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# Poverty Dynamics: The Structurally and Stochastically Poor in Vietnam

Nguyen Viet Cuong<sup>1</sup>

## Abstract

This paper aims to measure the poverty dynamics in Vietnam using the most recent Vietnam Household Living Standard Survey in 2010. Since, there are no panel data between the 2010 VHLSS and the previous studies, the study uses the asset approach of Carter and May (1999, 2001) to estimate the proportion of the structurally and stochastically poor. It is found that the proportion of the structurally and stochastically poor is 11.1 percent and 9.6 percent, respectively. Nearly half of the poor are the stochastically poor. The proportion of the stochastically non-poor, who are non-poor but vulnerable to poverty, is small, at around 3.7 percent.

Keywords: poverty dynamics, household survey, Vietnam

JEL Classification: I30, I32.

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## 1. Introduction

Measurement of poverty dynamics has been long of interest for both development economists and policy makers. The poor is not a homogeneous group. The poor can include the chronically poor who are very poor for a long period and the transiently poor who experience both poverty and non-poverty years during that period (Hulme and Shepherd, 2003). Different poverty alleviation programs should be targeted at different poverty groups (Baulch and Hoddinott, 2000). For example, long-term investment in human capital such as education and healthcare (including cash transfers conditional on child education) should be targeted at the chronically poor. Meanwhile short-term programs such as cash transfers and vocational training should be provided for the transiently poor to help them escape poverty quickly and reduce vulnerability.

Vietnam has achieved great successes in poverty reduction during the past two decades. The poverty rate decreased from 58 percent in 1993 to 37 percent in 1998, and continued to decrease to 20 percent in 2010.<sup>2</sup> However, the speed of poverty reduction has been slow recently (World Bank, 2012). The economic growth was lower in recent years. The annual growth rate of GDP during the period 2008-2011 was approximately 6 percent, while this rate was around 8.2 percent annually during the period 2001-2007. To reduce poverty, the Government of Vietnam has implemented a wide range of poverty reduction programs. Measurement of the poverty dynamics can provide important information for policies on poverty reduction in Vietnam.

There are several studies on poverty dynamics in Vietnam using panel data from household surveys. There are a large number of household surveys in Vietnam including Vietnam Living Standard Surveys (VLSS) in 1993 and 1998, and five Vietnam Household Living Standard Surveys (VHLSS) during the period 2002-2010.<sup>3</sup> Glewwe et al. (2002) and Justino and Litchfield (2003) explain the probability of moving out and in poverty of households in the panel data of VLSS 1993 and 1998 using multinomial logit models. Nguyen et al. (2006) examines the chronic poverty using panel data of VHLSSs 2002 and 2004. They find that the percentage of chronically poor people has decreased substantially. Recently, Baulch and Vu (2010) examines the factors correlated with chronic poverty using panel data of VHLSSs 2002, 2004 and

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<sup>2</sup> Estimates based on the Vietnam Living Standard Surveys in 1993, 1998 and 2010.

<sup>3</sup> Until 2010, the VHLSSs were conducted in 2002, 2004, 2006, 2008 and 2010.

2006. They find that demographic and educational variables play an important role in explaining the chronic poverty.

In this study, we will measure the poverty dynamics using the most recent VHLSS in 2010. Unlike previous VHLSSs, there is no link between the 2010 VHLSS and a previous VHLSS. It is difficult to measure poverty dynamics using single cross-sectional data, since measurement of poverty dynamics often requires panel data. Jalan and Ravallion (2000) decompose poverty into two components: the transient poverty due to the intertemporal variability in consumption, and the chronic poverty simply determined by the mean consumption overtime using longitudinal data with at least three repeated observations. According to Hulme and Shepherd (2003), a person can be chronically poor if he/she is poor in all the years of interest, while another person can be transiently poor if he/she is poor in some years but non-poor in other years. This definition also requires panel data at least two periods.

In this study, a method of poverty dynamics by Carter and May (2001) is applied to decompose poverty into structural and stochastic poverty. This method requires only single cross-sectional data. The paper is structured into four sections as follows. The second section presents the methodology. Next, the third section presents data and the empirical findings. Finally, the fourth section concludes.

