (1997) points out, however, the theoretical foundation of the Rothbarth method are problematic when it comes to estimating household economies of scale. The procedure used to jointly estimate child costs and household economies of scale by White & Masset is also still new and untested. Their (0.5) estimate of the economies of scale coefficient (α) seems exceptionally high for a population in which average household size is under five members. [9] It is also important to note that gender differentials are much less marked in Vietnam than in many other Asian countries (UNDP, 2001; World Bank, 2001). In the remainder of this paper, we will therefore focus on monetary poverty estimated using per capita expenditures as the standard against which to compare our estimates of nonmonetary poverty.

5. MALNUTRITION

Most LSMS-type surveys collect anthropometric information on children under five years old but it is rare to collect such data on older children in large household surveys. Furthermore, the VLSS are almost unique in having collected anthropometric information from not only older children but also all adult members who were available to be measured and weighed (Alderman, 2000). The extensive nature of the anthropometric data collected, combined with the panel component of the VLSS, allows a number of interesting questions concerning stunting among children and energy deficiency among adults to be investigated, along with their relationship to monetary poverty.

For children, we take the cohort of 1,660 children in the panel aged between one and five years old in 1992–93, calculate their height for age z-scores, and then assess whether they are stunted by comparison with the US National Child Health Survey reference population. A child is categorized as moderately (severely)

Table 2. *Monetary poverty among all individuals in the VLSS panel (equivalized expenditures)*

		1997–98		
		Nonpoor	Moderately poor	Food poor
1992–93	Nonpoor	75.33	1.55	0.21
	Moderately poor	14.22	2.70	0.57
	Food poor	2.61	1.71	1.10
		$N = 17.322$	$\chi^2(4) = 4031.5$	$I = 0.791$

stunted if his or her height for age z-score is less than two (three) standard deviations below the reference population. For adults, we take the cohort of 8,089 adults aged 20 years or more in 1992–93 and then resurveyed in 1997–98. We calculate the BMI for each of these adults and, in accordance with standard practice, classify the mildly malnourished as those with BMIs of less than 18.5, the moderately malnourished as those with BMIs less than 17, and the severely malnourished as those with BMIs less than 16 (James, Ferro-Luizzi, & Waterlow, 1988). [10]

Table 3 compares stunting and monetary poverty in the cohort of children aged one to five years of age in 1992–93. Children under one year old (who are conventionally included in child anthropometrics) are excluded for two reasons. First, cultural factors discourage parents from allowing infants to be measured (indeed, in some rural areas in Vietnam, children are not given proper names until they have lived to be one year of age). Second, unlike older children and adults, infants cannot be measured standing-up making accurate recording of their heights more difficult.

Of the 1,660 children aged one to five in 1992–93, just over 35% had normal height for age z-scores in both 1992–93 and 1997–78. But, 14% and 7% of children in the cohort were moderately and severely stunted in both years. About one-eighth of children who were of normal height for age in 1992 had become moderately or severely stunted by 1998. More than one-half of the children who were moderately stunted in 1993 had regained normal height by 1998, while one-fifth had recovered from severe stunting to normal height. The upward mobility in this matrix, which is similar to the findings of Koch and Nguyen (2001), may surprise some analysts, who have been trained to expect that stunting in early childhood is irreversible. Recent clinical studies indicate however that stunted children who survive into childhood "normally have some degree of spontaneous catch-up" and that almost complete reversal of stunting is possible when diet and environmental factors improve over a sufficient period of time (Golden, 1994).

Paired t-tests show that stunting among boys and girls was not significantly different in 1992–93 but that by 1997–98 a small gap had emerged with a higher proportion of boys being severely stunted than girls ($t = 5.745$). Stunting is more common in rural than urban areas (in 1997–98, 10.7% of children were severely stunted in rural communes compared to 1.8% in urban wards). Chronic stunting (i.e., a child being severely stunted in both years of the panel) is an overwhelmingly rural phenomenon and disproportionally affects younger children from remote communes and ethnic minorities (Appendix A, column 4). Like chronic food poverty, chronic stunting is more common in the Northern Uplands and Central Highlands than the deltas or Southeast. Female children are about three times less likely to be chronically stunted than male children. Literacy of the household head and ownership of irrigated land does not appreciably influence the crude probabilities of chronic stunting.

