

Access to credit and non-farm activities: A quantitative analysis of household surveys in rural Vietnam

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The authors investigated the role of formal and informal credit in non-farm activities among Vietnamese rural households using pooled cross-sectional data from household surveys in 2016 and 2018. The econometric analysis confirms that households with more loans are more likely to engage in non-farm activities and increase the intensity of such activities. The probability and intensity of non-farm activities are also determined by the level of education and occupation of household heads. In addition, the presence of non-farm opportunities and access to roads in a commune increase the chance of non-farm participation for households living in that commune. The study suggests that policy interventions for promoting rural non-farm economy should aim to improve rural households' access to formal credit, better education, and non-farming opportunities.

Key Words: *formal credit, fractional logit model, Heckman selection, non-farm activities, rural Vietnam*

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Introduction

Viet Nam has made remarkable socio-economic progress. Over the past three decades, the country went from an agricultural to an industrialised economy,

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transforming the country from one of the poorest in the world to a lower-middle-income nation by 2011. This success has had a transformative influence on most of Vietnam's population, as measured by a wide range of development indicators (Tarp, 2017). Notably, Viet Nam continues to outperform most countries with a similar income level. For instance, Viet Nam's universal health coverage index has reached 73, with 87% of the population covered, a higher level than regional and global averages. Also, the country has a healthier and better-educated population, ranking 48th out of 157 countries on the Human Capital Index in 2018, second in ASEAN (just behind Singapore) and the highest among middle-income countries (Food and Agriculture Organization [FAO], 2020).

It is evident that the shift in the economy and labour structure (i.e. from agriculture to other sectors) is a significant contributor to poverty reduction and household welfare in rural Viet Nam (Kozel, 2014; Phan et al., 2019; Tran & Vu, 2020). The process of structural transformation has occurred at multiple levels. The decision-making outcome by individual households and even individual family members in rural areas stands at the lowest level (Tarp, 2017). Given the importance of non-farm employment to rural livelihoods, numerous studies have examined the role of the rural non-farm sector in poverty reduction, household income and the reduction of inequality. Participation in non-farm activities, both wage-earning and self-employed, reduce poverty and increase consumer expenditure for rural households (Do et al., 2019; Hoang et al., 2014; Pham et al., 2010). Over the 2008-2016 period, notably, the effect on income and food consumption from diversifying out of farm crops tended to be much higher for poorer households in rural Viet Nam. In general, the findings for Viet Nam (Phan et al., 2019; Tran & Vu, 2021) and other developing countries (Do et al., 2019; Rigg, 2006) confirm the crucial role of the rural non-farm economy in poverty alleviation and improving income for the rural population.

While the beneficial effect of access to credit has been well established for Viet Nam (Doan, 2011; Tran & Dinh, 2021) and in several developing countries (Tang & Guo, 2017), to the best of our knowledge, few studies investigate its effect on non-farm participation in rural Vietnam. A better understanding of the role of access to credit for rural non-farm occupations is vital both for academics and policymakers. The current study contributes to Viet Nam literature by providing new evidence concerning factors of the intensity of non-farm activities among rural households, focusing on the role of formal and informal credit.

The main aim of the current research is to quantify the influence of access to formal and informal credit on the extent of non-farm activities, as measured by the proportion of non-farm self-employment income in total household income. Our study uses pooled cross-sectional datasets from the Vietnam Household Living Standard Survey (VHLSS) in 2016 and 2018. We employ the sustainable rural livelihood framework (Department for International Development [DFID], 1999) as an analytical framework for analysing factors affecting the role of credit and other factors in non-farm activities. Also, both descriptive statistics and econometric analysis were used for research objectives. Furthermore, our study employs a fractional regression approach to examine factors affecting the

intensity of non-farm activities. This approach offers a significant benefit over the Tobit specification since it is based on a quasi-maximum likelihood estimator that does not require a full normal distribution assumption for consistent estimations (Cardoso et al., 2010; Tran et al., 2016). Also, we use a Heckman selection model to account for unobservable factors that may affect both the participation and level of participation in non-farm activities (Heckman, 1979; Tran & Dinh, 2021).

We found that households with non-farm employment have higher levels of education and vocations and bigger formal and informal loans than those who do not. Furthermore, the distribution of non-farm income is biased toward the wealthy rather than the disadvantaged. Notably, our micro-econometric result confirms the hypothesis that households with access to formal credit have higher levels of non-farm participation. The level of education and occupation of household heads significantly influence the likelihood and intensity of non-farm occupations. Furthermore, the existence of non-farming possibilities and access to roads in a commune increases the likelihood of households in that commune engaging in non-farm activities.

