WELFARE IN VIETNAM DURING THE 1990S: POVERTY, INEQUALITY AND POVERTY DYNAMICS.

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ABSTRACT

During the 1990s, Vietnam's economy was transformed through a series of economic, social and political reforms, resulting in an average growth rate over the decade in excess of 6% per annum. This strong growth performance was accompanied by a dramatic fall in the incidence of consumption per capita poverty. This paper examines the changes in poverty and poverty dynamics over the 1990s using a nationally representative panel of households surveyed in 1992-93 and 1997-98. We analyse how robust the reduction in poverty is to the methods used to measure poverty. We find that regardless of where the poverty line is drawn, consumption poverty fell between 1992-93 and 1997-98, but that the extent of this fall is sensitive to the choice of poverty line. We also examine changes in the distribution of living standards over time, finding that the fall in poverty was accompanied by a rise in inequality, with some sub-groups of the population failing to share equally in the strong growth of the country. Finally, we examine rural poverty dynamics, presenting transition matrices of movements in and out of poverty over time and estimating a model of consumption change. We find that regional differences are important, as are access to key institutions and infrastructure, and education. We also find that shifts in employment and production patterns, especially of rice, which we argue to be induced by the economic reform process, are strongly related to changes in living standards over time.

JEL codes: C23; I32; O53.

Keywords: Poverty, growth, dominance, economic reform, Vietnam.

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1. INTRODUCTION

Vietnam is one of the success stories in the attack on poverty. During the 1990s, income poverty estimates and a range of human development indicators improved dramatically (World Bank, 1999). These achievements have been accompanied by remarkable developments in the economic sphere. The strong economic and poverty progress is largely ascribed to the "Doi Moi" or "renovation" policies introduced in the late 1980s with removal of price controls on many goods, decollectivisation of land, reduction or removal of trade barriers and an opening up to foreign direct investment.[1] Vietnam's economic and social achievements are particularly remarkable given the collapse of the former Soviet Union, on which Vietnam had been dependent upon for a wide range of manufactured goods. Growth rates averaged 6-7% per year during the period 1990 to 1997, rice production (the main staple crop) increased dramatically, turning the country from a net rice importer to one of the world's largest exporters of rice, and the agricultural sector diversified into production of other goods such as coffee and aquaculture.[2] Increased employment in the private sector led to an employment growth rate between 2-3% during the 1990s and furthermore, although data is scarce, evidence suggests that real wages started to rise after 1995 (Economist Intelligence Unit, various issues; O'Connor, 1996; World Bank, 1999; CIEM, 2000; IMF, 2000; Minot and Goletti, 2000). Table 1 below shows some selected economic indicators that illustrate the extent of the transformation.

TABLE 1 – SELECTED ECONOMIC INDICATORS FOR VIETNAM

	GDP (1998 US$ million)	GDP growth (%)	GDP p.c. (1998 US$)	GDP p.c. growth (%)	Exports (US$ million)	Imports (US$ million)	Rice production ('000 tons)	Rice exports ('000 tons)
1990	13645	5.10	206	-	2404	2752	19225	1624
1991	14458	5.96	214	3.88	2087	2338	19622	1033
1992	15708	8.65	228	6.54	2581	2541	21590	1946
1993	16976	8.07	241	5.70	2985	3924	22837	1722
1994	18477	8.84	258	7.05	4054	5826	23528	1983
1995	20240	9.54	277	7.36	5449	8155	24964	2058
1996	22130	9.34	298	7.58	7256	11144	26397	3047
1997	23934	8.15	317	6.38	9185	11592	27524	3682

[1] There is debate about both the beginnings and the extent of Vietnam's reform process. Although Doi Moi begain in the late 1980s. Some argue that Vietnam was already reforming in the very early 1980s. In addition, the reform process has been characterised by reversals and non-implementation of reforms (see Niimi, Vasudeva-Dutta and Winters (2002) for an overview of trade reform in the 1990s.

[2] See Justino and Litchfield (2003) for an analysis of the effects of agriculture diversification (amongst other economic changes) on poverty dynamics in Vietnam.

1998	25322	5.80	331	4.42	9360	11500	29146	3793

Source: World Development Indicators database and Vietnam's General Statistical Office.

It would not be surprising, given the economic performance of Vietnam, to see that poverty has fallen in an equally dramatic fashion. World Bank estimates suggest that the incidence of consumption poverty in Vietnam fell from 54% in 1992-93 to 37% in 1997-98 (World Bank, 1999) and that a range of human development indicators also improved during the period. Table 2 illustrates the extent of the improvement in a range of welfare indicators.

TABLE 2. FALLING POVERTY AND IMPROVING SOCIAL INDICATORS

		1992/93	**1997/98**
Consumption per capita[a]	Mean	1,915	2,764
	Median	1,587	2,111
Consumption Poverty Incidence [b]	National	58	37
	Urban	25	9
	Rural	66	46
Lower Secondary Enrolment Rate [b]	Female	29	62
	Male	31	61
Child Malnutrition [b]	Female	51	33
	Male	50	35
Adult Malnutrition [b]	Female	32	30
	Male	32	25
Access to Clean Water [b]	Rural	17	29
	Urban	60	75

Sources: [a]Authors' calculations from VLSS 1992/93 and 1997/98; [b]Vietnam Development Report 2000. Consumption levels are annual total household consumption per capita in thousands of January 1998 Vietnamese Dong.

However measuring poverty involves a number of steps with a range of technical decision to be made and it is not always the case that changes in poverty are robust to the decisions taken by the poverty measurer. This paper aims firstly to examine how robust the fall in poverty in Vietnam reported by official sources is one of the most arbitrary of poverty measurement decisions, namely the choice of poverty line. This is not merely a statistical exercise in appropriate methods of measuring poverty, although this does have some merit, but has an important role to play in designing and implementing anti-poverty policy. Furthermore, at a time when Vietnam is the subject of much scrutiny from academics and policy-makers alike, keen to understand the reasons why past reforms have had such a dramatic impact on poverty and how this might be repeated in the future, and indeed in other countries in the region, a clear understanding of the evolution of poverty is vital. We examine robustness to the choice of poverty line using poverty dominance analysis. This analysis also allows us to test the

robustness of fall in poverty to choice of poverty measure. The second objective of the paper is related to the distribution of the gains from poverty reduction and examines whether poverty has fallen for some groups, or fallen by proportionately more. We examine the changing shape of the distribution of household consumption per capita and changes in the profile of poverty.

Section 2 briefly discusses the issues involved in poverty measurement and explains in more detail how robustness will be tested. Section 3 describes the Vietnamese household survey data, Section 4 presents our results on robustness, Section 5 our analysis of distributional change and poverty profile poverty. Section 6 concludes.

2. MEASURING POVERTY

Measuring poverty, as Sen (1981) describes, involves two key steps: identification of the poor and aggregation into a summary measure. Each of these steps involves a number of decisions and choices and each of these can influence both who is identified as being poor and the value that the poverty measure takes. Hence any analysis of poverty, whether it be concerned solely with measurement or broader issues of the impact of policy, must be cognisant of these issues. Indeed, any estimate of poverty can only be fully understood when the underlying assumptions and decisions used in deriving that estimate are transparent.

Consider first the issue of identifying the poor. There are (at least) five decisions to be made: the concept of poverty, the indicator of poverty, the unit of analysis, how differences in household size and composition are to be incorporated, whether spatial price indices are to be taken account of, and the type and choice of poverty line. There is an enormous set of different poverty concepts. When poor people in developing and transition countries are asked what poverty means to them, they often reply that poverty is multi-dimensional, encompasses both material and psychological deprivation, and can be viewed in terms of not having enough money, not being able to work, being ill, lacking education, lacking land and other physical capital, and being excluded from social, economic or political processes (Narayan et al, 1998). Most poverty researchers and policy makers would probably agree with this view, and certainly the authors of this paper do, that poverty is multidimensional, difficult to describe and hence difficult to measure.

But where most poverty researchers and policy makers disagree is how to proceed from there to choosing an indicator. Generally economists prefer to adopt a monetary approach – i.e. they view poverty as being essentially about lack of money that would allow a poor individual or family to purchase the goods and services necessary to sustain a given standard of living. The indicators of poverty can then take a variety of forms: for example consumption of specific goods, total expenditure or total income (Atkinson, 1989). Analyses based on each of these three approaches may lead however to different conclusions. For example, a family may have an income below the poverty line but is able to spend above the poverty line by using up its savings or by borrowing. Glewwe and Van der Gaag in their study of Cote d'Ivoire found that different indicators, even monetary-based ones, could identify different people as being poor, leading potentially to different policy recommendations (Glewwe and Van der Gaag, 1988). Furthermore, incomes above the poverty line may not translate into a minimum level of consumption due to unequal distributions of real purchasing power and the presence of market failures. Hence, most other professionals (and some economists) prefer a different approach, arguing that it is also not clear that these monetary measures are the best indicators of poverty and concepts such as social exclusion may be more adequate.[3]

The choice of poverty indicator is further complicated by the need to consider the unit of analysis: individuals, families or households? Accounting for differences in the size and composition of families or households involves the use of equivalence scales, but their construction is complicated, and their application usually leads to the creation of a number of variants on the poverty indicator. For example, common practice is to use income or consumption per capita, i.e. per person in the household or family, and there is a general consensus that poor families or households tend to be large ones, i.e. there is an inverse relationship between household size and poverty. But the relationship is substantially weakened when other equivalence scales are used, i.e. when economies of scale in consumption and lower consumption needs of children are allowed. Applying an equivalence scale that assumes that child costs are less than adult costs has the effect of moving households with children up the distribution of the income or consumption indicator: two households with identical incomes and of equal size in terms of number of people, but not in

[3] See Rugeri Laderchi (2000) for a comprehensive discussion of this issue.

terms of numbers of adults and numbers of children, will be ranked identically using a per capita income indictor, but the household with fewer children will be ranked as poorer than that with more children. This has the effect of weakening the perceived relationship between household size and poverty, and may even change the profile of poverty that is then constructed. [4]

Once an indicator of poverty has been chosen some threshold that identifies the poor and hence the non-poor must be selected. However, the concept of a poverty line as a basis to measure poverty has been the source of controversy.[5] Arguments exist whether the poverty line should be viewed as an absolute threshold defining some minimum standard of living that ensures survival, and maybe a bit more than just that, or whether it should be defined in relative terms, i.e. relative to the living standards of the society as a whole. In practice, those interested in studying poverty in developing and transitional countries, where standards of living are generally low and a significant proportion of the population is engaged in a daily battle for survival, absolute poverty lines are generally adopted. This is usually defined as the cost of purchasing a bundle of goods, defined either in terms of calorie consumption or a wider set of food and non-food items, while for international comparisons the dollar-a-day poverty line is used.[6] Analysts of poverty in developed countries tend to adopt a relative poverty line, such as a percentage of mean or median income. [7] But the choice of poverty line is often the most arbitrary decision but one which is usually the most crucial. If large numbers of people have incomes or expenditures close to the chosen poverty line, varying the poverty line by a few percent can lead to dramatic changes in not only the estimates of the level of poverty at any one point in time but also the change in poverty over time. The choice of poverty line is the focus of our attention in this paper as we seek to examine how robust the fall in poverty in Vietnam is to changes in the poverty line. The technique of poverty dominance analysis (described below) allows us to make generalisations about the change in poverty over time without having to commit to a particular, arbitrary poverty line.

