Determinants of nonfarm participation among ethnic minorities in the Northwest Mountains, Vietnam

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DETERMINANTS OF NONFARM PARTICIPATION AMONG ETHNIC MINORITIES

IN THE NORTHWEST MOUNTAINS, VIETNAM[*]

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ABSTRACT

This study is the first to analyze the intensity of nonfarm participation and its correlates among ethnic minority households in the Northwest Mountains - the poorest region of Vietnam. We found that ethnic minority households depend heavily on agriculture for subsistence and their access to nonfarm employment is very limited. Households that participated in nonfarm activities have a much higher level of education, income, assets and a lower level of poverty than those without nonfarm participation. Factors affecting the level of nonfarm participation were examined by using a fractional logit model. The results show that education, notably among other factors, has a strongly increasing effect on the intensity of nonfarm participation. Having more annual crop land and water surface for aquaculture reduces the intensity of participation in nonfarm activities. In addition, some commune characteristics were found to be closely linked to the extent of nonfarm participation. A commune with nonfarm job opportunities and paved roads increases the intensity of nonfarm participation for households living in that commune. From the findings what policy implication can be drawn is that any poverty alleviation policies should aim at improving the access of ethnic minorities to education and nonfarm job opportunities.

Keywords: fractional logit, ethnic minorities, intensity, nonfarm participation.

JEL classification codes: I 32, O12, J15

1. Introduction

Vietnam is a multi-ethnic country with 54 ethnic groups; each has its own language, lifestyle and cultural heritage. The largest group is called "Viet" or "Kinh", which contributes 86 % of the country's population (Tung & Trang, 2014). This group tends to concentrate in inland deltas and coastal areas, having higher living standards than minority groups. "Hoa" or Chinese group is a relative rich group that also lives in inland deltas and coastal areas (Imai, Gaiha, & Kang, 2011). The other 52 ethnic minority groups distribute over upland and mountainous areas spreading from the North to the South (Tung & Trang, 2014), where access to infrastructure or health and educational facilities is limited and they are much poorer than the ethnic majority group (King/Hoa groups)[1](Imai et al., 2011). Although ethnic minority groups account for less than 15 percent of Vietnam's total population, they contribute 47 percent of the poor in 2010, compared to 29 percent in 1998. Using an updated poverty line proposed by the General Statistical Office - World Bank (GSO-WB) in 2010, it was estimated that 66.3 percent of minorities still lived below the poverty line compared to only 12.9 percent of the Kinh majority population (WB, 2012). Especially, there are a large proportion of ethnic minorities living in Northern Mountains, with very limited access to non-farm opportunities and other social and physical infrastructure (Cuong, 2012).

Ethnic minorities rely mainly on agriculture production in association with land for subsistence and their ability to switch to nonfarm employment is very low. The shift in economic and labor structure from agriculture to other sectors in ethnic minority areas has slowly taken place, not met yet with the local development trend and the development rate of the country (UNDP, 2012). Participation in nonfarm activities was found to be a positive determinant of poverty alleviation and household welfare among rural households (Pham, Bui, & Dao, 2010) as well as ethnic minorities in Vietnam (Cuong, 2012). However, to the best of our knowledge, little evidence exists on the determinants of nonfarm participation among ethnic minorities in Vietnam and furthermore, no econometric evidence determines factors affecting the intensity of nonfarm participation among the ethnic minorities in Northwest Mountains, Vietnam. A thorough understanding of what barriers hinder ethnic minorities from accessing nonfarm employment is much of importance, when designing

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[1] Following previous studies (Cuong, 2012; Van de Walle & Gunewardena, 2001), we defined King/Hoa groups as the ethnic majority group in the current study.

policy interventions for this disadvantaged group. For this reason, the current study was conducted to fill in this gap in the literature.

The main objective of the current study is to examine factors affecting the intensity of nonfarm participation among ethnic minority households in the Northwest Mountains, Vietnam (hereafter called "Northwest region"). The study differs from previous studies on nonfarm participation in two important respects. *Firstly*, it is the first study to investigate determinants of the intensity of participation in nonfarm activities among ethnic minority households in the Northwest region – the poorest region of Vietnam by using a unique data set from a recent survey of Northern Mountain Baseline Surveys in 2010. *Secondly*, previous studies have often focused only on the determinants of nonfarm participation using a logit or probit model (e.g., Ackah, 2013; Oseni & Winters, 2009; Ruben & Van den berg, 2001). This approach, however, can be a little dubious because it does not distinguish a household earning very little nonfarm income with another household depending largely or totally on nonfarm income sources (Rahut, 2006). To deal with this limitation, in this study, a fractional logit model was used to examine factors affecting the extent of participation in nonfarm activities. The study added to the extant literature on nonfarm participation by providing the first econometric evidence for factors affecting the intensity of nonfarm participation among the ethnic minorities in the Northwest region, Vietnam.

