

Income Diversity and Poverty Transitions: Evidence from Vietnam

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Abstract

The large share of the population in rural areas of the developing world has been diversifying their livelihood to nonagricultural activities. However, the amount of the literature that discusses the possible effects of the diversity on a household's well-being is still limited. This study contributes to this strand of the literature by investigating the effects of income diversity on poverty transitions. The analysis is based on household panel data collected in the 2000s from Vietnam and applied to a multinomial logit model. The results show that households with better access to markets are more able to diversify their income sources to nonagricultural activities and the diversity is helpful for a household to escape poverty or to avoid falling into poverty.

Key words: income diversity, poverty transitions, nonagricultural income sources, Vietnam.

JEL classification: I32, O13, P36, R11

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Introduction

The dynamics of poverty have been one of the central issues in development economics. There has been a great deal of theoretical studies (Cappellari and Jenkins 2004; Carter and Barret 2006) and empirical studies (McCulloch and Baulch 1999; Glewwe, Gragnolati, and Zaman 2000; Woolard and Klasen 2005; Justino, Litchfield, and Pham 2008) that discuss the transitions into and out of poverty using different approaches and country cases. They have identified the characteristics of a household, the private and public assets a household possesses, the changes in macroeconomic condition such as trade reform, inflation, and economic crisis on the dynamics of poverty.

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In fact, the majority of the poor lives in rural areas and engages in agricultural activities. Also, the large share of the rural population is diversifying their income sources to nonagricultural activities that are usually of higher returns and consequently making them better off. Studies by De Janvry, Fafchamps, and Sadoulet (1991) and Kinsey, Burger, and Gunning (1998) indicate that income diversification is not only positively correlated with wealth but also with an increased ability to cope with shocks. Diversification is a way through which rural households insure themselves against the occurrence of such shocks, or, in other words, diversification reduces livelihood vulnerability. This self-insurance can also be seen as a negative function of the availability of social insurance, provided, for example, by the community or family. The better access to social networks and institutions, the less likely a household needs to apply self-insurance systems as the diversification of income portfolios. In contrast, social capital can also foster the ability to participate in many different income activities.

This study aims to contribute to the literature of vulnerability to poverty by examining the relationship between a household's diversity of income sources to nonagricultural activities and its transitions into and out of poverty. The main goal is to identify which households are more able to diversify income sources and if such income diversity makes the household better off or prevents it from falling into poverty.

This study examines these research questions in the context of Vietnam, although the approach can be applied to other developing countries. Vietnam has been one of the most successful countries in the developing world in terms of economic growth and poverty reduction. The rapid economic growth, together with market liberalization and trade openness that took place during the last two decades, has lifted a large share of the population out of poverty (see Tran, Alkire, and Klasen 2015). Nonetheless, poverty is still a central issue in the country as nearly 43 percent of the population still lives on less than \$2 a day (World Bank 2013), and many people earn their living by engaging in agricultural activities. Various population subgroups have benefited less from such development; households in rural areas have made slower progress than those in urban areas (see GSO 2011).

This study uses three waves of a panel surveys from 2007, 2008, and 2010 of more than 2000 rural and peri-urban households from three provinces in Vietnam. The drivers of poverty transitions are investigated via descriptive statistics and empirical results from multinomial logit (MNL) models. The analyses are based on the hypothesis that a

household that diversifies its income sources to nonagricultural activities finds it easier to escape poverty than a household that relies its income only on agricultural activities. The findings confirm that an increase in the share of nonagricultural income to total household income is correlated with the advancement of a household's well being.

This study is organized as follows. Section 2 describes the household panel data used in the analysis and presents the estimation strategy. Section 3 discusses the results of the MNL models that highlight the relationship between income diversification and household well-being. It also discusses the robustness of the estimation results. Finally, Section 4 concludes with the key messages of this paper.