Table 3 also shows the percentages of cohort children who lived in monetary poverty (along with the rest of their families) when per capita expenditures are used as the welfare measure.

Table 3. *Stunting and monetary poverty among young children in the VLSS panel*[a]

		1997–98		
		Normal Nonpoor	Moderate Moderately poor	Severe Food poor
1992–93	Normal	35.30	4.88	0.36
	Nonpoor	23.31	4.16	0.72
	Moderate	17.95	14.10	2.11
	Moderately poor	19.22	14.04	5.78
	Severe	5.60	12.41	7.29
	Food poor	7.59	11.93	13.25
		$N = 1660$	$\chi^2(1) = 201.7$	$I = 0.567$ $I = 0.506$

[a] The top number in each cell of this matrix refers to the percentage of children who were normal height, moderately or severely stunted in 1992–93 and 1997–98. The lower number in each cell refers to their monetary poverty status in these years.

Inspection of the table reveals that six of the nine cell percentages are within two percentage points of one another. But a much higher percentage of children have normal height for age z-scores in both years than are continuously nonpoor. As a consequence, the immobility measure (0.567) for the stunting matrix is higher than that for monetary poverty (0.506). Note, however, that a lower percentage of children have low z-scores in both years of the panel than live in chronic monetary poverty. A more formal chi-squared test of the null hypothesis that the entire distributions of monetary poverty and stunting for the cohort are equal is firmly rejected ($\chi^2[4] = 201.1$). This test is also strongly rejected when equivalized expenditures are used to assess monetary poverty ($\chi^2[4] = 644.6$).

Although the cohorts used to classify stunting and monetary poverty in Table 3 are identical, there is no reason why their cell frequencies need overlap. Indeed, in the admittedly unlikely scenario that monetary poverty and child stunting were equally but oppositely distributed, one would expect the overlap between children would be minimal. To investigate the extent to which chronic monetary poverty and chronic malnutrition are correlated, we constructed an index of chronic stunting. This index takes the value one when a child has normal height for age in at least one period, the value two when a child is mildly stunted in at least one period, and three when the child is moderately or severely stunted in both periods. Similarly, an index of chronic monetary poverty was calculated taking the value one, when per capita expenditures are above the poverty line in at least one year, two when expenditures fall below the poverty line in at least one year, and three when expenditures are below the food poverty line in both years. The Spearman rank correlation coefficient between the two indices is 0.170 indicating a modest (although statistically significant) level of correlation between chronic monetary poverty and chronic stunting. Focusing on the bottom right-hand corner of Table 3, less than 14% of chronically food poor children are also chronically stunted.

Why is the correlation/overlap between chronic monetary poverty and chronic stunting so low? Three explanations might be advanced. First, monetary poverty in 1992–93 might be poorly correlated with monetary poverty in 1997–98 while stunting in 1992–93 might be poorly correlated with stunting in 1997–98. This is not, however, the case: the Spearman rank correlation coefficient between monetary poverty in the two years is 0.491 while that for stunting is 0.548. Second, the cut-offs used to distinguish between normal, moderate and severe stunting and between nonpoor, poverty and food poverty might be inappropriate and reduce the correlation between the underlying continuous welfare measures. There is some evidence of this, as the Pearson correlation coefficients for the 1,660 children's height for age scores in 1992–93 and 1997–98 is 0.647 while that for their per capita expenditures is 0.727. Third, correlation between stunting and monetary poverty in 1992–93 and between stunting and monetary poverty in 1997–98 might be modest. This turns out to be the case. The rank correlation coefficient between monetary poverty and stunting is 0.161 in 1992–93 and 0.180 in 1997–98. [11] We therefore conclude that it is the lack of association between stunting and monetary poverty in any one year that is at the root of the modest correlation between chronic poverty and chronic stunting.

It is important to point out that attrition is relatively high (30%) from the subsample of children aged one to five in 1992–93. The null hypothesis of different food poverty levels for attritors and panel children cannot however be rejected at the 5% level ($t = 1.07$). Indeed, like the full individual panel, overall poverty is higher among panel children than attritors.

Turning to adult malnutrition, we computed the BMI for all adults 20 years of age and above in the panel. An individual is classified as mildly malnourished if his /her BMI is less than 18.5, moderately malnourished if his/her BMI is less than 17, and severely malnourished if his/her BMI is less than 16 (James *et al.*, 1988). To avoid low cell frequencies and make the number of malnutrition categories the same as those for monetary poverty, we combined the moderate and severe categories of chronic energy deficiency (Table 4).