[4] See Lanjouw and Ravallion (1995) on the relationship between household size and poverty, and White and Masset (2002) for an application to Vietnam.
[5] See Blackwood and Lynch (1994) and Sen (1997) for more detailed analyses of this problem.
[6] The dollar-a-day line is valued in 1985 PPP dollars. See World Bank (2000) for more details on how the poverty line is constructed.
[7] See for example the study by Atkinson et al (1995) of low incomes in OECD countries.

The aggregation of information on the extent of poverty in the form of one or various measures of poverty has also been subject of extensive discussions.[8] The most commonly used measures of poverty are the Foster, Greer and Thorbecke class of poverty measures: the headcount index, the poverty gap index and the squared poverty gap index (Foster, Greer and Thorbecke, 1984). The general formula of the FGT class of poverty measures is:

$$P(a) = \frac{1}{n}\sum_{i=1}^{k}\left(\frac{z - y_i}{z}\right)^a, a = 0,1,2.$$

where z is the poverty line, y_i is the value of the poverty indicator (e.g. income or expenditure) for each unit of analysis, k is the number of poor people in the population of size n and a is a poverty aversion parameter. The headcount ratio is derived by setting a equal to zero, the poverty gap by setting a equal to one and the squared poverty gap by setting a equal to 2. Setting a equal to higher values increases the weight given to incomes or expenditures further below the poverty line.

Despite the criticisms, the poverty line method and the Foster, Greer and Thorbecke measures have been widely used to measure poverty given its ease of measurement and data availability. Using techniques of poverty dominance allows us to move away from specific estimates of poverty with different poverty measures to make generalisations about poverty comparisons.

Thus the measurement of poverty raises several important choices regarding the poverty indicator, the poverty line, equivalence scale, and choice of measure. However, in keeping with the bulk of work on poverty in Vietnam, and given that trends in consumption poverty mirror trends in broader non-monetary indicators of human development (from Table 2), we adopt as our indicator total annual household expenditure per capita. We focus here on two of these choices and test the robustness of the change in poverty over time in Vietnam to the choice of poverty line and choice of poverty measure.

[8] See Sen (1997).

3. THE VIETNAMESE SURVEY DATA

This paper examines poverty measurement issues in Vietnam using household consumption data provided in the Vietnam Living Standards Measurement Surveys (VLSS) for 1992-93 and 1997-98. The VLSS data is obtained from nation-wide nationally representative household surveys conducted in 1992-93 (October 1992 to October 1993) and 1997-98 (December 1997 to December 1998). The VLSS data sets were collected by Vietnam's General Statistical Office and the Ministry of Planning and Investment, with financial assistance from the United Nations Development Program and the Swedish International Development Agency and technical assistance from the World Bank. The surveys provide valuable information at the household and commune levels. The household surveys provide detailed information on schooling, health, employment, migration, housing, fertility, agro-pastoral activities, non-farm self-employment, food expenses and home production, non-food expenditure and consumer durables, credit and saving and some anthropometric variables. The commune questionnaire includes information on demographic variables, economy and infrastructure, education, health and a separate price questionnaire.

In 1992-93 4800 households in 120 communes were surveyed. The 1997-98 survey includes 6000 households (approximately 4000 households from the original 1992-3 sample) and 150 communes. The VLSS surveys are particularly useful as they allow the construction of a panel of 4303 households interviewed in both years. The 1992-93 survey is self-weighting, but the 1997-98 survey data requires the use of sample weights to derive nationally representative estimates. All data presented in this paper derived from the VLSS 97-98 are calculated using the weights provided by the GSO.[9]

4. IS THE REDUCTION IN POVERTY IN VIETNAM ROBUST TO MEASUREMENT CHOICES?

The VLSS provide a rich database that can be used to measure poverty over the 1990s. However, there has been wide debate over the poverty line to be used and different studies

[9] Although the two survey years are, individually, representative of the population, the rural panel is not representative of the total rural population (see Haughton, Haughton and Phong, 2001). All results in this paper that take advantage of the panel dimension of the Vietnam data are thus not population-weighted.

report widely different estimates of poverty in Vietnam. Table 3 below shows a brief overview of some of the various poverty lines available for Vietnam.

TABLE 3 VIETNAM POVERTY LINES

Poverty line	Value ('000 dong)[a]	
	1992-93	1997-98
World Bank		
Food only	750	1,287
General	1,160	1,790
MOLISA		
Rural	434	750[b]
Urban	543	1,080
Jamal and Jansen		
Rice only	369	518
Rice and sauce	488	703
General	748	1,135[c]

Source: Jamal and Jansen (1998); Nguyet, C. N. (1999); World Bank (1999).

Notes: [a] 1992/3 poverty lines are shown in Jan 1993 prices, 1997/8 in January 1998 prices. [b] Average of poverty lines for rural households in different regions (mountainous countryside and islands, and delta countryside and midlands). [c] Jamal and Jansen general poverty line for 1997/98 computed by inflating the 1992/93 general poverty line using annual consumer price inflation.

The most commonly used poverty lines are those estimated by the World Bank (World Bank, 1999) and the Ministry of Labour, Invalids and Social Affairs (MOLISA) (see Nguyet, 1999). The World Bank provides a general (food and non-food) poverty line and a food-only poverty line. The food-only poverty line is based on the food consumed per person per day of the third quintile of the population, which yields approximately 2052 calories, calculated from the Vietnam Living Standards Surveys. Quantities of each item in the food basket are scaled up to yield 2,100 calories per person per day and then priced using regional and monthly price indices to give a food poverty line for 1992/93 of 749,722 dong per person per year in January 1993 prices. The general poverty line incorporates non-food expenditures and is based on average non-food expenditures of the third quintile, adjusted by regional and monthly prices and by the calorie adjuster of 2100/2052 yielding an average non-food expenditure of 410,690 dong, and so a general poverty line for 1992/93 of 1,160 thousand dong in January 1993 prices. The 1992/93 food basket is then re-valued using regional and monthly prices for those items to give a 1997/98 food poverty line of 1,287,000 dong in January 1998 prices. The 1997/98 general poverty line is calculated by scaling up the 1992/93 non-food expenditure by

the official consumer price index and then added to the 1997/98 food poverty line, yielding a 1997/98 general poverty line of 1,790,000 dong in January 1998 prices. The Vietnam General Statistics Office (GSO) provides an alternative poverty line, calculated using the same method as the World Bank but using income data from the Multi-Purposes Household Surveys and the Survey on Wealth and Poverty for 1993 (General Statistics Office, 1995). Both poverty lines yield, however, similar poverty estimates in 1992-93 and 1997-98. See Nguyet, 1999 for a discussion.

The World Bank poverty lines have been criticised on a number of grounds. Firstly, in a country as poor as Vietnam, a poverty line that estimates that half the population is poor (as the World Bank general poverty line does) may not be the most appropriate for poverty targeting. Hence, the MOLISA poverty line is based on only the monetary value of rice consumption (the most important staple in Vietnam) and concentrates on the poorest households, i.e. "starving" or hungry households with very minimal rice consumption (13 kg per month, which translates into 1600 calories per day), and specifies different poverty lines for the urban and rural sectors. The World Bank's poverty lines have also been criticised by Jamal and Jensen (1998) on the grounds that the consumption of the third quintile cannot be considered representative of the typical consumption patterns of the poor and poverty lines based on the food basket of the third quintile will overestimate the extent of poverty. Jamal and Jensen construct an alternative food poverty line using estimates of rice consumption only. When a varied diet is considered important, they use estimates for 'rice and sauce' consumption, where 'sauce' includes the cheapest non-rice items. They also provide estimates for a food and non-food poverty line where the food basket contains rice and sauce.

Hence there is some debate about where the poverty line should be set to adequately capture the notion of monetary poverty. Anyone unwilling to hold hostages to fortune over a particular poverty line needs to find a way of evaluating how robust the fall in poverty is to the choice of poverty line. One method is to calculate the value of a range of measures using a range of poverty lines and then compare the direction and magnitude of the change over time. But this is cumbersome, involves unnecessary computation and leaves open the possibility that a "new" poverty line will emerge, rendering the analysis incomplete.

An alternative and preferable technique is to use poverty dominance analysis. This technique allows the researcher to compare distributions of the chosen poverty indicator and make generalisations about the direction and extent of poverty changes without ever having to commit to a particular poverty line. The worst case scenario is that poverty rankings will be made for a range of poverty lines. Furthermore, the technique has the advantage of allowing the researcher to make generalisations about a number of poverty measures belonging to the FGT class, rather than just the one or two measures that are usually calculated. The technique has a number of applications beyond the inter-temporal comparisons examined here, including poverty comparisons across sub-groups of the population. Deaton (1997) illustrates how the technique can be applied to an analysis of poverty among different racial groups in South Africa while Quisimburg et al (2001) apply the technique to shed light on poverty rates among male and female headed households.

Consider a cumulative distribution function (c.d.f.). This is a plot of, in our case, expenditure per capita on the horizontal axis and the cumulative probabilities on the vertical axis. From this plot we can read off on the vertical axis the proportion of the population that is below any given expenditure level – or poverty line. Hence the c.d.f. can be used to estimate the value of the headcount ratio, and by varying the poverty line we can examine how the headcount ratio varies. By plotting two c.d.f.s on the same graph, for example for two different years, we can make comparisons about the value the headcount ratio takes for different poverty lines. Consider the case of two distributions, A and B, shown below in Figure 1. Wherever distribution A lies below (or at least not above) distribution B we can conclude that for that range of expenditure levels (i.e. poverty lines), the headcount ratio in A is less than in B, that is distribution A exhibits poverty dominance over distribution B.[10] In Figure 1 it is possible to see that for any given poverty line or income level, the c.d.f. of distribution B gives a higher headcount than that of distribution B.

[10] This is often referred to as first order dominance as it relates to the first moment of the distribution.