## 2. Methodology

Carter and May (1999, 2001) assume that a household  $i$  has two-time periods. At the time  $t$ , the household has asset  $A_{it}$  (both physical and human). The household must choose consumption  $c_{it}$  and investment  $I_{it}$  to maximize their utility, which is a function of consumption. The model is expressed as follows:

$$\begin{aligned} \max_{\{c_{it}, I_{it}\}} u(c_{it}) \text{ subject to:} \\ c_{it} = F(A_{it}, \theta_{it}) - I_{it} \\ A_{i(t+1)} = A_{it} + I_{it} - \Theta_{it} \end{aligned} \tag{1}$$

There are two main constraints. The first is the budget constraint given by income  $F(A_{it}, \theta_{it})$ , a function of assets  $A_{it}$  and the stochastic income shock  $\theta_{it}$ . The second constraint shows that the future asset depends on the current asset, investment and shock  $\Theta_{it}$ .

The household prefers smoothness rather than fluctuation in consumption over two periods. To smooth consumption, the household can borrow in event of shocks. However, a credit market is not available for the poor, especially in developing countries. Thus, the household has to sell assets to cope with shocks. If a large amount of assets is sold, the remaining assets might not be sufficient to generate enough consumption in next period, and the household can fall into poverty.

Carter and May (1999, 2001) decompose the realized (current) consumption,  $c_{it}$  into three following components:

$$c_{it} = c_{0i} + c(A_{it}) + \varepsilon_{it}. \quad (2)$$

The first component  $c_{0i}$  is the stable consumption based on permanent income. The second component implies that consumption can depend on the current asset  $c(A_{it})$  (the household sell asset in case of shocks and without access to credit), and the third term  $\varepsilon_{it}$  will become non-zero when the household cannot smooth out shocks (either negative or positive).

A household is defined as the poor if their realized consumption is below the money metric poverty line, denoted by  $C_{PL}$ . In Carter and May (1999, 2001), the asset poverty line,  $A_{PL}$ , is estimated so that it satisfies the following condition:

$$A_{PL} = \{A \mid \hat{c}(A_{PL}) = C_{PL}\}. \quad (3)$$

The asset poverty line  $A_{PL}$  is the combination of assets that are expected to yield the level of welfare equal to the poverty line  $C_{PL}$ . Once the asset poverty line is estimated, households can be classified into four groups: the structurally and stochastically poor, the stochastically and structurally non-poor. Households are defined as structurally poor if their consumption is below the consumption poverty line and their asset level is also below the asset poverty line. Households who are poor in terms of their realized consumption but have the asset level above the asset poverty line are defined as stochastically poor. The stochastically non-poor households are those who are non-poor by the consumption poverty line but poor by the asset poverty line. Finally, the structurally non-poor households are those who are non-poor by both the consumption and asset poverty lines.

### 3. Empirical results

The study relies on data from the most recent Vietnam Household Living Standard Surveys (VHLSS) in 2010. The survey was conducted by the General Statistics Office of Vietnam (GSO). The survey covered 9,399 households. The sample is representative for the whole country, rural and urban areas, and six geographic regions. The survey contains detailed data on household living standards including basic demography, employment and labor force participation, education, health, income, expenditure, housing, fixed assets and durable goods, participation of households in poverty alleviation programs.

In this paper, a household is classified as the poor if their per capita expenditure is below the poverty line. This poverty line is constructed by GSO and WB. It is equal to 7863 thousand VND/person/year.<sup>4</sup>

To estimate the stochastic and structural poverty, we have to estimate the asset level and the asset poverty line. This is challenging since there can be a large number of asset items, and many human assets such as education and demography cannot be measured. Equation (3) suggests that we use the predicted expenditure given observed asset variables to predict the asset level. More specifically, the first step is to run regression of per capita expenditure on asset variables which are expected to generate income of the households in the long-term. In the second step, the predicted expenditure per capita is estimated for each household in the sample. This expected expenditure can be regarded as the long-term expenditure which depends on the asset level. Thus it can be a proxy for the asset level of households. The expenditure poverty line can be used as the asset poverty line, since the predicted expenditure is used as the prediction of assets.