The paper is structured into four sections. The next section describes data source and econometric models used in this study. The third section presents estimation results and discussion. Finally, conclusion and policy implications are presented in the fourth section.

2. Data and methods

2.1. Data source

The dataset from The Northern Mountains Baseline Survey (NMBS) 2010 was employed for the current study. The 2010 NMBS was implemented by GSO from July to September in 2010 to collect the baseline data for the Second Northern Mountains Poverty Reduction Project. The overall objective of the project is to focus on alleviating poverty in the Northern Mountains, Vietnam. The project has invested in social and physical infrastructure in poor areas and also has provided supports for the poor to promote agricultural and off-agricultural

production. The project covers six provinces in the Northwest region, including Hoa Binh, Lai Chau, Lao Cai, Son La, Dien Bien and Yen Bai (Cuong, 2012).

A multi-stage sampling method was used for the survey. Firstly, 120 communes from six provinces mentioned above were randomly chosen with probability proportional to the population size of the provinces. Secondly, from each of selected communes, three villages are randomly chosen and then five households in each village are randomly selected for the interview, yielding a total sample size of 1,800 households. The survey included a large number of households from various ethnicities such as Tay, Thai, Muong, H'Mong and Dao.

The survey collected both household and commune data. The household data consist of characteristics of household members, education and employment, healthcare, income, housing, fixed assets and participation of households into targeted programs. The commune data contain information about the characteristics of communities such as demography, population, infrastructure, nonfarm job opportunities and targeted programs in the communes. The commune data can be merged with the household data.

2.2. Specification of econometric models

First, households that participated in wage employment or nonfarm self-employment were called " *households with nonfarm participation*" and households that did not participate in any types of nonfarm employment are referred as "*households without nonfarm participation*". Once households were clustered into the two groups, statistical analyses were then used to compare the means of household characteristics and assets between these two groups. As noted by Gujarati and Porter (2009), there are various statistical techniques for examining the differences in two or more mean values, which commonly have the name of analysis of variance. However, a similar objective can be obtained by using the framework of regression analysis. Therefore, regression analysis using Analysis of Variance (ANOVA) model was used to compare the mean of household characteristics and assets between the two groups. In addition, a chi-square test was applied to examine whether a statistically significant association existed between two categorical variables such as the type of households and their participation in credit markets.

Because the intensity of nonfarm participation, defined as the share of nonfarm income (both wage and self-employment income) in total household income, is a fractional response

variable taking the values from zero to 100 percent[2], the determinants of the level of nonfarm participation were modeled by using a fractional regression model proposed by Papke and Wooldridge (1996). This approach was developed to deal with models containing fractional dependent variables bounded between zero and 100 percent. As demonstrated by Wagner (2001), the fractional logit/probit approach, is the most appropriate approach because this model overcomes a lot of difficulties related to other more commonly used estimators such as OLS and TOBIT[3]. There have been a growing number of studies applying the fractional logit/probit model to handle models containing a fractional response variable being bounded between zero and one (e.g, Cardoso et al., 2010; Gallaway, Olsen, & Mitchell, 2010; Jonasson, 2011; McGuinness & Wooden, 2009; Tuyen, Lim, Cameron, & Huong, 2014). Hence, following this approach, we applied the so-called fractional probit model:

$$\text{E}(\boldsymbol{Y}|X) = G(X|\boldsymbol{\beta X}) = \frac{Exp\left(\boldsymbol{\beta'}_s \boldsymbol{X'}_s\right)}{1 + Exp\left(\boldsymbol{\beta'}_s \boldsymbol{X'}_s\right)}$$

, where $\boldsymbol{Y}$ is the share of nonfarm income that takes the values in the interval [0, 1], i.e. $0 \leq \boldsymbol{Y} \leq 1$; G is a function satisfying the predicted variables, $\boldsymbol{Y}$, will lie in the interval [0, 1]. The coefficients $\boldsymbol{\beta'}_s$ are the parameters need to be estimated in the model and $\boldsymbol{X'}_s$ are the explanatory variables. The empirical model can be estimated by the quasi-maximum likelihood estimator, with heteroscedasticity-robust asymptotic variance.