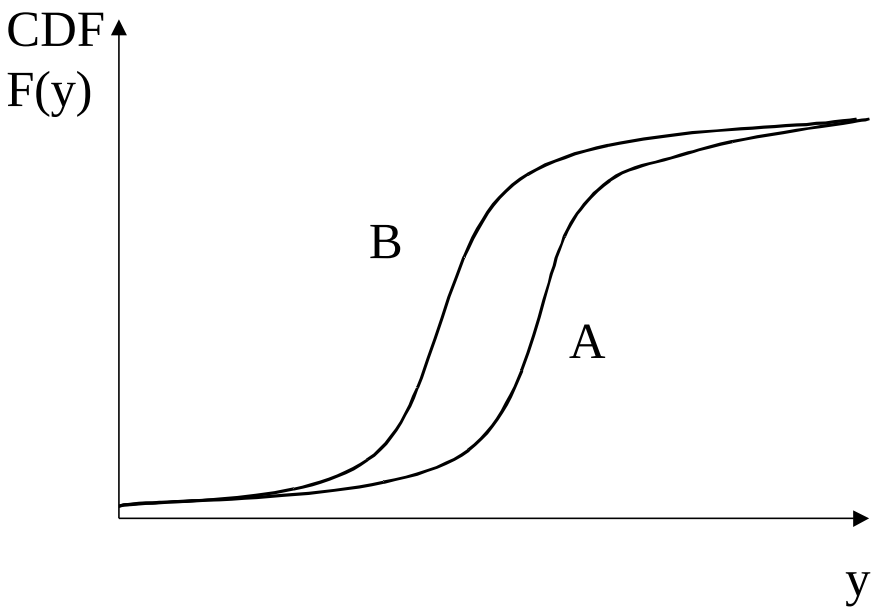


Figure 1. Distribution A displays 1st order dominance over distribution B if $F_A(y) \leq F_B(y)$ $\forall y$

A particularly powerful result demonstrated by Atkinson (1987) is that if we can establish first order dominance for a range of poverty lines, $[z^-, z^+]$, where z^- is a lower poverty line (maybe zero but any other value will do) and z^+ an upper poverty line, then it is possible to conclude that any poverty measure that satisfies Sen's focus axiom of poverty measurement, for example all those in the FGT(a) class and many more besides, will rank distribution A as having lower poverty than distribution B.[11] Poverty dominance analysis is therefore a powerful tool for poverty researchers. It allows one to abstract from any specific poverty line and from any one specific poverty measure without having to calculate each possible poverty measure for each possible poverty line.

Let us turn now to Vietnam distributions. The c.d.f.s of real annual household expenditure per capita for Vietnam in 1992/3 (labelled cumy92) and 1997/8 (labelled cumy98), each valued in 1998 Vietnamese dong are shown in Figure 2.

[11] Sen (1976) sets out a set of desirable properties or axioms of poverty measures. The focus axiom requires that any poverty measure P be unchanged for any changes in incomes of expenditures above the poverty line, that is the focus is on those below the poverty line.

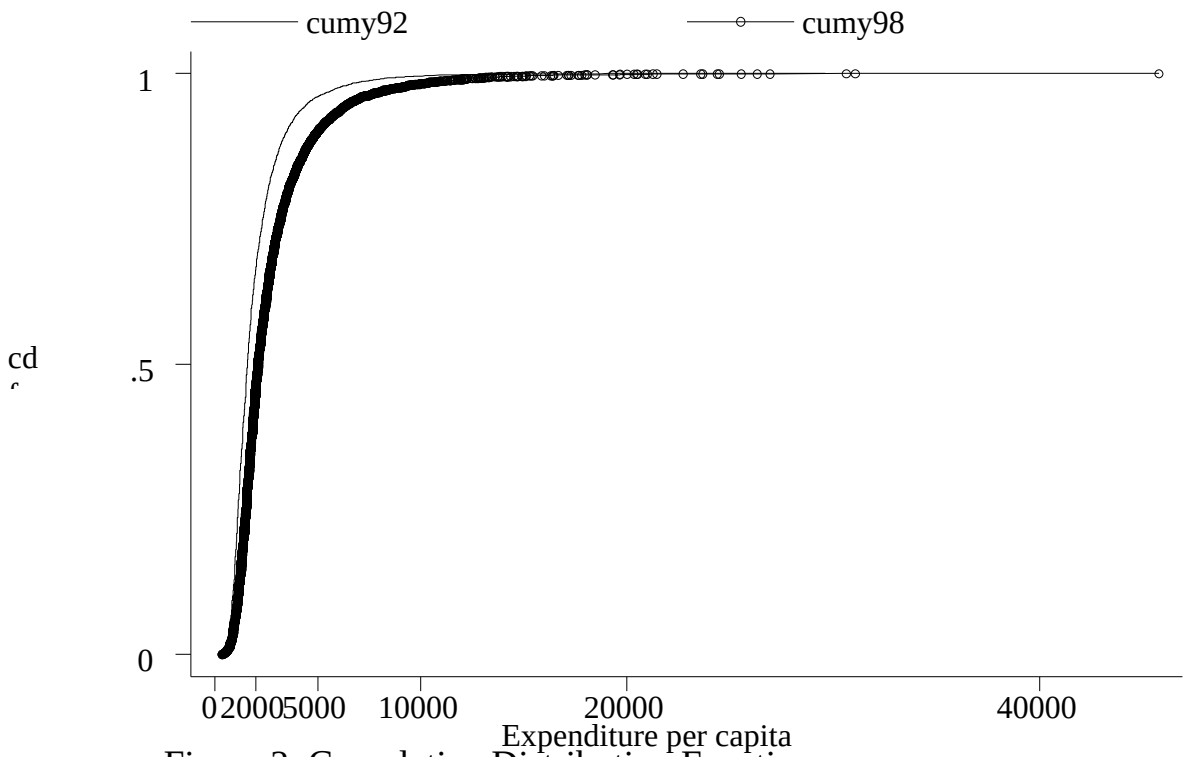


Figure 2. Cumulative Distribution Functions

Figure 2 shows a shift in the whole distribution between 1992-93 and 1997-98. Inspection of the graph coordinates shows that the CDF for 1997-98 is always below the CDF for 1992-93, which indicates that consumption expenditure increased for all in 1997-98. The result can be more clearly visualised in Figure 3, which shows the same CDFs for consumption expenditures in the neighbourhood of the World Bank's upper poverty line of 1,790,000 VN dong. This allows us to see more clearly that regardless of where we draw the poverty line, the c.d.f. for the 1992/3 distribution lies everywhere above that of 1997/8, hence poverty dominance of 1997/98 over 1992/93 is established for the entire range of plausible poverty lines.

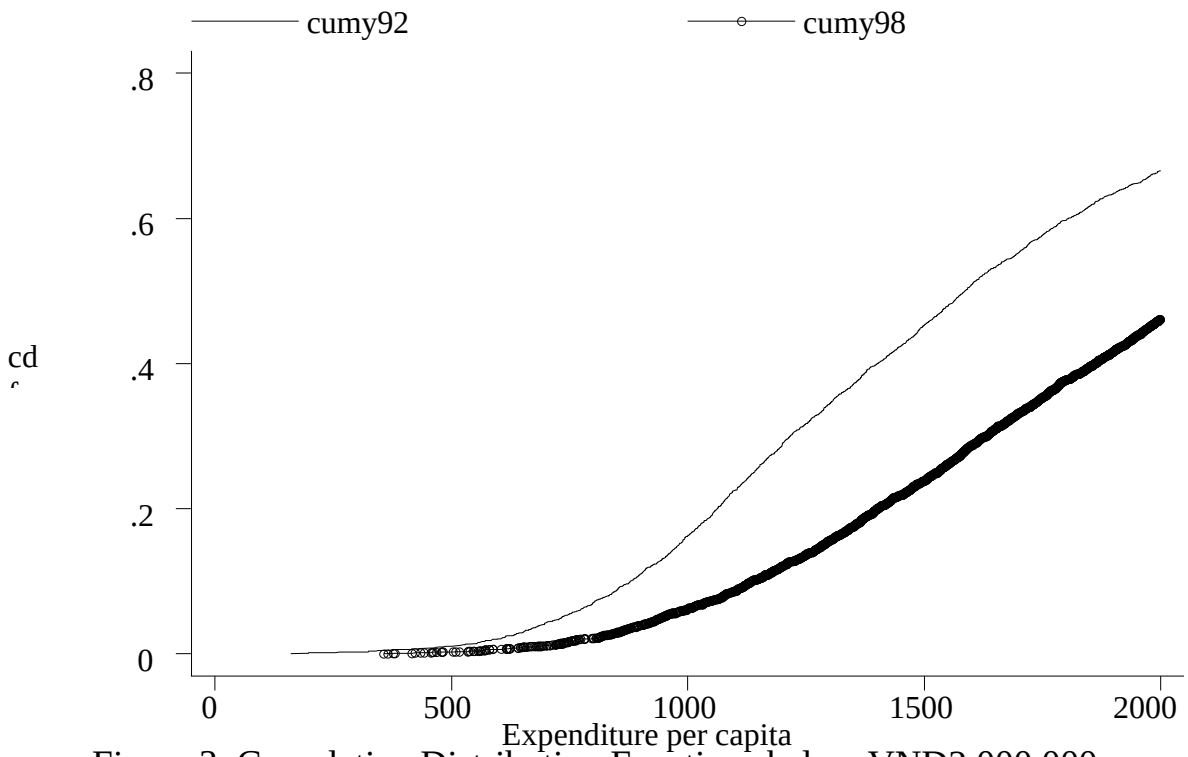


Figure 3. Cumulative Distribution Functions below VND2,000,000

The results obtained from the dominance analysis confirm that poverty did indeed decrease in Vietnam between 1992-93 and 1997-98 and that this result is independent of any national poverty line used. Furthermore because we can establish first order dominance, we can also conclude that not just the headcount ratio but any poverty measure that belongs to the FGT(α) class or even more generally any poverty measure that satisfies Sen's focus axiom will record a decline in poverty.

5. WAS POVERTY REDUCTION EVEN?

The cumulative distribution functions shown in Figures 2 and 3 reveal that the entire distribution of household expenditure per capita shifted upwards during the 1990s, allowing us to conclude that poverty reduction did indeed occur, regardless of where we choose to draw the poverty line. But what the c.d.f.s do not reveal is whether poverty reduction was experienced by all groups of the population. We analyse whether poverty reduction was in fact even by firstly examining changes in the distribution of household expenditure per capita and secondly examining changes in the poverty profile.

Table 4 shows some simple summary statistics for Vietnam in 1992-93 and 1997-98.