Based on the predicted and observed expenditure, households with both the predicted expenditure and observed expenditure below the expenditure poverty line are defined as the structurally poor. Households who have the predicted expenditure above the poverty line, but the observed expenditure below the poverty line are classified as the stochastically poor. Households who are non-poor by the observed expenditure but poor by the predicted expenditure are the stochastically non-poor. The last group of

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<sup>4</sup> The poverty lines are calculated taking account of regional price differences and monthly price changes over the survey period.

households who have both the predicted and observed expenditure above the poverty line is the structurally non-poor.

Table 1 presents the regression results of expenditure per capita on asset variables. We select important assets, both human and physical, that tend to be unchanged in the short-run. The explanatory variables include geography (regional dummy variables), basic demography, education, land and housing variables. The model is estimated separately for urban and rural areas, since the expenditure pattern is different between the urban and rural areas.<sup>5</sup>

Table 1: Regression of log of per capita expenditure

Explanatory variables	Urban households			Rural households		
	Coef.	Std. Err.	P>t	Coef.	Std. Err.	P>t
Red River Delta	Omitted					
Northern Mountains	-0.1821	0.0598	0.002	-0.1811	0.0472	0.000
Central Coast	-0.1202	0.0589	0.042	-0.1203	0.0440	0.006
Central Highlands	-0.0467	0.0592	0.431	-0.0860	0.0501	0.086
Southeast	0.1009	0.0620	0.104	0.1073	0.0627	0.087
Mekong Delta	-0.1363	0.0628	0.030	-0.0059	0.0450	0.895
Gender of head (male=1)	-0.0458	0.0303	0.131	-0.0652	0.0214	0.002
Age of head	0.0021	0.0012	0.077	0.0006	0.0007	0.380
Household size	-0.0368	0.0083	0.000	-0.0160	0.0054	0.003
Proportion of children (below 15)	-0.3485	0.0597	0.000	-0.4065	0.0363	0.000
Proportion of elderly (above 60)	-0.2132	0.0658	0.001	-0.3053	0.0352	0.000
Ethnic minorities (yes=1)	-0.3033	0.0538	0.000	-0.3572	0.0259	0.000
Head without education degree	Omitted					
Head with primary school	0.1282	0.0321	0.000	0.0976	0.0151	0.000
Head with lower-secondary	0.1963	0.0394	0.000	0.1453	0.0206	0.000
Head with upper-secondary	0.3113	0.0456	0.000	0.2078	0.0278	0.000
Head with technical degree	0.3306	0.0419	0.000	0.3295	0.0282	0.000
Head with post-secondary	0.5329	0.0478	0.000	0.4406	0.0423	0.000
Head without spouse	Omitted					
Spouse without education degree	-0.0614	0.0413	0.138	0.0352	0.0287	0.219
Spouse with primary school	-0.0197	0.0441	0.655	0.1025	0.0296	0.001
Spouse with lower-secondary	0.0037	0.0456	0.935	0.1052	0.0277	0.000
Spouse with upper-secondary	0.0478	0.0529	0.367	0.1975	0.0415	0.000
Spouse with technical degree	0.1113	0.0470	0.018	0.2902	0.0389	0.000
Spouse with post-secondary	0.2611	0.0627	0.000	0.4657	0.0510	0.000
Per capita annual crop land (1000 m2)				0.0079	0.0042	0.063
Per capita perennial crop land (1000 m2)				0.0145	0.0037	0.000
Per capita living area (m2)	0.3129	0.0266	0.000	0.3424	0.0163	0.000
Solid house	Omitted					
Semi-solid house	-0.3260	0.0298	0.000	-0.0796	0.0221	0.000
Temporary house	-0.4165	0.0516	0.000	-0.1844	0.0249	0.000
Constant	9.1517	0.1215	0.000	8.5993	0.0945	0.000
R-squared		0.564			0.545	
Number of observations		2649			6750	

*Source: Estimated from the 2010 VHLSS.*

<sup>5</sup> Chow-test (F test = 70) rejects the hypothesis that coefficients in the expenditure equation are the same for the urban and rural areas.