Empirical Strategy

Data

This study is based on panel household surveys from 2007, 2008, and 2010 from the provinces of Hà Tĩnh (HT), Thừa Thiên Huế (TTH), and Đắk Lắk (DL) in Vietnam for the purpose of the research project “Vulnerability in Southeast Asia” being run by a consortium of German universities and local research institutes (see Klasen and Waibel 2012). The survey covers more than 2000 households located in rural and peri-urban areas in these three provinces. The three provinces have a diversity of agricultural and ecological conditions with mountainous, highland, lowland, and coastal zones. The surveys collect information on household demographics, health, education, economic activities, employment, access to financial markets, public transfers, household expenditures, and assets, and particularly on shocks and risks.

1.1 The Drivers of Poverty Transitions

This study applies an MNL model presented in Wooldridge (2002). Changes in household poverty statuses over a period can be classified into several mutually exclusive outcomes. The MNL model determines the probability that household i experiences one of the mutually exclusive outcomes j . The probability is expressed as

$$p_{ij} = P(Y_i = j) = \frac{e^{\beta_j x_i}}{\sum_{k=1}^J e^{\beta_k x_i}} \quad \text{for } j = 0, 1, 2, \dots, J,$$

(1)

where Y_i is the outcome experienced by household i , β_k are the set of coefficients to be estimated, and x_i includes a household's covariates and their changes. The model is,

however, unidentified since there is more than one solution for β_0, \dots, β_J that leads to the same probabilities $Y = 0, Y = 1, Y = 2, \dots, Y = J$. To identify the model, one of the β_j must be set to zero, and all other sets are estimated in relation to that base category. For convenience, β_0 is set to zero; therefore, the above probability function can be written as

$$p_{ij} = P(Y_i = j) = \frac{e^{\beta_j x_i}}{1 + \sum_{k=1}^J e^{\beta_k x_i}}, \text{ for } j = 1, 2, \dots, J \quad \text{and} \quad p_{i0} = P(Y_i = 0) = \frac{1}{1 + \sum_{k=1}^J e^{\beta_k x_i}} \quad (2)$$

From the panel years of 2007, 2008, and 2010, poverty dynamics can be classified into eight categories of (1) being nonpoor in all periods, (2a) poor–poor–nonpoor, (2b) poor–nonpoor–nonpoor, (3a) nonpoor–poor–poor, (3b) nonpoor–nonpoor–poor, (4a) nonpoor–poor–nonpoor, (4b) poor–nonpoor–poor, and (5) being poor in all periods. These eight categories can be grouped into five mutually exclusive outcomes: (1) $J = 4$ and $P(Y = 0)$ is the household's probability of being nonpoor in all periods, $P(Y = 1)$ is the probability of rising (includes categories (2a) and (2b)), $P(Y = 2)$ is the probability of falling (includes categories (3a) and (3b)), and $P(Y = 3)$ is the probability of churning (includes categories (4a) and (4b)), and $P(Y = 4)$ is the probability of being poor in all periods. Thus, the specific model applied in this study when standardizing $\beta_0 = 0$ is expressed as

$$p_{ij} = P(Y_i = j) = \frac{e^{\beta_j x_i}}{1 + \sum_{k=1}^4 e^{\beta_k x_i}}, \text{ for } j = 1, 2, 3, 4 \quad \text{and} \quad p_{i0} = P(Y_i = 0) = \frac{1}{1 + \sum_{k=1}^4 e^{\beta_k x_i}}. \quad (3)$$

The (MNL) model will estimate coefficients for four categories relative to the omitted category (being nonpoor in all periods). In order the relationship to make more sense, the results of the (MNL) model are used to predict marginal effects, which measure the conditional probabilities of a change in the regressors on the outcome and are estimated as

$$\frac{\partial p_{ij}}{\partial x_i} = p_{ij} \left(\beta_j - \sum_{k=1}^4 p_{ik} \beta_k \right). \quad (4)$$

A marginal effect shows the impact of a change in an explanatory variable on the probability of a household being in each of the five categories.

To investigate the dynamics of poverty in Vietnam, I hypothesize that a household's poverty transitions depend on the diversity of income sources, its characteristics, and its head's characteristics.