TABLE 4 – SUMMARY STATISTICS, VIETNAM 1992-93 AND 1997-98

	1992/93	1997/98	%change
Inequality[a]			
GE(0)	0.177	0.199	12.5
GE(1)	0.197	0.225	14.7
GE(2)	0.277	0.330	19.1
Decile Means			
1	699	918	31.4
2	978	1281	31.0
3	1140	1522	33.5
4	1310	1743	33.1
5	1497	1980	32.3
6	1691	2270	34.2
7	1956	2657	35.9
8	2347	3203	36.5
9	2980	4191	40.7
10	5354	7875	47.1
Decile Shares			
1	3.5	3.3	-5.1
2	4.9	4.6	-5.9
3	5.7	5.5	-3.3
4	6.6	6.3	-4.0
5	7.5	7.2	-4.4
6	8.5	8.2	-3.3
7	9.8	9.6	-1.7
8	11.8	11.6	-1.4
9	14.9	15.1	1.4
10	26.8	28.5	6.2

Source: Authors' calculations from Vietnam Living Standards Survey 1992-93 and 1997-98.
Notes: [a] GE(α),α=0,1 or 2, are members of the Generalised Entropy Class of inequality measures. Higher levels of α correspond to greater weight being given to income gaps in the upper tail. See Litchfield (1999) for more details.

Table 4 shows the estimates of the three inequality indices (GE0, GE1 and GE2), consumption means per decile group and the share in consumption expenditure of each population decile group. The inequality estimates show that inequality increased in Vietnam between 1992-93 and 1997-98. The increase is greater for those measures that emphasise consumption expenditure at the top end of the distribution, that is GE(2). This result is further confirmed by the estimates of decile group means and shares of consumption. These figures show that although all decile groups benefited from increases in their means per capita consumption levels between 1992-93 and 1997-98, the share in consumption expenditure of the eight bottom decile groups has decreased, whereas the shares of the two top deciles have

increased by 1.41% and 6.19% respectively. These results suggest that although everyone benefited from the strong economic performance experienced in Vietnam, some groups have benefited more than others.

We can see this more clearly when we examine the shape of the distribution. One way of doing this is to plot the kernel density estimates of the distribution. [12] Figure 4 shows that the 1997-98 distribution is shifted upwards from the 1992-93 line but it did not move proportionally. It appears that the upper tail has shifted upwards by proportionately more than the lower tail, suggesting an increase in inequality during the period.

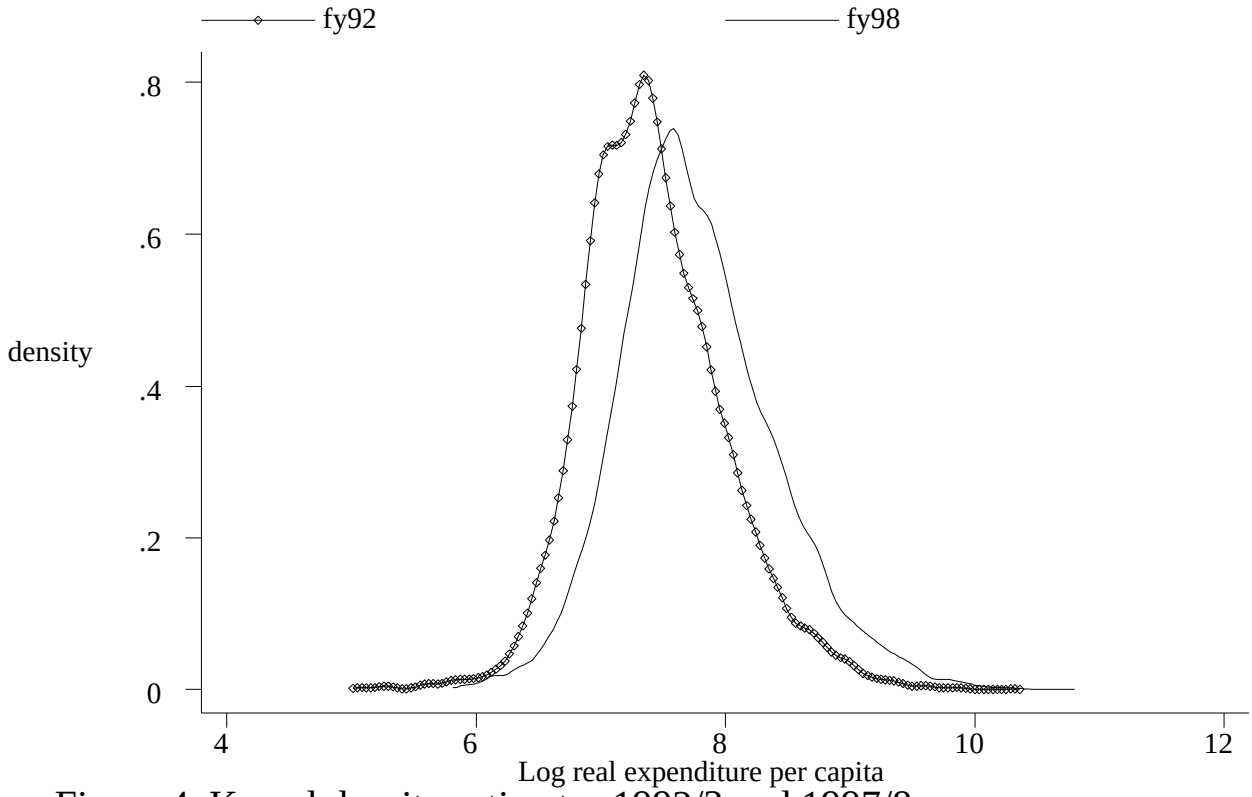


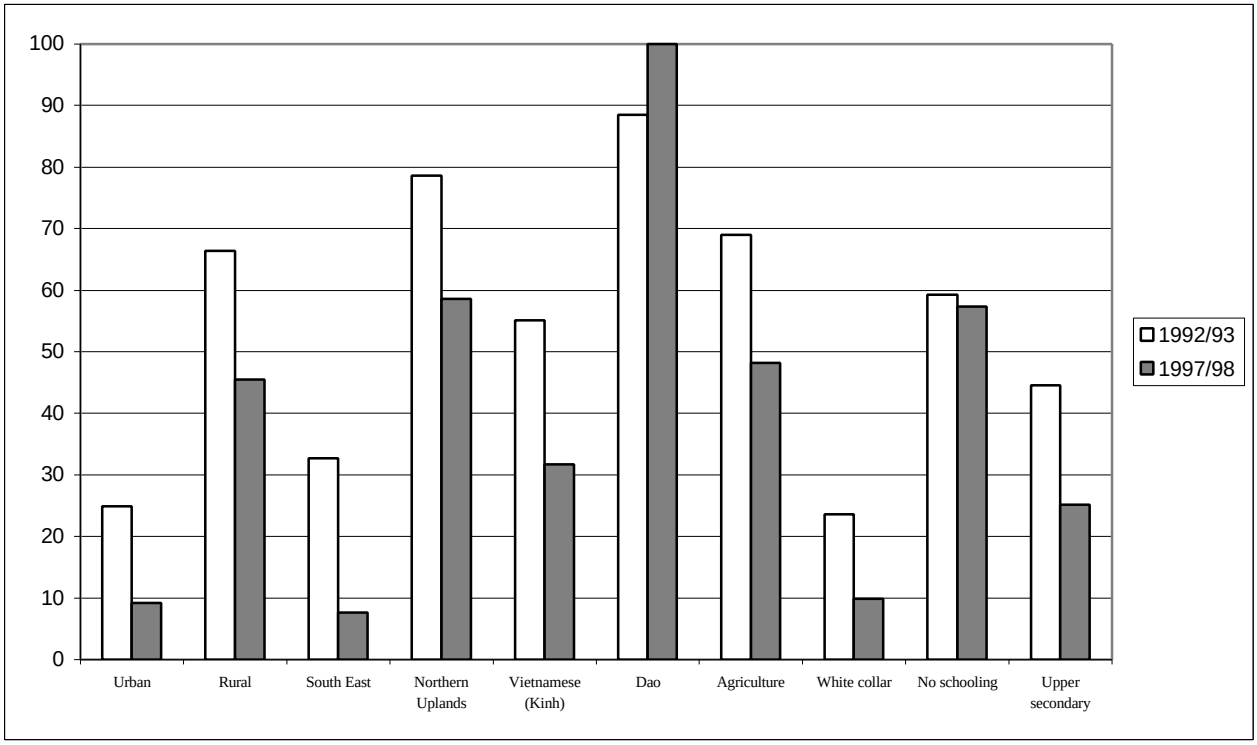
Figure 4. Kernel density estimates 1992/3 and 1997/8

This conclusion is further confirmed by the analysis of the incidence of poverty disaggregated by various socio-economic groups. Table B1 in Appendix B shows the full set of results for the World Bank's upper poverty line of 1790 thousand VN dongs (per year per capita) in

[12] Kernel density estimates are similar to histograms, in that they plot expenditures against their relative frequencies, but differ by applying weights (called a kernel function) to observations within each expenditure interval. The kernel plots here are created using log expenditure and a normal kernel function. See Cowell, Ferreira and Litchfield (1999) for a discussion of kernel density plots of income and expenditure data.

1998 prices, which we summarise here. The results show clearly that poverty improvements varied a lot between groups. For example, urban households benefited from a 63.9% decrease in poverty between 1992-93, whereas poverty amongst rural households decreased by only half of that value. Households living in the Northern Uplands and in the Central Highlands benefited from a 25% decrease in poverty between 1992-93 and 1997-98, whereas households living in the South East registered an almost 77% decrease in poverty between the two years. Households belonging the major ethnic group (Kinh) benefited from the largest decrease in poverty in relation to other ethnic groups (poverty amongst the Dao group even increased). Similar patterns are observed for other categories: households in which the head has a white collar job and higher levels of education have had larger decreases in poverty than households in which the head has other jobs and lower levels of education.

@this graph must be changed as some of the data was wrong



6. POVERTY DYNAMICS IN VIETNAM

@paragraph on the importance of examining poverty dynamics

In order to understand the direct causes and consequences of poverty, it is important to know whether poverty is simply a transitory state experienced by some households at one time or another or whether it is a persistent phenomenon for certain groups. This information is

central for the design and targeting of policies aimed at reducing poverty. This paper focuses therefore not so much on changes in poverty rates per se but in movements in and out of poverty (poverty dynamics), thereby taking advantage of the important panel dimension of the Vietnamese household surveys.

The table below illustrates movements in and out of poverty in Vietnam between 1992-93 and 1997-98. The table includes estimates using the official poverty line and two other poverty lines, one 10% above the official values and another 10% below those values. We have also included changes in poverty for a poverty adjusted by adult equivalent scales.[13]

TABLE 4 –POVERTY DYNAMICS IN VIETNAM 1992-93 AND 1997-98

	P→P	NP→P	P→NP	NP→NP
Official poverty line	28.73%	4.74%	27.34%	39.19%
	(1236)	(204)	(1176)	(1686)
Off poverty line +10%	36.29%	4.46%	26.50%	32.75%
	(1561)	(192)	(1140)	(1409)
Off poverty line -10%	20.97%	4.46%	26.80%	47.77%
	(902)	(192)	(1153)	(2055)
Poverty line per adult	39.24%	4.83%	25.83%	30.10%
equivalent	(1688)	(208)	(1111)	(1295)

Source: Own calculations from VLSS 1992-93 and 1997-98.
Notes: Estimates in brackets indicate the number of households that remained poor, fell into poverty, escaped poverty or remained non-poor.