Empirical evidence in some developing countries has often shown that access to credit plays a crucial role in the growth of rural non-farm activities. For instance, lack of access was found to be a primary obstacle to the growth of non-farm activities in Nigeria (Nwosu et al., 2020), Ethiopia (Asfaw et al., 2017), rural Bangladesh (Khandker, 1996) and Peru (Escobal, 2001). Ali et al. (2014) employ a direct elicitation approach for a national sample of Rwandan rural households to empirically assess the extent and nature of credit rationing in the semi-formal sector and its impact. They found that credit constraints lower the chance of engaging in off-farm self-employment by roughly 6.3% while increasing the likelihood of low-return farm wage work. Also, Asfaw et al. (2017) found that access to credit increases the likelihood of households participating in non-farm activities by 15% in Ethiopia. Many other studies have also proved the positive effect of credit on non-farm participation in both developing (Asfaw et al., 2017; Berhe, 2020; Senadza, 2012) and developed countries (Briggeman et al., 2009). However, some other studies find no significant impact of credit on non-farm activities. For example, Ruben's (2001) study reveals that access to credit has no statistically significant association with either wage or non-farm self-employment among rural households in Honduras. Similarly, a study among rural households in Vietnam's Northwest region by Tran (2015) indicates that access to formal credit is not linked with non-farm self-employment.

The literature also indicates that several other factors affect the likelihood of households participating in non-farm activities. Most studies established that education plays a key role in participating in rural non-farm activities, both wage and self-employment in developing (Ali et al., 2014; Berhe, 2020; Do et al., 2019; Escobal, 2001; Khandker, 1996; Mech et al., 2017; Raihan & Haque, 2018; Ruben, 2001; Tran, 2014) and developed countries (Lim-Applegate et al., 2002). Some studies also reveal that some demographic characteristics significantly affect non-farm employment. For instance, the likelihood of non-farm participation reduces with age in Ethiopia (Berhe, 2020) and rural Bangladesh (Raihan &

Haque, 2018). Also, males are more likely to participate in wage employment while females are more likely to engage in non-farm self-employment in rural Vietnam and other countries (Tran et al., 2016).

While having more farmlands tends to promote agricultural production, it tends to reduce the participation and level of non-farm activities in rural Cambodia (Do et al., 2019), rural Bangladesh (Raihan & Haque, 2018) and several countries (Rigg, 2006; Tran, 2014). Also, access to public assets such as roads or electricity was found to have a significant effect on promoting non-farm activities in several countries such as Cambodia (Do et al., 2019), Peru (Escobal, 2001), Ghana (Senadza, 2012), Nicaragua (Corral & Reardon, 2001) and Indonesia (Gibson & Olivia, 2010). Having more assets (e.g. livestock, motorbikes) was also found to increase the chance of rural households participating in non-farm activities in Ethiopia (Berhe, 2020) and rural Cambodia (Do et al., 2019). Notably, some studies find that shocks such as income loss or natural disasters are closely linked with non-farm participation (Do et al., 2019; Tran & Vu, 2020).

Data and econometric method

The authors utilised the sample research of rural households from the Viet Nam Household Living Standard Surveys (VHLSS) in 2016 and 2018. The survey was conducted by the General Statistical Office (GSO), Vietnam. The survey sample is representative of the national, regional, and provincial levels. The surveys show that about 70% of households live in rural areas, while about 30% reside in urban areas. The GSO also estimates in 2019 that the proportion of urban and rural populations accounts for about 34% and respectively 66% of the total population (GSO, 2019). It collects detailed information about individual and household characteristics (i.e. demography, education, occupation, economic activities, income, land, and housing conditions).

It also gathers information about the socio-economic characteristics of the communes where households live. The authors combined both household and commune-level data for both years, yielding a pooled cross-section dataset. Such a combination allows us to examine both household and commune-level factors that affect non-farm employment. Also, pooling the data from two years enables us to increase the sample size and account for year fixed effects. In this study, the outcome variable is the intensity of non-farm self-employment, measured by the proportion of non-farm income in total household income, and is a fractional response variable with values ranging from 0% to 100%. Thus, we use a fractional regression model to identify factors affecting the scope of non-farm employment among rural households. This economic specification is the most suitable for models with response variables bounded between 0% and 100% (Papke & Wooldridge, 1996). Following this approach, our study employs the so-called fractional logit model:

$$E(Y|X) = G(X|\beta X) = \frac{Exp(\beta' s X' s)}{1 + Exp(\beta' s X' s)}$$

Where,

- Y = the percentage of non-farm income with values between [0, 1], i.e., $0 \leq Y \leq 1$;
- G = a function satisfying the predicted variables, Y, and will lie in the interval [0, 1].
- $\beta' s$ = parameters to be estimated in the model,
- $X' s$ = vector of explanatory variables.