Table 2 presents the estimation of the incidence of different poor and non-poor groups in 2010. The poverty rate is 20.7 percent. The proportion of the structurally and stochastically poor is 11.1 percent and 9.6 percent, respectively (the poverty rate is equal to sum of the structural poverty rate and stochastic poverty rate). The stochastically poor account for 46.4 percent of the poor. The proportion of the stochastically non-poor is 3.7 percent. These people have low asset levels, though consumption higher than the poverty line. Because of a low asset level, these people are more likely to fall into poverty than other non-poor people with a higher asset level.

Among regions, Northern Mountain has the highest poverty rate. Most of the poor are structurally poor (or chronically poor). There are also 8.8 percent of people who are found stochastically non-poor. Central High is the second poorest region with a large proportion of the structurally poor. Northern Mountain and Central High are regions with high concentration of ethnic minorities. On the contrary, South East and Red River Delta are the richest regions with a low poverty rate and a low stochastic non-poor rate. In these regions, most of the poor are stochastically poor.

Table 2: Distribution of population by poverty statuses in 2010 (%)

	Structurally Poor	Stochastically Poor	Stochastically Non-Poor	Structurally Non-Poor	Total	Ratio of sto. poor over the total poor (%)
<i>Regions</i>						
Red River Delta	1.1 (0.3)	10.8 (0.6)	1.1 (0.2)	87.0 (0.8)	100	90.5
Northern Mountains	37.1 (1.4)	7.8 (0.7)	8.8 (0.7)	46.4 (1.4)	100	17.3
Central Coast	12.8 (0.7)	10.9 (0.6)	4.7 (0.4)	71.6 (1.0)	100	46.1
Central Highlands	25.3 (1.9)	7.4 (1.0)	5.5 (1.0)	61.8 (2.0)	100	22.6
Southeast	1.3 (0.4)	5.7 (0.7)	0.9 (0.3)	92.1 (0.9)	100	81.5
Mekong Delta	7.0 (0.7)	11.7 (0.6)	4.2 (0.5)	77.1 (1.0)	100	62.7
<i>Ethnic minorities</i>						
Kinh and Hoa	2.8 (0.2)	10.1 (0.3)	1.8 (0.2)	85.2 (0.4)	100	78.2
Ethnic minorities	59.7 (1.6)	6.7 (0.8)	14.8 (0.9)	18.9 (1.3)	100	10.0
Total	11.1 (0.4)	9.6 (0.3)	3.7 (0.2)	75.5 (0.5)	100	46.4

Source: Estimated from the 2010 VHLSS.  
Standard errors are in parentheses. Standard errors are estimated using bootstrap with 500 replications.

Compared with Kinh and Hoa, people of ethnic minorities have a very high poverty rate. Only 10 percent of the ethnic minority poor are stochastically poor. It



means that 90 percent of the poor are structurally poor. There is also a large proportion of stochastically non-poor, who are more vulnerable to poverty.

The poverty estimates can be sensitive to the selection of asset variables in the regression of per capita expenditure. To examine this sensitivity, we run two additional models: the first model uses a small set of explanatory variables (only regional dummies, demography and education variables), and the second models use a large set of explanatory variables (using the same explanatory variables in Table 1, but plus dummy variables of ownership of television, motorbike, television and electric fan). The poverty estimates based on these models are presented in Tables A.2 and A.3 in Appendix. Overall, the poverty estimates are very similar to those based on the model reported in Table 1.

Table 3: Distribution of urban population by poverty statuses in 2010 (%)