Poverty dynamics can be associated with various household characteristics. These characteristics vary from household to household and are fundamental in determining how households respond to socio-economic changes. Tables 5, 6, and 7 show the poverty transition matrices by socio-economic groups defined along the following characteristics for the whole of Vietnam and the rural sector between 1992-93 and 1997-98: geographic location,[14] ethnicity,[15] age and gender of the head of the household, household size and

[13] We created expenditure per equivalent adult using the WHO equiv scale of 1 for adults and 0.65 for children. We also adjusted the poverty line so it is in per adult terms, rather than per person terms. To do this we multiplied the poverty line by 2800/2100 (which is the calorie needs of an adult over the calorie needs of an average person).
[14] For administrative purposes, Vietnam is divided into seven regions: the Northern Uplands, the Red River Delta, the North Central, the Central Coast and the Central Highlands in the north and the South East and the Mekong River Delta in the south.
[15] The VLSS specify eight ethnic groups: the Kinh (the Vietnamese majority), the Tay, the Thai, the Chinese, the Moung, the Nung, the H'mong and the Dao. All remaining ethnic groups are aggregated under the heading 'others'. These groups are usually grouped for convenience into the majority Kinh, the ethnic Chinese (a special group that includes a small minority of quite well-off households) and other ethnic groups that are often located in specific regions only. See van de Walle and Gunewardena (2001) and Baulch et al. (2002) for more detailed analyses of the social and economic position of ethnic groups in Vietnam.

composition, main occupation of the head of the household,[16] and level of education of the head and spouse of the head of the household.[17]

TABLE 4 - POVERTY MATRIX FOR 1992-93 AND 1997-98: GEOGRAPHIC AND ETHNIC CHARACTERISTICS

Category	% of rural panel		Always poor (%)		Nonpoor 92-3 Poor 97-8 (%)		Poor 92-3 Nonpoor 97-8 (%)		Never poor (%)	
	92-93	97-98	All	Rural	All	Rural	All	Rural	All	Rural
Region										
Northern Uplands	16.54	16.54	47.15	54.84	4.53	4.84	27.30	25.61	21.02	14.71
Red River Delta	25.01	25.01	24.90	29.11	3.86	4.00	34.65	39.02	36.58	27.57
North Central	15.74	15.74	38.11	41.09	4.07	4.55	33.71	33.27	24.10	21.09
Central Coast	10.70	10.70	25.15	29.95	3.99	4.81	22.95	25.13	47.90	40.11
Central Highlands	3.29	3.29	41.74	41.74	2.61	2.61	25.22	25.22	30.43	30.43
South East	8.47	8.47	7.98	10.81	2.10	3.04	24.16	33.11	65.76	53.04
Mekong River Delta	20.23	20.23	23.89	27.16	8.57	9.76	18.74	20.37	48.80	42.72
Ethnic group										
Kinh	84.77	84.60	23.81	27.95	4.73	5.39	29.14	31.90	42.32	34.76
Chinese	0.37	0.34	5.73	28.00	1.27	0.00	5.73	8.00	87.26	64.00
Others	14.85	15.05	65.86	67.66	5.30	5.26	18.14	17.61	10.70	9.47

Source: Authors' own calculations from the Vietnam Living Standards Survey 1992-93 and 1997-97.

TABLE 5 - POVERTY MATRIX FOR 1992-93 AND 1997-98: DEMOGRAPHIC CHARACTERISTICS

Category	% of rural panel		Always poor (%)		Nonpoor 92-3 Poor 97-8 (%)		Poor 92-3 Nonpoor 97-8 (%)		Never poor (%)	
	92-93	97-98	All	Rural	All	Rural	All	Rural	All	Rural
Gender of head										
Male	77.99	76.56	21.10	28.34	4.77	6.23	25.43	28.53	48.60	36.90
Female	22.01	23.44	31.49	35.52	4.73	5.09	27.99	30.02	35.79	29.37
HEAD AGE GROUP										
Under 30	14.57	5.90	42.91	46.15	7.85	8.11	27.34	28.25	21.90	17.48
30 to 60	66.57	73.07	28.97	34.33	4.08	4.57	27.95	30.56	38.99	30.54
60 and above	18.86	21.04	21.56	26.04	5.60	6.67	25.24	27.33	47.59	39.96
No. children (0-14) in the household										
≤ 2	65.23	74.27	21.34	26.45	5.24	6.16	27.38	30.49	46.04	36.91
2-5	28.68	22.32	45.61	48.32	3.47	3.59	28.53	29.24	22.40	18.86
≥ 5	6.10	3.41	64.15	65.66	3.08	3.01	19.89	20.18	12.89	11.14
Household size										
Small (≤ 3 members)	22.70	22.35	17.93	22.30	5.58	6.73	27.04	30.05	49.45	40.91
Medium (3-6 members)	40.44	45.22	26.35	31.54	4.54	5.05	28.93	31.81	40.18	31.61
Large (≥ 6 members)	36.86	32.43	39.37	44.32	4.42	4.83	25.48	26.81	30.73	24.04

Source: Authors' own calculations from the Vietnam Living Standards Survey 1992-93 and 1997-97.

[16] This variable was constructed using the list of profession codes provided in the household surveys. We have divided our occupation variable into white collar jobs (scientists, architects, lawyers, economists, academics, clerical workers, etc), sales and services (retail and wholesale workers, salesmen, hotel managers and workers, hairdressers, etc), agriculture (farmers, forestry workers, fishermen, etc), production (miners, masons, food processing workers, shoemakers, painters, etc) and those not working (see also Glewwe, Gragnolati and Zaman, 2001). The unemployed include those heads looking for a job and those who have no job.

[17] We have chosen to examine the highest diploma or degree obtained by the head (or spouse of the head) of the household instead of the number of years the head and the spouse spend in school as in Glewwe, Gragnolati and Zaman (2001). We did not feel that this variable represented accurately the level of education of each individual since it is not perfectly comparable between the two household surveys and may include individuals that have reported a large number of years spent in school without having achieved a certain level of education.

TABLE 6 - POVERTY MATRIX FOR 1992-93 AND 1997-98: LABOUR MARKET AND EDUCATION CHARACTERISTICS

Category	% of rural panel		Always poor (%)		Nonpoor 92-3 Poor 97-8 (%)		Poor 92-3 Nonpoor 97-8 (%)		Never poor (%)	
	92-93	97-98	All	Rural	All	Rural	All	Rural	All	Rural
Occupation of the head										
White collar	3.41	4.29	6.34	11.15	1.69	2.60	17.76	27.14	74.21	59.11
Sales and services	4.26	5.44	8.70	15.04	3.87	5.60	18.65	25.96	68.78	53.39
Agriculture	75.19	71.84	36.18	37.45	5.35	5.49	30.02	30.06	28.44	27.00
Production	7.81	8.21	20.33	27.86	3.98	4.46	28.73	33.57	46.96	34.11
Unemployed	9.33	10.22	21.35	30.31	4.23	6.00	22.58	26.50	51.83	37.19
Education of head										
None	39.30	10.85	37.33	41.44	5.35	5.71	23.81	23.97	33.51	28.88
Primary	24.53	37.72	29.22	33.20	5.88	6.53	26.77	28.83	38.13	31.45
Lower secondary	24.10	35.89	29.02	33.30	4.48	4.77	33.45	35.35	33.05	26.57
Upper secondary	3.98	9.62	18.81	25.68	2.54	3.37	23.13	28.42	55.52	42.53
Technical and university	8.10	5.92	13.00	20.41	2.23	3.27	22.52	30.82	62.25	45.51
Education of spouse										
None	37.44	9.79	38.36	41.52	5.40	5.70	25.18	26.12	31.06	26.67
Primary	17.40	32.57	28.85	31.84	5.04	5.21	27.73	29.84	38.39	33.10
Lower secondary	17.46	27.07	31.61	37.21	4.52	4.95	30.93	33.87	32.93	23.97
Upper secondary	2.83	6.12	20.71	29.07	4.90	6.71	26.50	31.63	47.88	32.59
Technical and university	4.52	3.41	8.27	14.44	1.61	2.53	23.59	30.32	66.53	52.71

Source: Authors' own calculations from the Vietnam Living Standards Survey 1992-93 and 1997-97.
Note: The education level of the spouse of the household head refers only to those households with a spouse.

The tables show that rural households most likely to be poor in both years of the surveys were those living in the Northern Uplands, belonging to an ethnic minority, headed by a female,[18] with a younger head, a large number of children and other members,[19] with a head employed in the agriculture sector and with low level of education. These characteristics were those that we expected to be associated with higher levels of poverty in a country such as Vietnam.

The high levels of poverty in the Northern Uplands are related to the remote and mountainous geography of the region, which does not allow the development of agriculture and the establishment of adequate infrastructure (World Bank, 1999). As such, households that live in the southern regions are much more likely to be non-poor in both years. Households living in the Mekong River Delta have, however, the highest probabilities of having fallen into poverty

[18] However, male-headed households were slightly more likely to have fallen into poverty in 1997-98.
[19] This result may, however, hide differences in intra-household allocation of goods and household economies of scale that we have not considered in our analysis (see White and Masset, 2001). We do not believe though that our results will be significantly distorted by not considering the possibility of economies of scale as food (which is not prone to large economies of scale) constitutes by large the main expenditure of poor households. We have decided not to use household equivalence scale also because we want to find out the effects of demographic changes on household poverty dynamics. If we had calculated equivalent expenditure we would have had to some extent adjusted for demographic changes and differences (see Burgess, Gardiner, Jenkins and Propper, 2000 for similar argument). We do, however, test the robustness of our results in section 4 to the introduction of adult equivalence scales. If we consider adult equivalence scales, the percentage of rural households that remain poor in both years, that fall into poverty in 1997-98, that escape poverty in 1997-98 and that remain non-poor in both years is, respectively, 45.94%, 5.97%, 26.96% and 21.84%. The differences between these estimates and those in tables 3, 4 and 5 are not statistically significant.

in 1997-98. This is likely due to the high number of landless households in the Mekong River Delta (Lam, 2001), which have experienced a deterioration of their living standards. Hired labour in the agricultural sector is more common in the Mekong River Delta than in any other regions in Vietnam and there has been an increase in the availability of jobs in the region, thanks to the introduction of double and triple cropping and the diversification of production (introduction and expansion of cash crops and shrimp farming). However, the availability of non-farm employment is still limited, and thus some landless people go to urban areas in search for work (Lam, 2001). This may partially explain why so many households in the Mekong River Delta have fallen into poverty in 1997-98, when this is one of the better-off regions in Vietnam.