Following the framework for micro policy analysis of rural livelihoods proposed by Ellis (2000), the intensity of participation in nonfarm activities was hypothesized to be determined by a vector of household and commune variables. The definitions, measurements and expected signs of explanatory variables are given in Table 1. Specifically, our specification included household size and dependency ratio, the proportion of male working members, the age, education and gender of household heads. Some other socio-economic characteristics, namely land, access to credit and fixed assets were also included in the models. In addition, we

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[2] The intensity of nonfarm participation is a percentage variable that is by definition limited between zero and 100 percent with a lot of households (about 60 % of observations) not having any nonfarm income source.

[3] One may argue that the two-limit variant of the Tobit estimator is suitable. Nonetheless, Wagner (2001, p. 231) noted that: "TOBIT is simply not made for a situation when the endogenous variable is bounded to be zero or positive by definition." It is appropriately applied to situations where the values of variable are outside of the limits because of censoring. In addition, Cardoso, Fontainha, and Monfardini (2010) indicate that the fractional logit model has a crucial advantage over the Tobit specification because it is based on a quasi-maximum likelihood estimator, which does not require an assumption of full normal distribution for consistent estimates.

controlled for some commune characteristics such as population density, and the presence of nonfarm opportunities, bus station, and paved roads.

Table 1: Definition and measurement of variables included in the models

Explanatory variables	Definition and measurement	Expected signs
Household size	Total household members (persons)	**+/-**
Dependency ratio	Proportion of dependents in the households	**+/-**
Age	Age of household head (years).	**+/-**
Male member ratio	Proportion of male working members	**+**
Gender[a]	Whether or not the household head is male (Male=1; female=0).	**+/-**
Primary education[a]	Whether or not the household head completed the primary school	-
Lower secondary[a]	Whether or not the household head completed the lower secondary school	-
Upper secondary and higher[a]	Whether or not the household head completed the upper secondary school or higher level	-
Annual crop land	The size of annual crop land per capita (100 m^2 per person).	-
Perennial crop land	The size of perennial crop land per capita (100 m^2 per person).	-
Forestry land	The size of forestry crop land per capita (100 m^2 per person).	-
Water surface for aquaculture	The size of water surface for aquaculture per capita (100 m^2 per person).	-
Resident land	The size of resident land per capita (10 m^2 per person).	+
Fixed assets	Total value of all fixed per capita (Log of VND 1,000).	+
Credit	Total value of loans that the household borrowed during the last 24 months before the time of the survey (VND 1 million).	+
Bus station	Is there a bus station within the commune in which the household lived?	+
Paved road[a]	Is there any paved road to the commune in which the household lived?	+
Nonfarm opportunities[a]	Is there any production/services unit or trade village within the distance that the people in the commune can go there to work and then go home every day?	+
Population density	Number of people per one square kilometer	+

Note: [a] means dummy variables. Dependents include young dependents (members under 15) and old dependents (male members above 59 and female members above 64).

3. Results and discussion

3.1. Background on household characteristics and assets

Table 2 reports poverty measures by household group in the Northwest region in 2010. Nearly two thirds of the ethnic minority households were poor and about 42 percent were the extreme poor. A closer look at each group reveals that households with nonfarm participation are much better-off than those without nonfarm employment. The poverty gap is about 38 percent for households without nonfarm employment, indicating that on average, the households would have to mobilize financial resources up to 123 thousand VND per month (30.8 percent of 400

thousand VND) for each household member to be able to move out of poverty. However, the corresponding figure for the households with nonfarm participation was only 90 thousand VND.