The measurement of poverty dynamics refers to equivalence scaled² income and a Vietnam national poverty line estimated by the Ministry of Labour, Invalids and Social Affairs (MOLISA), which was approximately \$1.21³ a day by 2008. Similarly, a household's income is used to measure the diversity from agricultural sources to nonagricultural sources.

Explanatory variables include income diversity and household asset levels. Income diversity is measured by an increase in the share of income from nonagricultural activities to the household's total income over a period. A household's asset is measured by household and individual characteristics as proxies for human capital; land use and asset index represent physical assets. Also, a household's location will be a proxy for the household's access to markets.

Household characteristics are measured by a household's size that counts the number of the household's member. The household's head characteristics include gender, age, ethnicity, and education attainment. In addition, a household's physical assets include quantitative and qualitative items. The quantitative assessment concerns whether the household has: a motorbike, a bike, a television, a radio, a CD player, an electric fan, an electric rice cooker, a fridge, and a mattress. The quality assessment includes: having improved flooring condition, having improved housing condition, having access to improved sanitation facility, and using improved cooking fuel.⁴ House size is also included, measured in square meters. These items are included in the estimation of the asset index via principal component analysis. Among the items, motorbike plays an important role (with a weight of 24 percent), and then comes television (10 percent), while the other items are less important, each of which contributes less than 10 percent to the asset index (see Table A.1).

The location of a household includes a dummy variable indicating provincial location. DL is located in the highlands with basalt soil, which is suitable for high-value crops such as

² Equivalence scaled income is calculated by dividing a household's total income by its equivalence size using OECD (1982) scale.

³ This poverty threshold is measured in purchasing power parity (PPP) price estimated in 2005

⁴ Reference categories: The floor is made of cement or ceramic. The main walls are made of concrete and the roof is made of slates or concrete. The household uses flushed toilet. The household cooks with gas or electricity.

coffee, pepper, cashew, and rubber. The population density in the province is also low, allowing households to possess more land than households in the other two provinces. In contrast, HT and TTH are in the coastal area and are frequently hit by storms and floods. These differences make it reasonable to treat DL as a reference.

Income Diversity and Poverty Transitions in Vietnam

The Patterns of Income Diversification

The main income sources of many households were those from agricultural activities. On average, agricultural activities accounted for 40 percent of a household's total income; this share was 50 percent in DL as many households there grew high-value crops such as coffee and pepper.

Agricultural activities usually included the crop production of rice, coffee, pepper, and corn, peanut, vegetable, and livestock production of cow, pig, and chicken. On average, a household had slightly more than five agricultural activities that yielded close to Vietnamese Dong (VND) 10 million by 2007, i.e., each activity yielded an average of VND 2 million per year. Over the three-year period, there was an increase of 0.5 activities and income from these activities increased by closed to 10 percent. Nonagricultural activities were usually off-farm employment, self-employment, interest from lending, remittance, and public transfer, etc. On average, a nonagricultural activity yielded closed to VND 18 million by 2007. Over the three years, there was only a little increase of 0.1 activities, but income from this activity rose by 22 percent (see Table 1). These imply that the transition to nonagricultural activities affects positively on a household's income; yet, the transition was relatively slow.

The pattern of income diversity differed from one population subgroup to another. Households in DL had less agricultural activities than their counterparts in HT and TTH, but agricultural activities in the former were of higher value. On average, a household in DL had only less than four agricultural activities and earned closed to VND 17 million from coffee, pepper, and cashew crops, while a household in TTH and HT had more than six agricultural activities by 2007 and earned only approximately VND 5 million. Nonagricultural sectors were not developed in HT, making households there rely more on crops and livestock to generate income.

Among 54 ethnic groups in Vietnam, the Kinh is the majority that accounts for nearly 86 percent of the entire population. They usually live in lowlands, which allows them to

have better access to markets and public services, ergo they benefit more from economic growth. On average, a Kinh household had less agricultural income sources and earned more from these than a household of ethnic minority groups did; the earlier also made a faster increase in the income. A Kinh household was also more likely to diversify its income sources to nonagricultural activities.