Empirically, the model can be estimated using the quasi-maximum likelihood estimator, with heteroscedasticity-robust asymptotic variance.

Following the framework for rural livelihoods developed by the Department for International Development [DFID] (1999) and empirical research (Atamanov & Van den Berg, 2012; Doan, 2011; Tran, 2015; Tran et al., 2016), the scope of non-farm employment was assumed to be determined by a set of household and commune-level variables. Notably, access to credit F_{it} is the variable of interest, measured by the number of formal and informal loans taken out by a household over the last 12 months. Formal loans are defined as loans provided by banks, mass organizations or micro-finance institutions, while informal loans include funds borrowed from friends, neighbours, or relatives and moneylenders.

$$NFSij = \beta_0 + \beta_1 F_{it} + \beta_2 X_{it} + U_{it}$$

Our study hypothesised that both formal and informal credit would increase the level of non-farm employment. Households with more financial resources are more likely to invest in and expand their economic activities, increasing income from non-farm employment. Other control variables include age, ethnicity, gender, marital status, education, the main occupation of household heads, household size, dependency ratio, various types of land, and social capital. Also, we controlled for specific major commune characteristics, such as access to roads and transportation and the occurrence of natural disasters. We also examine the determinants of non-farm employment using a logit regression model. The definition and measurement of included variables are given in Table 1.

$$NFPij = \beta_0 + \beta_1 F_{it} + \beta_2 X_{it} + U_{it}$$

Following Atamanov & Van den Berg (2012), we also examined factors affecting the amount of nonfarm income using the Heckman (1979) selection model to account for possible selection bias as follows:

Nonfarm income equation: $L_i = \gamma loan + \beta X_i + u_{1i}$

Selection equation: $S_i^* = \gamma loan + \alpha X_i + u_{2i}$

Where,

- S_i^* = a latent variable

- L_i = the log of non-farm income in the last 12 months, is observed if $S_i^* > 0$ and not observed if $S_i^* \leq 0$.

The selection equation is employed to account for sample selectivity bias. Households may self-select into taking non-farm income according to their characteristics. Furthermore, the assumptions about the errors are that:

$$u_{1i} \sim NID(0, \sigma^2) \text{ and } u_{2i} \sim N(0, 1) \text{ and } cov(u_{1i}, u_{2i}) = \rho_{12}$$

Following previous studies in rural Vietnam (Hoang et al., 2014), we used the non-farm network (as measured by the percentage of households with non-farm activities within a commune) as the instrument for non-farm participation. The instrument is assumed to influence non-farm participation decisions (i.e. the selection equation) but not the level of non-farm participation (e.g. amount of non-farm income) (Atamanov & van den Berg, 2012; Heckman, 1979).

Results

Descriptive statistics for households are given in Table 1, which shows that, on average, each household earned about 2.88 million Vietnamese Dong (VND) per person per month over the 2016-2018 period.

However, the figures are significantly higher for those with non-farm employment than those without (3.58 vs 2.58 million VND). Also, the former secured more substantial formal and informal loans than did the latter. For instance, households with non-farm employment obtained a total value in formal loans more than double that of those without formal loans. A similar result is found for informal loans, suggesting that access to credit is closely linked with non-farm employment.

The average age of household heads is lower for households with non-farm employment than for those without. Also, the proportion of male household heads belonging to the Kinh/Hoa majority population group is higher for the former than for the latter. Furthermore, the number of formal years of schooling is slightly higher for the heads of households with non-farm employment than for those without (8.34 vs 7.56 years). Notably, the heads of non-farm households have a higher level of employment than their counterparts.

For example, 65% of household heads lacking non-farm employment worked in unskilled jobs, while the corresponding figure is 35% for households with non-farm employment. On average, however, households with non-farm employment owned less land than did those without. Finally, the percentage of households participating in socio-political groups is somewhat lower for the former than for the latter.