The tables show also that households with younger heads have a higher probability of being poor in both years. This probability decreases with increases in the age of the head. We believe that this result is associated with the fact that households with young heads are likely to have young children, which poses a financial burden on the household. This is confirmed by the fact that the probability of being poor in both years increases with the number of children in the household (table 5). One important cause of higher poverty for households with larger numbers of children is the high costs of education which have soared in Vietnam after the implementation of the new economic reforms (World Bank, 1999). However, the number of households with large number of children decreased between 1992-93 and 1997-98, a result likely to be associated with the economic incentives provided by the Vietnamese government to families with just one child.

Table 6 shows that households in which the head works in the agriculture sector have the higher probability of being poor in both years. However, the number of heads employed in white-collar jobs, sales and production increased between 1992-93 and 1997-98, whilst the number of heads working in the agriculture sector decreased in the same period. Although there was a slight increase in the percentage of unemployed heads, the increase in the percentage of heads in occupations other than the agriculture sector is bound to have contributed towards the decrease in poverty levels.

The most striking observation suggested by the estimates in table 6 is, however, the sharp decrease in the number of household heads and spouses with no education: 47.5% of all panel

household heads and 39.5% of all panel spouses experienced increases in their levels of education between 1992-93 and 1997-98. Given that households in which the head has no education have the highest probability of being poor in both years, this change is likely to have affected positively the reduction of poverty in Vietnam. We suspect, however, that some of this increase in education levels may be due to recording errors (or changes in classification of perception we are not aware of) as most changes refer to heads and spouses with no education in 1992-93 but with the basic level of education in 1997-98. If we assume these changes of be fictitious, we are left with 'genuine' increases in education for 12% of all panel heads and 11% of their spouses, attributed to changes in household heads and spouse due to the death or migration of the previous head or to the household head and/or spouse being students. These are still significant improvements in education levels and may have contributed towards the decrease in poverty in Vietnam between 1992-93 and 1997-98.

The results reported in tables 4, 5 and 6 suggest that some households have benefited less than others from the reduction in poverty that took place in Vietnam between 1992-93 and 1997-98. These were the type of households expected to be associated with poverty in a poor rural economy such as Vietnam: large households living in remote rural areas, employed in the agriculture sector and endowed with low levels of human capital. However, households in Vietnam have undergone changes that may be associated with the reduction in poverty observed in the country between 1992-93 and 1997-98: there has been a significant decreased in the percentage of households headed by a younger individual (and thus more prone to be poor), the number of very large households decreased by over four percentage points, the number of households with a large number of young children also decreased significantly (indicating that fewer children were born), the education level of household heads and their spouses improved sharply and the number of household heads employed in sectors other than the agriculture sector increased. Although some of these changes may be associated with the economic reforms that took place in Vietnam after 1986, they reflect, to a large extent, intergenerational changes within the household (panel attrition) as well as the impact of non-economic policies such as those promoting 'one-child families' and literacy-oriented programmes.

7. CORRELATES OF RURAL POVERTY IN VIETNAM

We extend the poverty profile above to an analysis of rural poverty correlates. We focus on the rural sector, on the grounds that the majority of the population and of the poor population resides in rural areas.[20] We use a simple logit model to empirically measure the probability of each household being poor in 1992-93 and 1997-98 using a range of geographical, commune, household and household head and spouse characteristics. NB: I have changed probits into logits in order to keep the results consistent across all models and also to be able to compare this with the mlogits in the other paper. This means that we will not be able to use dprobits but logit models provide odd-ratios.

@What follows needs to be changed to logit models

Limited dependent variable models, of which probits are one, are common ways of examining the relationship between poverty and a range of individual, household and geographical factors. Most recent poverty assessment exercises carried out by the World Bank for example incorporate a poverty probit. We first define a variable p_i=1 if per capita expenditure y_i of household i is less than the poverty line, z, and p_i=0 otherwise. The probability of a household i being poor can be expressed as:

$$P[p_i = 1] = P[y_i < z] = \Phi[g(z) - X_i^{'} b^{*}]$$

where $g(y_i) = X_i^{'} b + e_i$ defines the underlying process of expenditure of household i, X_i is a set of explanatory characteristics and g is a any monotonic transformation that gives e_i~N(0,1) and F is the standard normal cumulative distribution function. The estimate of the intercept is given by $g(z)$-b_0 but as long as the estimate of the intercept is not needed then the model can be estimated as:

$$P[p_i = 1] = P[y_i < z] = \Phi[X_i^{'} b^{*}]$$

where the slope coefficients $b_j = -b_j^{*}$. [21] Note that the function g has not been specified but it can effectively be any monotonic non-decreasing transformation[22] of y_i as long as it results in a normally distributed error term. This means that there is no functional form imposed on the data and the relation can take a variety of forms including non-linear and log-linear transformations (Stewart and Swaffield, 1997).

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[20] Our focus on the rural sector is justified by the fact that 78% of all households in Vietnam in 1997-98 lived in rural areas (80% in 1992-93) and 61% of all Vietnamese households were employed in the agriculture sector in 1997-98 (65% in 1992-93) (table 1). Furthermore, two of the key economic reforms implemented in Vietnam (reform of rice pricing and rice trade and de-collectivisation of the agricultural sector) were directed at the rural sector.

[21] Stewart and Swaffield (1997).

However, there are drawbacks to this sort of limited dependent variable modelling. It has been argued (e.g. Deaton, 1997) that reducing a continuous variable, such as household expenditure per capita (y_i), to a binary variable ($p_i=0,1$), "throws" information away on the variation in y with respect to the variation in the explanatory variables. More seriously, on statistical grounds, is the requirement that g be a monotonic transformation of expenditure. Pudney (1999) demonstrates that it is possible that this condition may not be satisfied if either g is decreasing locally and/or if "the derivatives of some elements of b are of opposite sign to the corresponding elements of X" (Pudney, 1999: 387). In his Hungary example, Pudney shows that among some sub-groups of the population (e.g. young people) b may take on different signs for different individuals within the group. There may be some who are on a trajectory into deeper, persistent poverty and others who are poor simply because they are the beginning of their economic life. Hence $b>0$ for the former group but $b<0$ for the latter. [23]

Pudney proposes an alternative "semi-non-parametric" model but despite the drawbacks of the probit model finds little difference between probit results and his proposed new technique.[24] In summary then, the probit model does have some disadvantages but it is still useful as a tool for profiling the poor population.

Although it is difficult to establish causality in regression models the results can at least be interpreted as proving insight into the correlates of poverty. Probit models are particularly useful for predicting which households are poor, and hence for targeting of anti-poverty policies. The probit model is estimated using maximum likelihood estimation and the results show the marginal effect on the probability of being poor, other things being equal, of a change in the independent variable. Using the **dprobit** command in STATA produces marginal effects (as opposed to the coefficients b_j^*) i.e. the effect on the probability of being

[22] See below for a brief discussion of this monotonocity requirement.
[23] Pudney (1999) provides futher examples of locally decreasing coefficients but in a context of relative poverty lines.
[24] Pudney (1999) finds that for all "reasonable" poverty lines (i.e. above 35% of median income) the condition of globally non-decreasing coefficients is satisfied.

poor for an infinitesimal change in the continuous independent variable or for a switch from 0 to 1 for the discrete dummy variable, evaluated at the mean. [25]

The dependent variable in the poverty probit shows the poverty status of household *i*, taking a value of 1 if poor and 0 if not poor. The explanatory variables (or better, the potential correlates of poverty" encompass characteristics of the household head and spouse such as age, gender, education, health and occupation, demographic characteristics of the household, household assets, dummy variables for net producers and net consumers of rice, and a set of commune characteristics, such as presence of a school, clinic, distanceincluded in our analysis are explained in more detail in Appendix 1 and the full set of results are presented in Table B2. Variables used: fixed household characteristics (region and ethnicity), household demographic characteristics (household composition) in year *t*, occupation of the head of the household in year *t*[26], illness shock (number of work days lost due to illness) in year *t*,[27] weather shock (whether the commune suffered from a weather disaster in any of the years between 1993 and 1998), education levels of the head of the household and spouse in year *t*, assets owned by the household (net income assets and remittances)[28] in year *t* and institutional and infrastructure characteristics in year *t*. This variable represents the effects of access to electricity (as a proxy for access to development infrastructure not included in other variables) and commune characteristics.[29] In order to control for noise in the data originated from sampling methods, we have decided to include a variable that represents the quarter in which the household was interviewed. All these variables refer to household characteristics in 1992-93 and represent initial conditions. We have also

[25] Homogeneity across individuals within the same household is controlled for by calculating robust standard errors by clustering on household identification number.

[26] This variable was constructed using the list of profession codes provided in the household surveys. We have divided the occupation variable into white collar jobs (scientists, architects, lawyers, economists, academics, clerical workers, etc), sales and services (retail and wholesale workers, salesmen, hotel managers and workers, hairdressers, etc), agriculture (farmers, forestry workers, fishermen, etc), production (miners, masons, food processing workers, shoemakers, painters, etc) and those not working. The unemployed include those heads looking for a job and those who have no job.

[27] This is a dummy variable that takes the value 1 if the head of the household lost more than 7 days of work due to illness in the month prior to the interview and 0 otherwise.

[28] Net income assets represent total savings minus debts held by the household. We have decided to include remittances in our model as these have become an important source of household income in Vietnam during the later 1990s (Dang and Le, 2002).

[29] Communes differ in terms of availability of schools, access to roads and transport, access to markets and availability of resources. Belonging to a certain commune is therefore likely to affect the poverty status of each household. Because commune characteristics are, to a certain extent, time-invariant (particularly in the short period of five years), we can control for commune effects on household poverty dynamics. In order to capture the characteristics of the commune to which the household belongs we have included in the model some institution characteristics of Vietnamese communes. Some of these characteristics reflect the integration of each commune within the whole Vietnamese economy (access to road, market and post office), whereas other characteristics illustrate the availability of various resources within the commune (schools, food shop and clinic).

included a variable for land irrigation per capita and for rice production,[30]as well a variable measuring access to land.[31] The results presented in that table are already corrected for unobserved heteroscedasticity in the household surveys using White's adjusted heteroscedasticity-consistent variances.