Table 2: Poverty measures by household group

Poverty measures (%)	Headcount	Poverty gap	Poverty severity
Poor			
All households	68.00	27.10	13.10
Households with nonfarm participation	56.00	22.60	11.20
Households without nonfarm participation	76.00	30.80	14.20
Extreme poor			
All households	42.00	13.0	5.7
Households with nonfarm participation	33.00	11.00	5.4
Households without nonfarm participation	49.00	14.00	5.8

Source: authors' own calculation from the 2010 NMBS using the poverty line which is based on the income per person per month of 400 thousand VND and the extreme poverty line being calculated as two thirds of the poverty line. 1 USD equated to about 19 VND thousand in 2010.
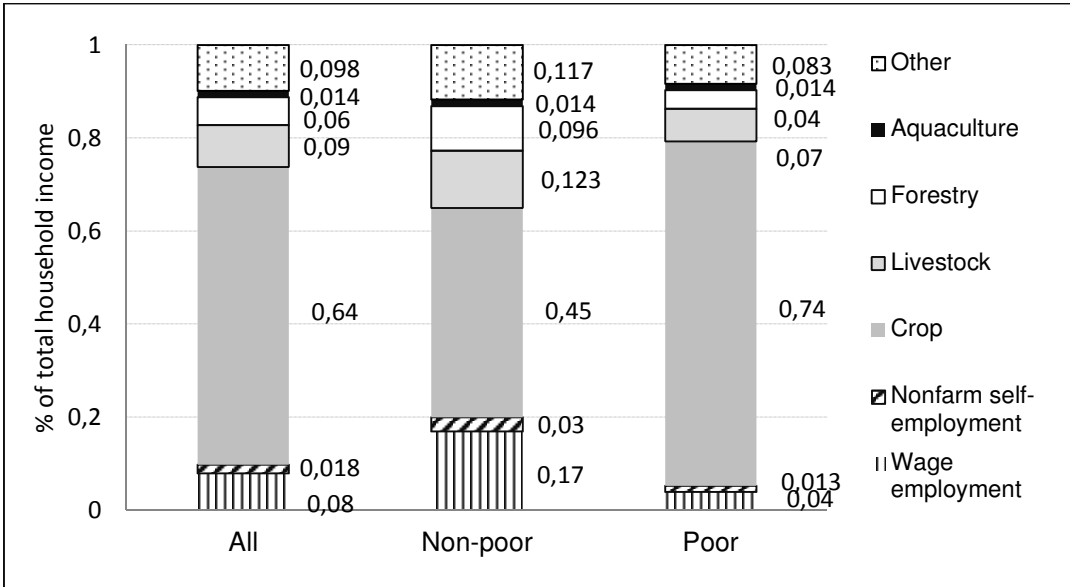

Figure 1: Household income structure

Source: Authors' own calculation from the 2010 NMBS

Figure 1 reveals that crop income made up the largest share of total household income for the whole sample. Combined together, the income from crop, livestock, forestry, and aquaculture accounted for 80 percent of total income. This suggests that agriculture plays a crucial role in the livelihood of the ethnic minorities in the Northwest region. Income from nonfarm employment (wage and self-employment) contributed about ten percent to the total

income, while the rest ten percent was contributed by other sources. Looking at the income structure of each group, the crop income share of the poor is, on average, much larger than that of the non-poor. However, the non-poor earned more income from forestry and livestock than the poor. The share of aquaculture income is equally distributed between the two groups. The non-poor derived much more income from nonfarm activities, including both wage and nonfarm self-employment than the poor. Also, the non-poor received more income from other sources than the poor. These figures indicate that the poor tend to rely much more on crop production than the non-poor. Also, it implies that the differences in income per capita between the two groups might stem from the differences in income sources.

Table 3: Descriptive statistics of household characteristics by group

Variables	All households		Households without nonfarm participation		Households with nonfarm participation		t-value / Pearson chi2
	Mean	SD	Mean	SD	Mean	SD	
Household characteristics							
Household size	6.01	(2.32)	5.90	(2.00)	6.0	(2.40)	
Dependency ratio	0.83	(0.69)	0.72	(0.60)	0.91	(0.72)	***
Proportion of make working members	0.54	(0.19)	53	(19)	54	(18)	
Age of household head	41.46	(12.82)	43.23	(12.06)	40.44	(13.13)	***
Gender of household head[a]	0.92	(0.26)	0.91	(0.28)	0.94	(0.23)	*
Total value of loan (1,000 VND)	4,416	(7,481)	3,600	(6,300)	5,600	(8,800)	***
Education							
Primary education[a]	0.23	(0.42)	0.20	(0.40)	0.26	(0.44)	***
Lower secondary[a]	0.18	(0.38)	0.15	(0.35)	0.23	(0.42)	***
Upper secondary and higher[a]	0.05	(0.21)	0.02	(0.15)	0.08	(0.27)	***
Assets/Wealth							
Annual crop land	1,851	(1,736)	2,203	(1,795)	1,406	(1,524)	***
Perennial land	95.7	(506)	80.0	(364)	112	(665)	
Forestry land	1,517	(8,557)	1,392	(871)	1,704	(833)	
Water surface for aquaculture	16.17	(190)	17.00	(226)	15.00	(114)	
Value of fixed assets	23.60	(29.00)	21.30	(23.00)	27.00	(35.00)	*
Monthly income per capita[b]	390	(336)	335	(257)	471	(417)	***
Commune characteristics							
Bus station	0.42	(0.50)	0.40	(0.49)	0.44	(0.49)	
Paved road[a]	0.22	(0.42)	0.20	(0.40)	0.26	(0.44)	
Job opportunities[a]	0.23	(0.42)	0.18	(0.38)	0.31	(0.46)	***
Population density	156	(379)	143	(375)	176	(386)	
Total households	**1,800**		**1067**		**733**		