Table 1 Levels and changes in income sources by population subgroups

Population subgroups	Agricultural activities				Nonagricultural activities			
	Number of activities		Total income (mil. VND)		Number of activities		Total income (mil. VND)	
	Level 2007	Absolute change 2007–2010	Level 2007	Change 2007–2010 (%)	Level 2007	Absolute change 2007–2010	Level 2007	Change 2007–2010 (%)
Total	5.2	0.5	9.6	9.2	1.0	0.1	17.9	22.1
Head has no schooling	4.2	0.6	5.5	-0.6	1.1	0.1	13.1	21.6
Head attains primary school	4.7	0.5	6.9	47.2	1.1	0.1	17.2	-2.4
Middle school and beyond	5.6	0.5	11.4	1.8	1.0	0.1	19.2	29.9
Ethnic minority groups	5.4	0.4	9.2	7.6	0.9	0.1	18.7	26.0
Kinh (majority)	4.1	1.4	11.7	15.5	1.4	0.1	13.9	-4.6
Hà Tĩnh	6.3	0.5	5.2	85.4	0.6	0.2	15.5	39
Thừa Thiên Huế	6.0	-0.6	4.9	-8.9	1.3	0.1	19.7	34
Đắk Lắk	3.7	1.2	16.5	-12.8	1.3	0.1	19.4	3

Notes: Agricultural activities include crops and livestock production. Nonagricultural activities include all other income-generating activities. Income values refer to price level in April 2008. mil. VND refers to million Vietnamese Dong.

Source: Author's calculations from Vulnerability Surveys in Vietnam.

Generally, the results show that households with better human capital usually have better access to markets. They are, therefore, not only able to have more profitable crops and livestock but also more able to shift their income portfolio to nonagriculture sources. In addition, households in TTH and DL have more opportunities to switch to nonfarming income sources owing to the better performance of the economy in the two provinces as

compared with HT. Moreover, DL households particularly have advantages in growing high-value crops, such as coffee, pepper, and cashew, because of the weather and soil condition.

Trends in Poverty and Inequality

The overall poverty headcount ratio in Vietnam (as measured by per capita expenditure) continued to decrease from closed to 16 percent in 2006 to 14.5 percent in 2008 (GSO 2011). The poverty headcount ratios in the three provinces (as measured by equivalence scaled income) were lower than the ratios (as measured by per capita expenditure) found by Le, Nguyen, and Singh (LNS) (2014) (see Table 2). The three provinces not only made good progress in poverty reduction, but were also successful in keeping the equity of the development as well. The gap between the first and the fifth income quintiles increased slightly from 4.8 to 4.8 and 5.2 over the years, respectively, and the Gini index also increased only marginally from 0.301 to 0.301 and 0.315 over the period.

Table 2 Poverty headcount ratio at national poverty line by province, percent

	Estimated from Vulnerability Surveys			Estimated by LNS	
	2007	2008	2010	2006	2008
Hà Tĩnh	24.8	21.9	16.7	26	29
Thừa Thiên Huế	16.1	11.7	10.6	14	13
Đắk Lắk	19.0	16.4	14.4	17	22
Total	20.6	17.5	14.4	15.9	14.5

Source: Author's calculations from vulnerability surveys in Vietnam and Le, Nguyen, and Singh (LNS) (2014).

The Patterns of Poverty Transitions Across Groups

Over the three-year period, the majority of households stayed nonpoor (slightly over 62 percent) and the other 38 percent was vulnerable to poverty at some level. This pattern shows good progress in poverty reduction in which a large share of the population rose up, approximately 15 percent, and a small share of the population fell down at slightly more than 9 percent. Additionally, a tenth of the population moved around the poverty line (closed to 11 percent) and only a small share stayed poor in all periods (2.3 percent) (see Table 3).

The changes in poverty statuses differ across the subgroups of the population. Poverty is usually associated with a large-sized family and a higher burden of dependency. Nonpoor households tend to have fewer members and a lower dependency ratio, 4.1 and 0.4 respectively, while those who are poor in at least one period have nearly five members and a higher dependency ratio of 0.5. In fact, the poor have low incomes and low asset levels so they tend to live together and share their limited resources (see Table 3).