The estimates in Table B2 refer to changes in the probability of a household being poor in a given year as a result of a unit change in each explanatory variable. In the case of dummy variables, the results refer to the change in the probability of the household being poor for a discrete change of the variable from 0 to 1. NB: We cannot changes means in logit models

We have run logit models on: official poverty line, official poverty line -10%, official poverty line +10% and adult-equivalent adjusted poverty line. The first observation from Table B2 is the fact that the results from all models are very similar. The statistically significant explanatory variables for 1992-93 and 1997-98 is remarkably similar in all models, the levels of significance are the same and the probability values are very similar. The results show that: Julie: I have not corrected the results below but most are fine

- Living in the Red River Delta increases the probability of a household being poor in 1992-93; however, it seems to significantly decrease the probability of a household being poor in 1997-98. This change in the signs of the coefficients is associated with the trade reforms occurred in Vietnam. The Red River Delta was one of the regions most affected by the changes in rice production (together with the Mekong River Delta): in 1998 it generated 18% of the national rice production and produced a surplus of several hundred thousand tons of shipment to surrounding regions (Minot and Goletti, 2000).
- Living in the Central Coast, Central Highlands, South East and Mekong River Delta decrease the probability of a household of being poor in both years. The highest coefficients are those of the Mekong River Delta. The Mekong River Delta was also one of the regions most affected by the trade reforms. The Mekong River Delta region accounts for 51% of the national rice production and between 1995 and 1998 it generated a rice surplus ranging between 4.5 and 6 million tons per year. Most of this rice was

[30]Land irrigation per capita is given by the number of square metres of land irrigation per person in the household. Rice production refers to kilos of rice produced per household.

[31] Land was owned solely by the state prior to the 'Doi Moi' and land transactions were not allowed. After 1993, land tenure was extended to 20 years for annual crop land and 50 years for perennials. Households were also given extended rights to exchange, transfer, lease, inherit and mortgage land (Benjamin and Brandt, 2002).

exported, while the remainder was shipped to other regions. Two-thirds of the national production growth of rice between 1985 and 1995 can be attributed to the Mekong River Delta (Minot and Goletti, 2000).

- Sex of the head of the household is not a statistically significant explanatory variable for poverty in 1992-93 but having a male head accounts for lower probability of household being poor in 1997-98.
- Households where the head works in a white collar job, sales or production decreases the probability of the household being poor (in relation to working in agriculture) in both years. The fact that the head is not working does not seem to affect the probability of a household being poor.
- Being of Chinese origin decreases the probability of a household being in poverty in 1992-93. This variable is not statistically significant in 1997-98. However, in 1997-98, belonging to an ethnic group other than Kinh majority or Chinese increases significantly the probability of a household being poor. Being a Buddhist increases the probability of a household being poor in 1992-93 but is not statistically significant in 1997-98.
- Any amount of education of the head or the spouse decreases the probability of a household being poor in any of the two years in relation to households in which the head or the spouse have no education. The only exception is a university degree. Having a head or a spouse with a university diploma seems to increase the probability of a household being in poverty in 1992-93.[32] @need to check this result. The probability coefficients for the head in both years and for the spouse in 1992-93 (and 1997-98 for the highest diplomas) are generally higher for model 2 than for model 1, reflecting the fact that having some level of education is a particularly important variable for the poor.
- The larger the number of males between the age of 19-59 and adult females of any age decreases the probability of a household being poor in 1992-93. These variables are not statistically significant in 1997-98. The larger the number of young children in the household, the higher the probability of the household being poor in both years. In 1997-98, the higher the number of children between the ages of 6 and 14, the higher the probability of a household being poor. This result is most likely due to an increase in the costs of education in Vietnam after the period of reform (Vietnam Development Report, 2000).

[32] This variable was dropped in 1997-98 due to collinearity.

- Household with access to electricity have a higher probability of not being poor in both years than households with no access to electricity.
- Having access to land does not affect the probability of a household being poor in 1992-93 but increases the probability of a household being poor in 1997-98. This may reflect correlation between employment in agriculture and access to land. @@need to think about this
- Increases in the amount of land irrigated per capita and increases in rice productivity decrease the probability of a household being poor in both years. The probability coefficients for rice productivity in 1997-98 (not in 1992-93) are, however, lower in model 2 (for the poor) than in model 1 (for the whole sample), indicating that decreases in the probability of being poor resulting from additional increases in rice productivity are not as large for the poor.
- Households that live in communes with a road, a post office and a primary school have an increased probability of being poor in 1992-93. Households that live in communes with a market, a food shop and a clinic have a decreased probability of being poor in 1992-93. Living in a commune with a road, an upper secondary school and a clinic seem to increase the probability of a household being poor, whereas living in a commune with a lower secondary school and a food shop seem to decrease the probability of a household being poor in 1997-98. These results may not have a large significance because it all depends on whether each household has access to these institutions or not.

@@JL wrap up probits, do graph and then do transition matrices – maybe just overall TM for whole country and urban and rural TMs, then consumption model

We have run 'split' logit models (probability of household escaping and falling into poverty in 1997-98. The coefficient in general confirm that variables that contributed towards poverty in each year also explain movements into poverty between the two years.

I have also included consumption models but given that we had to use them in the other paper I would feel tempted not to refer to them and refer the reader to the other paper. Otherwise we will tend to have two papers which are two similar. We should limit this paper to analyse sensitivity of poverty changes and poverty dynamics.

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APPENDIX B. POVERTY PROFILE RESULTS

TABLE B1. CHANGES IN POVERTY BY SOCIO-ECONOMIC CHARACTERISTICS

	Headcount index			Population share	
	1992-93	1997-98	% change	1992-93	1997-98
All Vietnam	58.1	37.4	-35.6	100.0	100.0
Sex of the head					
Male	61.0	39.9	-34.6	77.5	78.4
Female	48.2	28.2	-41.5	22.5	21.6
Urban/rural					
Urban	24.9	9.0	-63.9	19.9	20.9
Rural	66.4	44.8	-32.5	80.1	79.1
Region					
Northern Uplands	78.6	58.6	-25.4	15.6	17.9
Red River Delta	62.8	28.7	-54.3	21.6	19.6
North Central	74.5	48.1	-35.4	12.8	13.8
Central Coast	49.6	35.2	-29.0	11.9	10.7
Central Highlands	70.0	52.4	-25.1	3.2	3.7
South East	32.7	7.6	-76.8	12.6	12.8
Mekong River Delta	47.1	36.9	-21.7	22.4	21.5
Ethnic group					
Vietnamese (Kinh)	55.1	31.7	-42.5	84.5	83.8
Tay	81.3	63.2	-22.3	2.0	1.9
Thai	82.3	71.1	-13.6	1.0	1.1
Chinese	11.8	8.4	-28.8	2.5	2.0
Khome	75.4	57.5	-23.7	2.0	2.0
Moung	89.6	80.6	-10.0	2.0	2.4
Nung	91.8	72.5	-21.0	1.6	1.9
H'mong	100.0	91.8	-8.2	0.7	0.8
Dao	88.5	100.0	13.0	0.3	0.3
Other	90.0	84.5	-6.1	3.5	3.8
Occupation of the head					
White collar	23.6	9.9	-58.1	4.6	6.6
Sales	27.7	13.0	-53.1	8.1	9.5
Agriculture	69.0	48.2	-30.1	64.7	61.0
Production	45.9	26.0	-43.4	10.9	11.5
Other/no work	44.4	27.4	-38.3	11.7	11.3
Education of the head					
No schooling	62.6	55.0	-12.1	36.4	8.4
Primary	56.7	42.2	-25.6	26.1	34.9
Low secondary	64.0	38.0	-40.6	22.6	36.3
Upper secondary	44.5	25.1	-43.6	4.3	12.3
Tech or university	39.2	14.2	-63.8	10.6	8.1

Notes: Authors' calculations from VLSS 1992-3 and 1997-8.

RESULTS OF LOGIT MODELS

	Poor 92	**Poor 92 (+10%)**	**Poor 92 (-10%)**	**Poor 92 pae**	**Poor 98**	**Poor 98 (+10%)**	**Poor 98 (-10%)**	**Poor 98 pae**
Northern Uplands	-0.042	-0.113	-0.157	0.113	-0.512***	-0.284*	-0.574***	-0.571***
Red River Delta	0.287*	0.384**	0.176	0.368**	-0.464***	-0.393***	-0.470***	-0.646***
(North Central)								
Central Coast	-0.768***	-0.772***	-0.791***	-0.891***	-1.072***	-0.936***	-0.902***	-1.097***
Central Highlands	-1.265***	-1.471***	-1.377***	-1.298***	-2.041***	-2.201***	-2.058***	-2.302***
South East	-1.658***	-1.668***	-1.588***	-1.698***	-2.216***	-2.317***	-2.397***	-2.231***
Mekong River Delta	-1.337***	-1.314***	-1.202***	-1.469***	-0.547***	-0.533***	-0.336	-0.589***
(Kinh)								
Chinese	-0.811	-0.343	-0.389	-0.752	-0.357	-0.800	-1.221	-1.076
Other ethnicity	0.295*	0.509**	0.188	0.303	0.868***	0.795***	0.552***	0.845***
(Not Buddhist)								
Buddhist	0.310***	0.270**	0.341***	0.295**	-0.100	-0.135	-0.219	-0.074
(Head is female)								
Head is male	0.068	-0.117	0.075	-0.075	-0.148	-0.239	-0.074	-0.127
Age of head	-0.236***	-0.389***	-0.268***	-0.326***	-0.311***	-0.277***	-0.289***	-0.201***
Age squared	0.174***	0.208***	0.171***	0.277***	0.128***	0.146***	0.089*	0.192***
No adults	0.235***	0.356***	0.217***	0.352***	0.348***	0.298***	0.356***	0.290***
No children	0.808***	0.750***	0.776***	0.490***	0.830***	0.827***	0.844***	0.517***
(Head no education)								
Primary education	-0.320***	-0.281**	-0.424***	-0.424***	-0.450***	-0.392**	-0.582***	-0.321*
Lower sec education	-0.519***	-0.454***	-0.753***	-0.621***	-1.010***	-1.011***	-1.103***	-1.035***
Upper sec education	-0.917***	-0.888***	-1.123***	-1.151***	-1.366***	-1.563***	-1.463***	-1.466***
Technical/university	-0.917***	-0.816***	-1.071***	-0.972***	-1.464***	-1.353***	-1.830***	-1.336***
Household no spouse	0.018	-0.149	0.185	-0.103	-0.263	-0.135	-0.301	-0.209
(Spouse no education)								
Primary education	-0.301**	-0.478***	-0.240*	-0.429***	-0.316*	-0.047	-0.384**	-0.153
Lower sec education	-0.012	-0.233	-0.045	-0.181	-0.398*	-0.107	-0.479**	-0.256
Upper sec education	-0.425	-0.764**	-0.278	-0.568*	-0.535**	-0.346	-0.619**	-0.384
Technical/university	-1.197***	-1.162***	-1.210***	-1.327***	-1.397***	-0.972***	-1.554***	-1.188***
White collar	-0.981***	-1.009***	-0.902***	-1.045***	-1.204***	-0.931***	-1.040***	-0.994***
Sales	-0.923***	-1.063***	-1.023***	-0.938***	-0.710***	-0.624***	-1.012***	-0.547***
(Agriculture)								
Production	-0.480***	-0.529***	-0.372**	-0.563***	-0.276*	-0.348**	-0.372**	-0.348**
Unemployed	-0.126	-0.100	-0.066	-0.079	0.021	0.078	0.114	0.051
Workdays lost	-0.219	-0.285*	-0.017	-0.405**	-0.132	-0.029	-0.261	-0.130
(No illness)								
Land irrigation pc	-0.107	-0.057	-0.053	-0.128*	-0.222***	-0.259***	-0.201**	-0.213***
Rice production	-0.788***	-0.791***	-0.954***	-0.714***	-0.327***	-0.217***	-0.511***	-0.274***
Weather shock					0.018***	0.019***	0.020***	0.021***
(No weather shock)								
Access to land	0.196	0.292	0.241	0.264	0.474***	0.414***	0.473**	0.537***
(No access to land)								
Income assets	-1.227***	-1.150**	-0.925**	-1.565***	-0.273*	-0.459***	-0.196	-0.356**
Remittances	-0.102	-0.243**	-0.107	-0.109	-0.226**	-0.241**	-0.263**	-0.185*
(No remittances)								
(1st quarter)								
2nd quarter	0.381**	0.356**	0.519***	0.434**	-0.461***	-0.253*	-0.632***	-0.311**
3rd quarter	-0.231*	-0.248*	-0.116	-0.396***	-0.475***	-0.269*	-0.746***	-0.245*
4th quarter	-0.055	-0.096	0.165	-0.076	-0.729***	-0.526***	-0.817***	-0.558***
Access to electricity	-0.744***	-0.821***	-0.575***	-0.824***	-0.761***	-0.816***	-0.742***	-0.845***
(No access to elect)								
Road	0.618***	0.632***	0.601***	0.736***	0.427***	0.457***	0.406**	0.454***
Lower sec school	-0.024	-0.014	0.079	-0.066	-0.151	-0.039	-0.108	0.008
Upper sec school	-0.279*	-0.270	-0.246	-0.314*	0.550*	0.391	0.836***	0.398
Post office	0.526***	0.436***	0.397***	0.425***	-0.032	-0.067	-0.047	-0.100
Daily market	-0.366***	-0.335**	-0.338***	-0.424***	0.277**	0.220*	0.287**	0.412***
Food shop	-0.479***	-0.479***	-0.465***	-0.388***	-0.636***	-0.556***	-0.716***	-0.657***
Primary school	1.955***	1.662***	1.601***	2.227***	0.152	0.201	-0.017	0.200
Clinic	-0.562***	-0.216	-0.527***	-0.443**	1.103***	1.058***	0.963***	0.836***
Constant	-0.293	0.303	-0.739	0.098	0.596	0.690	0.643	1.016**
Observations	3494	3494	3494	3494	3494	3494	3494	3494