Casual inspection of the cell frequencies indicates that the processes determining adult malnutrition and monetary poverty at a point in time are different. This is confirmed by the chi-squared test of the equality of their distributions, which can be rejected at the highest level ($\chi^2[4] = 1950.7$). [12] The immobility measure for adult malnutrition in this subsample is 0.753 with nearly 11% of individuals being moderately or severely malnourished in both years. By contrast, the immobility index for

Table 4. *Malnutrition and monetary poverty among adults in the VLSS panel*[a]

		1997–98		
		Normal Nonpoor	Mild Moderately poor	Moderate-severe Food poor
1992–93	Normal	58.56	5.92	1.68
	Nonpoor	40.94	3.98	0.74
	Mild	7.64	6.05	3.62
	Moderately poor	19.89	9.73	3.50
	Moderate-severe	2.74	3.13	10.66
	Food poor	6.43	7.08	7.70
		$N = 8089$	$\chi^2(1) = 1950.7$	$I = 0.753$
				$I = 0.584$

[a] The top number in each cell refers to the percentage of adults who were normal, mildly malnourished, or moderately-severely malnourished in 1992–93 and 1997–98. The lower number in each cell refers to their monetary poverty status in these years.

Table 5. *Primary school enrollments and monetary poverty in the VLSS panel*

		1997–98	
		In school Nonpoor	Not in school Poor
1992–93	In school	86.80[a]	4.95
	Nonpoor	31.34	3.06
	Not in school	5.15	3.1
	Poor	30.40	35.20
	$N = 2.546$	$\chi^2(1) = 3807.1$	$I = 0.899$
			$I = 0.665$

[a] Includes repeaters and primary school "graduates."

monetary poverty using per capita expenditures is 0.584, with 7.7% remaining in (chronic) food poverty in both years. As with child stunting, a higher proportion of adults have normal nutritional status in both years of the panel than remain out of monetary poverty. The relative masses in the bottom left hand corner and top right hand corner of the transition matrix suggest that Vietnam is reducing adult malnutrition less rapidly than it is growing out of poverty.

Like child stunting, it is interesting to disaggregate the bottom right-hand cell of the transition matrix for adult malnutrition (Appendix A, column 5). When we do this (results not shown) we find malnutrition is significantly higher ($\chi^2(1) = 21.68$) among women than men in rural areas but similar in urban areas. More than a quarter of chronically malnourished adults live in the Red River Delta, with another 30% living in the Mekong Delta and the Southeast. Adults from small households and those with illiterate heads are more likely to be chronic malnourished, while ownership of irrigated land again has a negligible impact.

Next we investigated the extent to which chronic malnutrition and chronic poverty overlap by calculating two three-category indices in a similar way to that for child stunting. The Spearman rank correlation coefficient between the indices of chronic malnutrition and chronic monetary poverty is also low at 0.056. This low correlation appears to stem primarily from the low static rank correlations between adult malnutrition and monetary poverty, which are 0.047 in 1992–93 and 0.086 in 1997–98. In contrast, the rank correlations between malnutrition in the two surveys is 0.65 while that for monetary poverty in 1992–93 compared to 1997–98 is 0.51. [13]

6. EDUCATION

A second dimension of nonmonetary poverty that can be examined using the VLSS is educational enrollments and achievements. It is customarily believed that children living in poor households are less likely to be enrolled in school, are more likely to drop-out and/or repeat individual school years, and are less likely to "graduate" from school. Using the cohort of 2,546 children of primary age in VLSS92, we track primary school enrollments and "graduations" in Table 5 below:

Unlike the previous transition matrices, this transition matrix requires some additional explanation. If a child does not drop-out or need to repeat any grades, primary schooling in Vietnam lasts for five years from the ages of six to 10 years old. Since there is an average of five years three months between the two VLSS surveys, 13.5% of the 2210 children described as "in school" in both years have actually just graduated from primary school. The remainder are either children currently enrolled in grade 5 (65.5%) or repeaters (22.0%). The 5.15% of children in the bottom left-hand corner of the matrix are children who were late-entrants to primary school (a particularly common phenomenon among children from ethnic minorities groups), while the 4.95% children in the top right hand corner of the matrix are children who have dropped out of primary school (98% of whom live in rural areas). Finally, the 3.1% in the bottom right-hand corner of the transition matrix are the percentage of primary school age children who have never attended primary school. Note, however, that this figure is almost certainly an underestimate of the nonenrollments, as street children and the children of urban migrants without registration papers are excluded from the sampling frame of the VLSS.