	Structurally Poor	Stochastically Poor	Stochastically Non-Poor	Structurally Non-Poor	Total	Ratio of sto. poor over the total poor (%)
<i>Regions</i>						
Red River Delta	0.0 (0.1)	4.0 (0.8)	0.3 (0.2)	95.7 (0.9)	100	100.0
Northern Mountains	4.7 (1.3)	6.3 (1.4)	2.9 (0.9)	86.1 (2.1)	100	56.9
Central Coast	2.3 (0.6)	5.6 (0.9)	0.9 (0.4)	91.2 (1.2)	100	71.0
Central Highlands	2.2 (1.0)	5.9 (1.5)	0.7 (0.6)	91.2 (1.9)	100	72.9
Southeast	0.0 (0.3)	3.0 (0.8)	0.0 (0.1)	97.0 (0.8)	100	100.0
Mekong Delta	2.9 (0.8)	6.9 (1.0)	2.1 (0.8)	88.0 (1.5)	100	70.5
<i>Ethnic minorities</i>						
Kinh and Hoa	0.5 (0.2)	4.3 (0.4)	0.6 (0.2)	94.7 (0.5)	100	89.1
Ethnic minorities	20.8 (3.9)	15.7 (2.5)	6.8 (2.3)	56.7 (4.7)	100	43.0
Total	1.3 (0.3)	4.7 (0.4)	0.8 (0.2)	93.1 (0.6)	100	78.0

Source: Estimated from the 2010 VHLSS.

Standard errors are in parentheses. Standard errors are estimated using bootstrap with 500 replications.

Tables 3 and 4 present the poverty estimates for urban and rural households. The poverty rate and the stochastic non-poor rate in urban areas are much lower than those in rural areas. In rural areas the poor are more likely to be structurally poor, while in the urban areas the poor are more likely to be stochastically poor. Rural Northern Mountain and rural Central Highland are areas having the highest structural poverty rates. The non-poor households in these areas are more vulnerable to the poverty due to lack of assets.

Table 4: Distribution of rural population by poverty statuses in 2010 (%)

	Structurally Poor	Stochastic- ally Poor	Stochastic- ally Non- Poor	Structurally Non-Poor	Total	Ratio of sto. poor over the total poor (%)
<i>Regions</i>						
Red River Delta	1.6 (0.4)	13.8 (0.9)	1.4 (0.3)	83.2 (1.1)	100	89.4
Northern Mountains	43.7 (1.5)	8.1 (0.8)	10.0 (0.9)	38.3 (1.5)	100	15.6
Central Coast	16.2 (1.0)	12.7 (0.8)	5.9 (0.6)	65.1 (1.4)	100	43.9
Central Highlands	34.5 (2.5)	8.0 (1.3)	7.4 (1.3)	50.1 (2.6)	100	18.9
Southeast	3.0 (0.7)	9.2 (1.1)	1.9 (0.7)	86.0 (1.5)	100	75.6
Mekong Delta	8.2 (0.8)	13.2 (0.8)	4.8 (0.5)	73.9 (1.2)	100	61.7
<i>Ethnic minorities</i>						
Kinh and Hoa	4.0 (0.3)	13.1 (0.4)	2.5 (0.2)	80.5 (0.6)	100	76.8
Ethnic minorities	63.1 (1.6)	5.9 (0.8)	15.5 (1.0)	15.6 (1.3)	100	8.5
Total	15.3 (0.5)	11.7 (0.4)	5.0 (0.3)	68.1 (0.6)	100	43.4

Source: Estimated from the 2010 VHLSS.

Standard errors are in parentheses. Standard errors are estimated using bootstrap with 500 replications.

#### 4. Conclusion

There are several studies on poverty dynamics in Vietnam using panel data from VLSSs and VHLSSs. This paper investigates the poverty dynamics in Vietnam using the most recent VHLSS in 2010. Since, there are no panel data between the 2010 VHLSS and the previous studies, the study uses the asset approach of Carter and May (1999, 2001) to estimate the proportion of the structurally and stochastically poor. It is found that the proportion of the structurally and stochastically poor is 11.1 percent and 9.6 percent, respectively. Nearly half of the poor are the stochastically poor. The proportion of the stochastically non-poor is small, at around 3.7 percent.

Among regions, Northern Mountain has the highest poverty rate, followed by Central Highland. 98 percent and 70 percent of the population in Northern Mountain and Central Highland are ethnic minorities. Most of the poor in these regions are structurally poor. The stochastically non-poor also account for a large proportion in these regions.