Note: estimates are accounted for sampling weights. SD: standard deviations. *, **, *** mean statistically significant at 10%, 5 % and 1 %, respectively. [a] means dummy variables. [b] measured in 1,000 VND. Value of fixed assets measured in 1 billion VND. 1 USD equated to about 19 VND thousand in 2010.

Table 3 indicates that there are significant differences in the mean values of most household characteristics between the two groups. Households without nonfarm employment had a much higher dependency ratio than that of those with nonfarm participation. The

statistically significant difference in the age and education of household heads between the two groups were also confirmed. On average, the heads of households with nonfarm employment were approximately three years older than those of households without nonfarm participation. In addition, the heads of households engaging in nonfarm activities had a higher rate of school completion (at all levels) than those of households without participating in nonfarm activities. Households with nonfarm employment also received a higher value of loans than their counterpart.

As shown in Table 3, the average income per capita for the whole sample is even lower than the poverty line. In addition, households that did not participate in nonfarm activities earned a much lower level of per capita income than those with taking up nonfarm employment. The disparities in all types of land were not found except for the case of annual crop land where households without nonfarm participation had more crop land than households with nonfarm participation. By contrast, households with nonfarm employment owned a higher value of total fixed assets than their counterpart. Finally, it is evident in Table 3 that only one statistically significant association existed between the type of households and the presence of nonfarm job opportunities. The likelihood of participating in nonfarm activities is higher for households that live in a commune with the availability of nonfarm job opportunities. Noticeable differences in some household and commune characteristics between the two groups were expected to be closely linked with the intensity of nonfarm participation.

3.2. Determinants of the intensity of participation in nonfarm activities

Table 4 report the estimation results from the fractional logit model. It is evident that many explanatory variables are statistically significant at 10 percent or lower level, with their signs as expected. Households with more dependent members are indicative of labour shortage, which in turn less likely to participate intensively in nonfarm activities. Hence having more dependents would reduce the level of nonfarm participation. Having more male working members increases the share of nonfarm income. Not as expected, we found no evidence for the impact of age and gender of household heads on nonfarm income share. However, it was found that education of the household heads has a positive effect on nonfarm income share and the effect increases with the level of education. For instance, holding all else constant, the share of nonfarm income would be four percentage points and 23 percentage

points, respectively, higher for households with the head attaining a lower secondary diploma and an upper secondary diploma or higher level than households whose heads not having these education levels. This implies that there some certain barriers in the form of formal education that hindered a number of households from taking up nonfarm activities. In part, the findings are also similar in Vietnam's peri-urban and rural areas (Tuyen et al., 2014; Van de Walle & Cratty, 2004) and Shandong Province, China where more educated members are more likely to engage in nonfarm activities (Huang, Wu, & Rozelle, 2009).