Some 86.8% of children in the cohort are either in primary school or have recently graduated from it. This figure is consistent with the extremely high net primary school enrollment rates usually reported for Vietnam (according to the 1999 Population Census, the primary net enrollment rate was 91.4%). It also accords with the high priority given by both parents and the state to schooling in Vietnam. Primary school enrollments are nearly five percentage points higher in urban than rural areas, but even in the most disadvantaged geographical areas net enrollment rates are close to 90%. Almost 70% of children who have never attended primary school come from the Mekong Delta or Northern Uplands, while almost two-thirds are female (Appendix A, column 6). Not unsurprisingly, children from large households or those with an illiterate or ethnic minority heads are two to three times more likely never to attend primary school.

Comparison of the cell percentages for educational enrollments and monetary poverty in Table 5 show dramatic divergences. Chi-squared tests for the equality of the rank distributions of educational enrollments and monetary poverty (estimated using both per capita and equivalized expenditures) are therefore clearly rejected. A Wilcoxon signed-rank test for matched pairs also rejects the equality of these distributions at the highest level of statistical significance ($P-\text{value}=0.00$). Differences in the distribution of educational enrollments and monetary poverty are also reflected in their immobility indices. The immobility index for the cohort of 2,546 primary school age children is 0.899 while that for monetary poverty of 0.655. The primary school enrollment matrix seems consistent with the commonly held belief that poor families in Vietnam sacrifice a lot to ensure that their children attend primary school. [14]

Given the high level of primary school enrollments, one might expect the overlap between chronic monetary and chronic educational poverty (defined as a primary school age child being out of school in both surveys) to be high. This turns out be the case: 76% of children in chronic education poverty are chronically poor in monetary terms. On the other hand, just 6.7% of primary school age children who are monetarily poor in both years are also out of school in both years. The Phi coefficient, a measure of association for two dichotomous variables similar to the correlation coefficient, between these two chronic poverty indices is just 0.153. [15]

Table 6 repeats this analysis for lower secondary school, which lasts for four years between the ages of 11 and 14 in Vietnam. Lower secondary school enrollment rates are known to be much lower than primary school enrollment rates (Haughton *et al.*, 2001). This is reflected in the top left-hand corner of the matrix, which shows that just 40% of the cohort of children of secondary school age in 1992–93 were still attending or had just graduated from lower secondary school by 1997–98 (8% of this 40% are repeaters). Some 29% of eligible children never attend lower secondary school, while the number of late entrants (18%) to lower secondary school is almost double that of drop-outs (13%).

Table 6. *Lower secondary school enrollments and monetary poverty in the VLSS panel*

		1997–98	
		In school Nonpoor	Not in school Poor
1992–93	In school	40.0[a]	12.72
	Nonpoor	41.25	3.23
	Not in school	18.31	28.97
	Poor	28.90	26.62
	$N = 1.360$	$\chi^2(1) = 434.3$	$I = 0.690$
			$I = 0.679$

[a] Includes lower secondary school "graduates" and repeaters.

The immobility index for secondary school enrollments is 0.690, which is similar to the comparable immobility index for monetary poverty of 0.679. The percentage of secondary school age children living in never poor households (41%) is also close to the percentage of children who are in or have graduated from lower secondary school in both years (40%). The percentage of children dropping out from lower secondary school (13%) is, however, much higher than the percentage of children falling into monetary poverty (3%). As a consequence both the Wilcoxon signed-rank and chi-squared test reject the equality of distributions in the transition matrix. [16] This is again consistent with the priority which most Vietnamese parents give to their children's education.

Lower secondary school enrollments are, unsurprisingly, much higher in urban than rural areas (75.1% compared to 54.7% net enrollments in 1997–98). There is evidence of a modest gender gap, as the proportion of girls to boys in lower secondary is relatively high (0.90) and rising. Remote geographical areas such as the high mountains have the lowest level of lower secondary school enrollments, although coastal areas also appear to be disadvantaged.