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## Appendix

Table A.1: Summary statistics of variables

Variable	Type	Urban households		Rural households	
		Mean	Std. Dev.	Mean	Std. Dev.
Red River Delta	Binary	0.214	0.410	0.211	0.408
Northern Mountains	Binary	0.126	0.332	0.197	0.398
Central Coast	Binary	0.219	0.413	0.220	0.415
Central Highlands	Binary	0.075	0.263	0.067	0.250
Southeast	Binary	0.197	0.398	0.089	0.285
Mekong Delta	Binary	0.170	0.376	0.216	0.411
Gender of head (male=1)	Binary	0.653	0.476	0.792	0.406
Age of head	Discrete	49.73	14.07	47.80	14.27
Household size	Discrete	3.820	1.464	3.982	1.602
Proportion of children (below 15)	Continuous	0.194	0.197	0.223	0.215
Proportion of elderly (above 60)	Continuous	0.124	0.251	0.120	0.259
Ethnic minorities (yes=1)	Binary	0.061	0.239	0.213	0.410
Head without education degree	Binary	0.156	0.363	0.296	0.457
Head with primary school	Binary	0.195	0.396	0.275	0.446
Head with lower-secondary	Binary	0.193	0.395	0.256	0.436
Head with upper-secondary	Binary	0.099	0.298	0.064	0.245
Head with technical degree	Binary	0.194	0.395	0.083	0.275
Head with post-secondary	Binary	0.164	0.371	0.026	0.159
Head without spouse	Binary	0.236	0.425	0.191	0.393
Spouse without education degree	Binary	0.108	0.310	0.263	0.440
Spouse with primary school	Binary	0.160	0.367	0.233	0.423
Spouse with lower-secondary	Binary	0.164	0.371	0.216	0.412
Spouse with upper-secondary	Binary	0.086	0.280	0.041	0.197
Spouse with technical degree	Binary	0.133	0.340	0.036	0.186
Spouse with post-secondary	Binary	0.113	0.316	0.020	0.142
Per capita annual crop land (1000 m <sup>2</sup> )	Continuous	0.212	0.928	0.874	1.626
Per capita perennial crop land (1000 m <sup>2</sup> )	Continuous	0.159	1.167	0.375	2.482
Per capita living area (m <sup>2</sup> )	Continuous	2.924	0.695	2.749	0.593
Solid house	Binary	0.442	0.497	0.222	0.416
Semi-solid house	Binary	0.510	0.500	0.631	0.483
Temporary house	Binary	0.048	0.214	0.147	0.355
Number of observations		2649		6750	

Source: Estimated from the 2010 VHLSS.

Table A.2: Distribution of population by poverty statuses in 2010 (%): a small set of explanatory variables

	Structurally Poor	Stochastically Poor	Stochastically Non-Poor	Structurally Non-Poor	Total
Regions					
Red River Delta	0.7	11.2	0.0	88.0	100
Northern Mountains	36.3	8.6	10.3	44.8	100
Central Coast	10.1	13.7	4.2	72.1	100
Central Highlands	24.3	8.5	5.1	62.2	100
Southeast	0.7	6.4	0.6	92.3	100
Mekong Delta	3.2	15.5	1.7	79.6	100
Ethnicity					
Kinh and Hoa	0.9	12.1	0.8	86.2	100
Ethnic minorities	59.4	6.9	16.0	17.8	100
Total	9.4	11.3	3.0	76.2	100

Source: Estimated from the 2010 VHLSS.

Table A.3: Distribution of population by poverty statuses in 2010 (%): a large set of explanatory variables

	Structurally Poor	Stochastically Poor	Stochastically Non-Poor	Structurally Non-Poor	Total
Regions					
Red River Delta	1.2	10.8	1.0	87.1	100
Northern Mountains	36.4	8.5	7.8	47.3	100
Central Coast	13.1	10.6	4.3	71.9	100
Central Highlands	25.9	6.9	5.9	61.4	100
Southeast	1.5	5.5	0.9	92.1	100
Mekong Delta	7.6	11.1	3.4	77.9	100
Ethnicity					
Kinh and Hoa	3.1	9.8	1.8	85.3	100
Ethnic minorities	59.0	7.3	12.9	20.8	100
Total	11.3	9.5	3.4	75.9	100

Source: Estimated from the 2010 VHLSS.