Table 3 Household and head characteristics by poverty trajectory, percent

	Nonpoor	Rising	Falling	Churning	Poor	Population share
Total	62.4	15.3	9.2	10.8	2.3	100
Household size	4.1	4.9	4.2	4.7	5.1	
Dependency ratio	0.4	0.5	0.5	0.5	0.6	
Head is less than 36 years old	52.6	17.2	9.5	18.1	2.5	17.1
Head is 36–50 years old	70.3	12.3	8.7	8.0	0.7	45.4
Head is 51–65 years old	63.5	15.3	8.4	11.2	1.7	23.9
Head is 66 years and beyond	46.0	23.4	12.1	10.1	8.4	13.6
Head has no schooling	43.9	22.0	12.1	17.0	5.0	13.4
Head attains primary school	54.0	18.6	11.4	11.9	4.1	22.9
Middle school and beyond	69.2	12.8	7.8	9.1	1.1	63.8
Ethnic minority groups	51.5	19.4	10.5	15.9	2.6	15.8
Kinh (majority)	64.4	14.5	9.0	9.9	2.2	84.2
Asset index	0.54	0.39	0.42	0.38	0.24	
Lowlands	65.8	13.2	8.5	10.3	2.3	48.2
Mountainous and highlands	59.1	17.4	9.9	11.3	2.3	51.8
Hà Tĩnh	58.1	17.2	9.1	11.7	4.0	38.6
Thừa Thiên Huế	71.2	12.7	7.2	7.4	1.5	22.2
Đắk Lắk	61.5	15.0	10.4	11.9	1.1	39.2

Notes: Population shares of the same category sum to 100.

Source: Author's calculations from Vulnerability Surveys.

There is a tendency that young and old households, headed by young or old persons, are more vulnerable to poverty than middle-aged ones. They are less likely to stay nonpoor

and are more likely to fall into poverty, fluctuate around the poverty line, or stay poor. Young households are usually newly formed ones, which mean that they also have to invest in bearing and caring for children. Older households are usually wealthier because they have experience in agriculture and livestock production and have accumulated more savings and assets. However, older heads are associated with having lower skills and being less healthy subsequently making them more vulnerable to poverty, which is confirmed by the result of a *t* test.

The education attainment of a household's head tends to have a negative relationship with the vulnerability to poverty. Slightly higher than 56 percent of households headed by men or women without any school are vulnerable to poverty. The share of vulnerable households decreases to 46 percent and 31 percent across the higher education attainment of the head. In addition, only 10 percent of the heads who are from the Kinh are illiterate, while 32 percent of the other heads cannot read or write. Moreover, the Kinh usually live in lowlands, which enables them to have better access to markets and allows them to have a lower risk of being poor.

The asset index is also believed to be a good proxy for household wealth (see Filmer and Pritchett 2001). It differs significantly across population subgroups; nonpoor households are again owners of higher asset levels, while stay-poor households are the least, being 0.54 and 0.24,⁵ respectively. In addition, the location of the household can be used as a proxy for public physical asset such as infrastructure and some regional differences. More than half of the households are in mountainous and highland areas where infrastructure such as roads, electricity, schools, and health clinics are in poorer condition and, thus, result in worse market access. Among the chronically poor households, the majority of them are in the mountainous areas in HT where infrastructure is usually of poor conditions, the natural condition is hard for agricultural production, and people are usually from ethnic minority groups who have less access to markets.