The overlaps between chronic monetary poverty and chronic education poverty at the lower secondary school level are not substantial. Some 49% of children whose families are monetarily poor in both 1992–93 and 1997–98 never attend lower secondary school. Similarly, 45% of children in the cohort who never attend secondary school are chronically poor in monetary terms. The Phi coefficient between the two dichotomous variables is 0.265.

7. SUMMARY AND CONCLUSIONS

This paper has investigated whether monetary and nonmonetary indicators of poverty tell the same story about chronic poverty using a unique two period household panel from Vietnam in the 1990s. Using simple tabulations and nonparametric statistics, we ask two distinct questions: (a) is the persistence of monetary poverty and nonmonetary poverty similar?; and (b) to what extent do different subgroups of chronic poverty (defined in terms of the intensity and duration of poverty) overlap? Monetary poverty is identified using a three-category scale (nonpoor, poor, and food poor) with per capita expenditures as the underlying welfare variable. Nutritional poverty is identified using stunting among children and chronic energy deficiency among adults. Educational poverty is analyzed using the enrollment status (out of school, in school) of two cohorts of primary and lower secondary school age children.

Using transition matrices we compare the persistence of monetary and nonmonetary poverty. Statistical tests on common samples reveal that the distributions of monetary poverty and child stunting, monetary poverty and adult malnutrition, and monetary poverty and children's school enrollments are all different. By examining cell frequencies and calculating a simple immobility measure, we discover that monetary poverty is less persistent than child stunting and malnutrition among adults. Monetary poverty is also less persistent than primary and lower secondary school enrollments. Such immobility reflects well-known irreversibilities in education and nutrition (though there is also evidence of some "catch-up" among stunted children). [17]

Defining chronic poverty as occurring when an individual is monetarily poor, stunted, malnourished or out of school in both waves of the panel, we examine the overlaps between the different dimensions of chronic poverty. Although the null hypothesis of independence between monetary and nonmonetary poverty indicators can always be rejected, the extent of overlap between the different subcategories of chronic poverty is generally quite modest. This is confirmed by examining poverty profiles and rank correlations between the different dimensions of chronic monetary and chronic nonmonetary poverty. The poverty profiles reveal that many, but not all, of the characteristics associated with chronic food poverty are shared by the chronically stunted and never educated. Children who are chronically stunted and have never attended primary school are, like the chronically food poor, most likely to come from a large, ethnic minority household living in a remote rural commune in the mountainous Northern Uplands or Central Highlands. This is not, however, true of chronically malnourished adults, most of whom live in the Red River and Mekong Deltas plus the Southeast, and come from the *Kinh-Hoa* majority. The indices of chronic monetary and nonmonetary poverty show there is more correlation between the same poverty indicator over time than between the monetary and nonmonetary poverty in the same time period. Hence, the correlation and overlap between any two different indices of chronic poverty is usually quite modest.

What implications do these findings have for policy and future research into chronic poverty? First, despite the greater immobility of nonmonetary poverty indicators, transitions between different categories of nonmonetary poverty are still quite high. Static indicators of nonmonetary poverty are therefore almost as weak proxies for chronic poverty as static monetary indicators. Second, the modest association between monetary and nonmonetary poverty indicators, both in the static and dynamic context, means that expanding the number of dimensions used to define chronic poverty will not always lead to greater clarity about the characteristics of the chronically poor. Some nonmonetary indicators of chronic poverty (e.g., stunting, educational nonenrollments) complement monetary indicators of chronic poverty while others (e.g., energy deficiency among adults) do not. Thus identifying the multiple dimensions of chronic poverty needs to be a nuanced rather than simple additive exercise.

It is, of course, important to note that our results come from a single (and possibly unique) country during a five-year period of exceptional economic growth. Future research should examine whether there is similar lack of association between monetary and nonmonetary poverty indicators of chronic poverty in other countries. Static comparisons from developing countries (Atkinson & Bourguignon, 1982; Sahn & Stiffel, 2000) certainly suggest that lack of overlap is common. It would also be useful to extend our analysis of the Vietnam panel to: (i) examine other dimensions of nonmonetary poverty, such as child mortality and the intergenerational transmission of poverty; and, (ii) conduct multivariate analysis of the determinants of different indicators of chronic poverty.

NOTES

1. See, for example, the household panel studies cited in Baulch and Hoddinott (2000), McKay and Lawson (2002), and Yaqub (2003).