RESULTS OF POVERTY DYNAMICS MODELS

	Escape poverty	**Escape (+10%)**	**Escape (-10%)**	**Escape pae**	**Fall into poverty**	**Fall (+10%)**	**Fall (-10%)**	**Fall pae**
Northern Uplands	0.075	-0.175	0.104	-0.003	0.103	0.327	0.201	-0.257
Red River Delta	0.255	0.046	0.325*	0.243	0.224	0.242	0.332	0.105
(North Central)								
Central Coast	0.311	0.139	0.410*	0.252	-0.335	0.004	0.170	0.082
Central Highlands	0.810**	1.123***	0.945**	1.403***	-1.083	-0.581	-0.094	-0.784
South East	1.741***	1.719***	2.052***	1.751***	-1.321***	-1.059**	-1.128**	-0.834*
Mekong River Delta	0.712***	0.500**	0.533**	0.567**	-0.083	-0.444	0.584	-0.247
(Kinh)								
Chinese	-1.786*	0.412	-0.497	0.067				
Other ethnicity	-0.813***	-0.724***	-0.572***	-0.839***	0.841**	1.114***	0.498	0.815**
(Not Buddhist)								
Buddhist	-0.047	0.046	0.012	-0.007	-0.578***	-0.594**	-0.825***	-0.632***
Head is female)								
Head is male	-0.023	0.007	-0.109	-0.028	-0.093	0.013	0.129	-0.078
Age of head	0.336***	0.310***	0.281***	0.191***	-0.442***	-0.169	-0.328***	-0.021
Age squared	-0.187***	-0.215***	-0.089*	-0.152***	0.194**	0.016	0.283***	-0.014
No adults	0.004	-0.055	0.037	-0.059	0.223**	-0.019	0.192*	0.159
No children	-0.355***	-0.330***	-0.349***	-0.121**	-0.173	-0.123	-0.047	-0.304**
(Head no education)								
Primary education	0.772***	0.656***	0.602***	0.668***	-0.046	0.055	-0.396*	-0.083
Lower sec education	1.082***	1.069***	1.214***	1.053***	-0.832***	-0.749**	-0.631**	-0.824**
Upper sec education	1.134***	1.079***	0.985***	1.002***	-1.575**	-0.710	-1.428**	-0.288
Technical/university	0.801***	0.742***	0.789***	0.762***	-1.461***	-1.386***	-0.823**	-1.170***
Household no spouse	0.052	0.085	0.033	0.140	0.093	0.217	-0.166	-0.063
(Spouse no educ)								
Primary education	0.224	0.242	0.275*	0.275*	-0.250	-0.217	-0.177	-0.072
Lower sec education	0.170	0.077	0.235	0.210	0.237	0.078	-0.056	0.046
Upper sec education	0.368	0.250	0.097	0.370	0.955*	0.406	-0.260	0.483
Technical/university	0.987***	0.940***	0.631*	0.908***	-0.448	-0.806	-0.721	-0.643
White collar	1.307***	1.207***	1.499***	1.195***	-0.451	-0.540	-0.756	-0.504
Sales	0.282	0.544*	-0.013	0.283	-1.112**	-0.055	-1.196**	-0.426
(Agriculture)								
Production	0.237	0.375**	0.108	0.356**	-0.180	0.216	-0.336	-0.485
Unemployed	-0.348*	-0.023	-0.344	0.067	-0.172	-0.302	-0.237	-0.266
Workdays lost	0.294	0.137	0.090	0.112	0.637**	0.695**	0.516*	0.737**
(No illness)								
Land irrigation pc	0.203	0.150	-0.015	0.211*	0.111	0.055	0.024	0.082
Rice production	0.440***	0.500***	0.597***	0.448***	-0.222	-0.103	-0.347**	-0.241*
Weather shock	-0.017**	-0.016**	-0.026***	-0.022***	0.045***	0.045***	0.049***	0.033**
(No weather shock)								
Access to land	0.095	0.457**	-0.071	0.349	-0.876***	-0.520	-0.437	-0.394
(No access to land)								
Income assets	-1.297	-0.520	-1.103	-0.195	0.129	-1.193	-0.474	-0.164
Remittances	0.138	0.086	-0.012	0.148	-0.407*	-0.273	-0.774***	-0.835***
(No remittances)								
(1st quarter)								
2nd quarter	-0.031	0.036	0.097	-0.124	-0.289	-0.249	0.140	-0.670
3rd quarter	0.178	0.158	0.286*	0.041	-0.088	-0.186	-0.285	-0.474*
4th quarter	-0.021	-0.145	0.187	-0.136	-0.234	-0.239	-0.543**	-0.306
Access to electricity	0.356***	0.513***	0.425***	0.485***	-0.910***	-1.062***	-0.596**	-1.047***
(No access to elect)								
Road	0.478**	0.404**	0.206	0.352*	-0.292	-0.616*	-0.026	-0.584*
Lower sec school	-0.272	-0.116	-0.233	0.087	-0.300	-0.287	0.054	-0.504*
Upper sec school	0.382*	0.398**	0.422**	0.413**	-0.345	-0.376	-0.697	-0.639
Post office	-0.540***	-0.576***	-0.364**	-0.483***	0.221	0.128	0.160	0.671***
Daily market	0.312**	0.384***	0.206	0.222	0.114	-0.020	-0.129	-0.117
Food shop	0.299**	0.239*	0.251	0.249*	-0.361	-0.150	-0.217	-0.474*
Primary school	0.019	0.265	-0.272	-0.108	-0.613	-0.288	0.034	-0.921
Clinic	0.779***	0.408*	0.919***	0.719***	-0.210	-0.675*	-0.442	-0.157
Constant	-1.843***	-2.428***	-1.011*	-2.623***	1.110	1.354	-0.853	2.437*

Observations	2221	2470	1901	2547	1264	1017	1584	939

RESULTS OF CONSUMPTION MODELS

	Cons exp	**Cons pae**
Northern Uplands	-0.044*	-0.046*
Red River Delta	0.059**	0.053**
(North Central)		
Central Coast	-0.120***	-0.119***
Central Highlands	0.008	0.035
South East	0.064*	0.076**
Mekong River Delta	-0.177***	-0.171***
(Kinh)		
Chinese	-0.150	-0.127
Other ethnicity	-0.082***	-0.081***
(Not Buddhist)		
Buddhist	0.087***	0.083***
(Head is female)		
Head is male	-0.026	-0.021
Age of head	0.015	0.001
Age squared	-0.004	0.019**
No adults	0.034***	0.021**
No children	0.066***	0.059***
(Head no education)		
Primary education	-0.010	-0.019
Lower sec education	0.046**	0.037
Upper sec education	0.078*	0.073*
Technical/university	0.055*	0.044
Household no spouse	0.015	0.019
(Spouse no educ)		
Primary education	0.018	0.022
Lower sec education	-0.008	0.001
Upper sec education	-0.078	-0.053
Technical/university	-0.011	-0.007
White collar	0.011	0.009
Sales	-0.076*	-0.081*
(Agriculture)		
Production	-0.028	-0.024
Unemployed	-0.018	-0.014
Workdays lost	-0.055*	-0.049
(No illness)		
Land irrigation pc	-0.037***	-0.036***
Rice production	-0.037***	-0.038***
Weather shock	-0.007***	-0.007***
(No weather shock)		
Access to land	0.087**	0.086**
(No access to land)		
Income assets	-0.002	-0.002
Remittances	0.029	0.027
(No remittances)		
(1st quarter)		
2nd quarter	0.064**	0.067***
3rd quarter	-0.069***	-0.071***
4th quarter	-0.022	-0.025
Access to electricity	-0.006	-0.011
(No access to elect)		
Road	0.175***	0.174***
Lower sec school	-0.074***	-0.069***
Upper sec school	0.001	0.001
Post office	-0.006	-0.006
Daily market	0.012	0.008
Food shop	-0.021	-0.024
Primary school	0.314***	0.302***
Clinic	-0.005	-0.002

Constant	-0.027	-0.063
Observations	3494	3494
R-squared	0.13	0.13