⁵ The asset index is scaled to the range of [0,1]

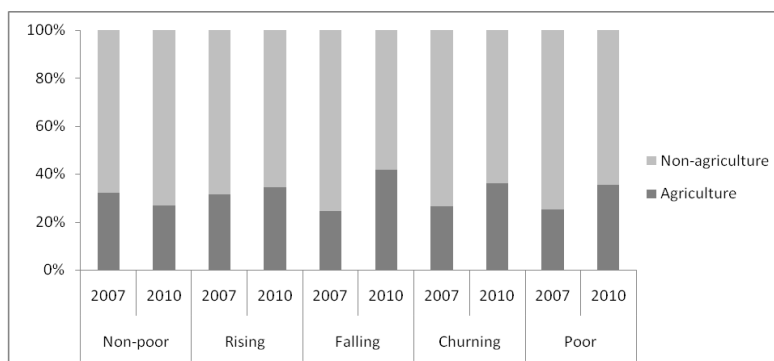


Figure 1 Changes in the patterns of income sources by poverty trajectory, percent

Source: Author's calculations from Vulnerability Surveys.

Notes: Agriculture refers to income from agricultural activities; nonagricultural refers to income from nonagricultural activities.

Finally, yet importantly, the patterns of and the changes in income sources also differ across population subgroups. On average, a nonpoor household had an income level of closed to VND 35 million by 2007 and it rose to slightly higher than VND 40 million by 2010. However, its income from agricultural activities stayed at almost the same level of VND 11 million over the same period making a decrease in the share of agricultural activities in the total income. Apparently, households of other groups had a lower income level than the nonpoor ones. By 2007, the incomes of a rising household, a falling one, a churning one, and a poor one were VND 15 million, VND 15 million, VND 14 million, and VND 11 million, respectively. The share of income from agricultural activities to the total household income of household in these groups are significantly higher than this share for nonpoor households, and interestingly the share for the former ones rose over the period, which implies that income from nonagricultural activities of these households increased slower than income from agricultural activities. This was the result of the economic recession in Vietnam started late 2008, causing loss in job, wage cut, etc. and hence affects negatively on remittance, and income from off-farm employment.

Drivers of Poverty Transitions

The marginal effects from the MLN regression show that the increase in the share of income from nonagricultural activities to total household income has an effect on the transitions of poverty. It had a positive relationship with the probability of rising out of poverty, negative relationship with the probability of falling into poverty as well as with

the probability of staying poor (see Table 4). These relationships imply that the transitions toward nonagricultural income sources are good for the household's well-being. Yet, not all the marginal effects are of high levels of significance because the diversity of income sources is not always successful.

Table 4 Marginal effects from multinomial logit model

	Nonpoor	Rising	Falling	Churning	Poor
Increase in the share of nonagriculture income 2007–2008	–0.04701 (0.0295)	0.0651*** (0.0175)	–0.00744 (0.0167)	–0.0102 (0.0158)	–0.0011* (0.000820)
Increase in the share of nonagriculture income 2008–2010	–0.00405 (0.0364)	0.0597*** (0.0224)	–0.0489*** (0.0197)	–0.00448 (0.0189)	–0.0013** (0.000945)
Household size	–0.0641*** (0.00993)	0.0246*** (0.00610)	0.0176*** (0.00563)	0.0203*** (0.00542)	0.00157** (0.000802)
Head is male	0.0808** (0.0334)	–0.00145 (0.0176)	–0.0418** (0.0207)	–0.0369* (0.0191)	–0.000644 (0.000925)
Head age	–0.000367 (0.000771)	0.000721 (0.000456)	0.000273 (0.000425)	–0.000629 (0.000394)	2.54e-06 (1.84e-05)
Head is from the Kinh	0.0916*** (0.0350)	–0.0486** (0.0238)	–0.0148 (0.0186)	–0.0249 (0.0185)	–0.00323 (0.00252)
Attains primary school	–0.0517 (0.0368)	0.0104 (0.0199)	0.0347 (0.0239)	0.00624 (0.0161)	0.000336 (0.000776)
Attains middle school and beyond	0.0320 (0.0347)	–0.0149 (0.0205)	0.00751 (0.0189)	–0.0234 (0.0179)	–0.00125 (0.00111)
Asset index	0.125*** (0.0729)	0.345*** (0.0446)	–0.192*** (0.0391)	–0.265*** (0.0376)	–0.0135* (0.00691)
Hà Tĩnh	0.0292 (0.0300)	–0.0100 (0.0195)	–0.0228 (0.0149)	–0.000417 (0.0164)	0.00409 (0.00304)
Thừa Thiên Huế	–0.0184 (0.0277)	0.0334* (0.0185)	–0.0270** (0.0131)	0.00836 (0.0143)	0.00366 (0.00260)