Table 4: Fractional logit estimates for determinants of the intensity of nonfarm participation

Explanatory variables	Coefficients	SE	Marginal effects	SE
Demographic characters				
Household size	-0.0465	(0.037)	-0.0040	(0.003)
Proportion of male working members	0.7102**	(0.343)	0.0618**	(0.030)
Dependency ratio	-0.2821**	(0.142)	-0.0246**	(0.012)
Age of household head	0.0016	(0.008)	0.0001	(0.001)
Gender of household head	0.0110	(0.266)	0.0010	(0.023)
Education				
Primary education	0.3310**	(0.149)	0.0310**	(0.015)
Lower secondary	0.4058**	(0.178)	0.0392**	(0.019)
Upper secondary and higher	1.5527***	(0.220)	0.2285***	(0.048)
Assets/capitals				
Annual crop land	-0.0437***	(0.008)	-0.0038***	(0.001)
Perennial land	0.0053	(0.010)	0.0005	(0.001)
Forestry land	-0.0010	(0.001)	-0.0001	(0.000)
Water surface for aquaculture	-0.0806**	(0.037)	-0.0070**	(0.003)
Residential land	-0.0004	(0.002)	-0.0000	(0.000)
Fixed assets	0.0022***	(0.001)	0.0002***	(0.000)
Access to credit	0.0001	(0.056)	0.0000	(0.005)
Commune characters				
Bus station	-0.1431	(0.135)	-0.0124	(0.011)
Asphalt/ concrete roads	0.2856*	(0.148)	0.0265*	(0.015)
Nonfarm job opportunities	0.4708***	(0.142)	0.0453***	(0.015)
Population density	0.0001	(0.000)	0.0000	(0.000)
Constant	-1.8265***	(0.666)		
Log pseudolikelihood		-19011.60381		
BIC		7907.159		
Observations		1,567		

Note: Estimates are accounted for sampling weights. Robust standard errors (SE) in parentheses. *, **, *** mean statistically significant at 10%, 5 % and 1 %, respectively. Marginal effects calculated at the mean.

Regarding the role of household assets in determining the intensity of participation in nonfarm activities, the results show that not all types of land are statistically associated with the nonfarm income share. Holding all other variables constants, an additional 1000 m^2 of annual land per person would reduce the share of nonfarm income by around four percentage points. A similar increase in the size of water surface for aquaculture would also diminish the share of nonfarm income by seven percentage points. However, a similar effect was not

detected for the case of perennial, forestry and residential land. The finding is partially consistent with Van de Walle and Cratty (2004) and Minot, Epprecht, Anh, and Trung (2006) that households with more land are less likely to participate nonfarm activities in Vietnam. We also found evidence that owning more fixed assets is positively associated with the level of nonfarm participation.

As expected, we found that some commune characteristics are closely related to the extent of nonfarm participation. Living in a commune with the presence of paved roads would raise the proportion of nonfarm income by 2.7 percentage points. Similarly, the availability of nonfarm job opportunities would increase the share of nonfarm income by 4.5 percentage points. The finding is also in line with the literature that nonfarm participation by households or individuals is significantly affected by some community characteristics such as access to road and nonfarm job opportunities (Escobal, 2001).

4. Conclusion and policy implication

This study examined the level of nonfarm participation and its correlates among ethnic minorities in the Northwest region of Vietnam. It was found that ethnic minority households depend largely on agriculture for their living and they also have a very limited access to nonfarm activities. It was evident that households that participated in any type of nonfarm employment would have a lower poverty rate as well as a lower intensity of poverty than than those without nonfarm participation. We also found that households with nonfarm participation attained a higher level of income and education, and hold a higher value of fixed assets than their counterpart. In addition, the results show that poor households rely much more on agriculture, notable crop income than non-poor households. The above findings imply that nonfarm employment is much of importance to the living standards of ethnic minorities in the study area.

In common with the empirical literature on the determinants of nonfarm participation, we found that demographic characteristics, education and assets are closely linked with the extent of nonfarm participation. Notably, education has a strongly increasing effect on the intensity of nonfarm participation and the effect increases with the level of education. As aforementioned, households that engaged in nonfarm activities are less poor and earn higher income than those did not participated in any nonfarm activity. Combined together, the findings suggest that the National Target Program on Education and Training should aim at

ensuring sustained and improved access for the poor ethnic minorities to education and training. This would help them have more chance of taking up lucrative nonfarm activities, which in turn enable them escape poverty and improve their welfare.

In line with previous findings, we found evidence that some commune characteristics play an important role in determining the extent of nonfarm participation. Controlling for other factors, a commune with the presence of nonfarm job opportunities and a paved road would increase the level of participation in nonfarm activities. A policy implication here is that promoting rural nonfarm activities, coupled with support for improving the access of poor households to these, are expected to be an effective way of reducing poverty in the Northwest region. Also, the intensity of nonfarm participation should be increased by investing in local physical (hard) infrastructure in the form of building up paved roads in the communes.

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