2. Note that for some nonmonetary indicators of poverty (such as school enrollments or child mortality) the issue of censoring does not arise, since the dependent variable is an inherently discrete variable.

3. It should be noted that the values taken by the immobility measure will depend on both the number of rows/columns in the transition matrices and the cut-offs used to distinguish them. We adjust for the former by ensuring the dimensions of the transition matrices compared are identical.

4. For the fertility module, only one woman of childbearing age was interviewed while for agricultural and household enterprises the most knowledgeable available member of the household was interviewed.

5. One household with highly incomplete data is customarily dropped from the 4,800 households interviewed in the first VLSS.

6. In common with most other studies of ethnic minorities in Vietnam, we include those of *Hoa* (Chinese) ethnicity along with the *Kinh* (ethnic Vietnamese) majority. See, for example, Van de Walle and Gunewardena (2001).

7. A detailed description of Rothbath's method can be found in Deaton (1997) and Deaton and Muellbauer (1986). Relying on other more commonly used methods for estimating child costs due to Engel & Barten, is

problematic when the aim is to identify the difference in resource allocation between male and female children (see Bourguignon, 1999).

8. An $\alpha = 0.5$ implies that if we double household size and double household expenditure, per adult equivalent expenditures increase by 50%.

9. Average household size was 4.96 members in 1992–93 and 4.70 in 1997–98. Since the mid-1980s, the Vietnam Government has encouraged parents to have no more than two children with a recommended five-year spacing between their births.

10. The BMI is computed by a person's weight (in kilograms) squared divided by his or her height (in meters) squared. Nutritionists use BMI as a measure of chronic energy deficiency in adults.

11. The Pearson correlation coefficients between children's height for age and (real) per capita expenditure were 0.184 in 1992–93 and 0.281 in 1997–98.

12. This test is again firmly rejected for adult malnutrition and monetary poverty estimated using equivalized expenditures ($\chi^2[4] = 2420.2$).

13. We also examined the extent to which the continuous welfare measures underlying the transition matrices are correlated. The bivariate (Pearson) correlation between the body mass index in 1992–93 and 1997–98 was 0.794 compared to 0.674 for per capita expenditures. Static correlation coefficients between the body mass index and per capita expenditures were somewhat lower (although still statistically different from zero) at 0.169 in 1992–93 and 0.249 in 1997–98.

14. Although, primary schooling is officially free in Vietnam, poverty may deter some children from attending primary school: the cost of books, school uniforms, and various local taxes must be paid by the parents of children attending primary school and these can represent significant expenditures for the poorest families (Poverty Working Group, 1999).

15. The Phi coefficient can vary between 0 and +1.

16. Again these test results hold for monetary poverty assessing using equivalized expenditures.

17. Monetary poverty may also be less immobile because there is more measurement error in the underlying welfare measure (per capita expenditures).

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APPENDIX A. POVERTY PROFILES FOR THE CHRONICALLY POOR (% OF INDIVIDUAL IN RELEVANT SAMPLE BELOW LOWER CUT-OFF IN BOTH YEARS OF THE PANEL)

Variables	All individuals	Chronically food poor individuals	Chronically stunted children	Chronically malnourished adults	Children never in primary school
Sample size (*N*)	17,322	1,692	121	808	74
Rural	82.1	98.0	96.7	82.5	96.2
Northern Uplands	18.1	39.4	28.9	16.2	31.7
Red River Delta	19.9	8.9	15.7	25.9	3.8
North Central Coast	13.7	17.2	17.4	12.1	8.9
Central Coast	11.6	11.5	12.4	13.0	6.3
Central Highlands	3.3	6.4	6.6	1.8	5.1
Southeast	11.9	2.5	6.6	12.8	6.3
Mekong Delta	21.5	14.1	12.4	18.2	38.0
Remote commune	3.8	8.1	5.8	4.5	1.3
Female	51.0	51.5	25.6	59.9	63.3
Other ethnic groups	13.8	43.0	22.3	8.5	36.7
Illiterate household head	20.7	37.1	19.8	27.5	54.4
Household size from 1 to 4	32.0	13.9	20.7	45.5	12.7
Household size from 5 to 6	41.2	38.2	46.3	35.5	29.1
Household size 7 and more	26.8	47.9	33.0	19.0	58.2
No irrigated land (rural households only)	29.9	36.9	31.6	28.0	54.0