Notes: Omitted categories: head is female, is from ethnic minority groups, has no schooling, Đắk Lắk, poverty dynamics are referred to national poverty line. All control variables refer to the base year level (2007). Nonagriculture income refers to nonagricultural income. Pseudo $R_2 = 0.226$, Observations= 1,858. The MNL regression passes tests of IIA assumption. Standard errors in parentheses. *** $p < 0.01$, ** $p < 0.05$, * $p < 0.1$.

Households in Vietnam have a tendency to have smaller sizes owing to the lower birth rate, the increasing migration, and the inclination of living in two generation households. Nevertheless, poor households usually have a larger size because they have more children, less chances to migrate, and having limited resources that prevent them from separating into smaller households. The marginal effects show that households of a larger size and higher dependency ratio have a lower probability of staying nonpoor and a higher probability of being poor in at least one period (see Table 4).

Female-headed households are typically home to more members than male-headed households, and the formers usually have less bread winners than the later, which consequently makes them have higher levels of vulnerability to poverty than their counterparts. In addition, there was no evidence of the difference between the vulnerability to poverty across household subgroups as classified by the head's age. In fact, the poverty dynamics are determined more by the change in the household's livelihood rather than the characteristics of the head (Carter and Barrett 2006), and findings from previous studies do not show the importance of the head's age (Kedir and McKay 2005; Bhide and Mehta 2005). In addition, the education attainment of the household head does not contribute to the differences in the probability of being in one or another poverty trajectory. In fact, the more the head is educated, the better his/her access to production resources, labour, and output markets is, and the more efficient he/she is in managing household resources. However, this type of human capital is more likely to have a long-term effect on a household's well-being rather than on the change in shorter period of time.

As discussed earlier, the Kinh are usually more able to access to market and, hence, take advantage of public service and the development process, which allows them to have a higher probability of being nonpoor, and lower probabilities of being poor in one or more periods than their households of ethnic minority groups (see Table 4).

Household wealth as measured by the asset index shows quite strong effects on poverty dynamics. It prevents households from being poor and is negatively correlated with falling into poverty, churning around poverty line, or being poor. It is also positively correlated with staying nonpoor and rising out of poverty (see Table 4). These findings are in line with the discussion of the role of assets in the poverty transitions (Carter and Barrett 2006) as well as with empirical findings from Bhide and Mehta (2005), and Imai, Gaiha, and Kang (2011).

There was little evidence of the difference among households in the three provinces in the vulnerability to poverty. TTH is more dynamic in terms of economic activities owing to the development of the tourism sector, and the convenience of transportation. Therefore, households in the province have a higher probability of moving out of poverty and a lower probability of falling into poverty than their counterparts in the other two provinces (see Table 4).

Robustness Check

In order to check the robustness of the MNL model for poverty dynamics, the study applies to the transitions of poverty as referred to the poverty line of \$2.5 a day (see Table A.2). The MNL regression, the results of which are shown in Table 4, and Table A.2 pass the Hausman tests or suest tests of independence of irrelevant alternatives (IIA), which means that assumptions of IIA could not be rejected; hence, estimates from MNL models are efficient. The reference model, in general, shows similar effects to those in the basic one. However, there are differences in the size of the effects in these models compared to the basic model because poverty dynamics in the additional model refer to a higher poverty line. Additionally, the results from Table 4 are in line with those from previous studies. The results from the MNL regression in this study are, therefore, realizable.

Conclusion

This study uses panel data on households from regions in Vietnam and a multinomial logit model to estimate drivers of poverty transitions. The results show a large share of the population is vulnerable to poverty where 38 percent of households have a risk of being either transient or chronically poor. This risk varies substantially across household groups; households of a large size, ethnic minority groups, and has limited physical assets have a higher risk of being poor since they typically have less access to markets than the other groups, which consequently prevents them from greatly benefiting from the economic growth. These findings are in line with most previous studies by Carter and May (1999), Glewwe, Gragnolati, and Zaman (2000), and Woolard and Klasen (2005).

A household with better access to production inputs and markets is more able to diversify its income sources to nonagricultural activities. The transition toward nonagricultural income sources usually results in higher income and, therefore, an improvement in a

household's well being. Particularly, the diversity to nonagricultural income sources is helpful for lifting a household out of poverty, but it is not very helpful for those who churn around the poverty line and the chronically poor. Additionally, nonagricultural activities are subject to shocks and risks, particularly from macroeconomic conditions and market performance. This implies that household developing countries still face challenges in the early stages of income diversity.

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1.2 Appendix

Table A.1 Components of asset index and their weights

Assets	Eigenvalue	Proportion
Household has a motobike	3.42	0.24
Household has a television	1.36	0.10
Household has an electric rice cooker	1.13	0.08
Household has a mattress	1.05	0.07
Household has a video player	0.96	0.07
Household cooks with electricity/gas	0.89	0.06
Household uses improved sanitation facility	0.81	0.06
Household has an electric fan	0.76	0.05
Household has a fridge	0.68	0.05
Household has improved flooring	0.64	0.05
House size	0.63	0.05
House (wall and roof) is made of improved materials	0.61	0.04
Household has radio	0.55	0.04
Household has a bike	0.52	0.04

Note: Proportions sum to one.

Table A.2 Marginal effects from MNL for poverty dynamics as referred to \$2.5

	Nonpoor	Rising	Falling	Churning	Poor
Increase in the share of nonagricultural income 2007-2008	-0.0240 (0.0418)	0.0218 (0.0281)	-0.0285 (0.0241)	0.00956 (0.0250)	0.00775 (0.00631)
Increase in the share of nonagricultural income 2008-2010	-0.0556 (0.0529)	0.0792** (0.0353)	0.0595** (0.0296)	-0.0358 (0.0311)	-0.0424 (0.00741)
Household size	0.0842*** (0.0137)	-0.0393*** (0.00933)	-0.0157** (0.00798)	-0.0154* (0.00846)	-0.0137*** (0.00303)
Head is male	0.0306 (0.0439)	0.0544** (0.0245)	-0.0440 (0.0276)	-0.0253 (0.0273)	-0.0158* (0.00823)
Head age	-0.00241** (0.00116)	0.00260*** (0.000734)	0.00102 (0.000644)	-0.00136** (0.000685)	0.000165 (0.000152)
Head is from the Kinh	0.187*** (0.0434)	-0.111*** (0.0359)	-0.0146 (0.0257)	-0.0121 (0.0264)	-0.0492*** (0.0175)
Attains primary school	0.0319 (0.0520)	0.00382 (0.0327)	-0.00671 (0.0274)	-0.0322 (0.0249)	0.00320 (0.00649)
Attains middle school and beyond	0.124** (0.0516)	-0.0358 (0.0338)	-0.0148 (0.0286)	-0.0641** (0.0309)	-0.00954 (0.00735)
Asset index	0.509*** (0.113)	0.495*** (0.0719)	-0.355*** (0.0592)	-0.452*** (0.0617)	-0.150*** (0.0273)
Hà Tĩnh	-0.0611 (0.0415)	0.0112 (0.0296)	-0.0316 (0.0216)	0.0355 (0.0270)	0.0460*** (0.0149)
Thừa Thiên Huế	0.0873** (0.0378)	-0.0173 (0.0254)	-0.0685*** (0.0190)	-0.0104 (0.0229)	0.00901 (0.00741)

Notes: Omitted categories: head is female, head is from ethnic minority groups, head has no schooling, Đăk Lăk, poverty dynamics are referred to national poverty line. All control variables refer to the base year level (2007). Pseudo R2 = 0.257, Observations= 1,858. The MNL regression passes tests of IIA assumption. Standard errors in parentheses. *** p<0.01, ** p<0.05, * p<0.1