Table 1. Descriptive statistics of households by non-farm employment, 2016-2018

Household characteristics	Without non-farm employment	With non-farm employment	Whole sample
Monthly income per person (1,000 VND)	2,583	2,179	3,580
Formal loans (1,000 VND)	17,384	63,074	40,291
Informal loans (1,000 VND)	2,987	24,282	5,686
Marital status (1=married; 0=single)	0.38	0.49	0.42
Age (years)	53.05	14.16	50.18
Gender (1=male; 0=female)	0.77	0.42	0.81
Ethnicity (1=Kinh/Hoa; 0=minority)	0.85	0.35	0.93
Number of formal years of schooling	7.56	3.71	8.34
Unskilled work (1=yes; 0=no)	0.65	0.48	0.37
Manual skilled work (1=yes; 0=no)	0.27	0.45	0.34
Non-manual low-skilled job (1=yes; 0=no)	0.03	0.18	0.25
Non-manual skilled job (1=yes; 0=no)	0.04	0.19	0.04
Household size (members)	3.54	1.58	4.00
Dependency ratio	0.41	0.33	0.33
Annual cropland (m ²)	2,916	7,024	2,549
Perennial cropland (m ²)	1,751	8,630	1,185
Horticultural land (m ²)	218	957	147
Party membership (1=yes ;0=no)	0.08	0.28	0.06
Women's union (1=yes; 0=no)	0.10	0.29	0.07
Farmers' association (1=yes;0=no)	0.36	0.48	0.31
<i>Commune characteristics</i>			
Access to roads (1=yes; 0=no)	0.96	0.20	0.97
Transportation (1=yes; 0=no)	0.72	0.45	0.75
Non-farm opportunities (1=yes; 0=no)	0.90	0.30	0.92
Inland areas (1=yes; 0=no)	0.58	0.49	0.64
Natural disasters (1=yes; 0=no)	0.81	1.24	0.75
Observations	33,172	14,256	47,428

Source: authors' compilation

Figure 1 shows the changes in household income structure between 2016 and 2018. It indicates that agricultural income contributed one-quarter of total household income in 2016, dropping to 23% in 2018. A similar trend was also observed for formal wage income, with a three-percentage point decrease. However, income from informal wage-earning work increased from 16% to 21% over the same period. Also, the proportion of other income in total household income rose slightly from 16% to 17%, while agricultural income remained unchanged over the two years.

Figure 2 shows the distribution of various income sources by income group. Income from formal wage-earning work (i.e. paid jobs with a formal labour contract) and non-farm activities is skewed toward more affluent households. Specifically, nearly 60% of these income sources characterize the top 20% of wealthiest households.

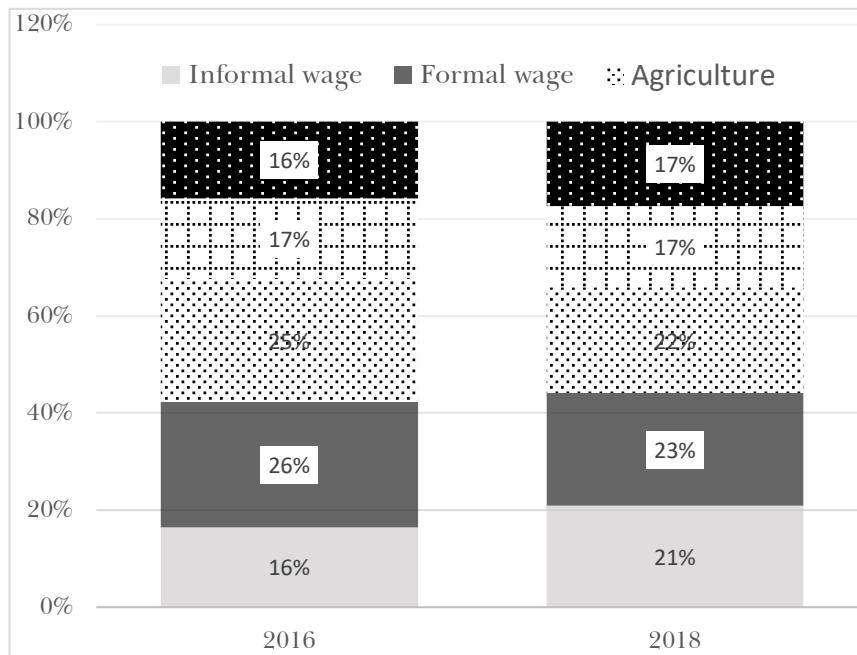


Figure 1: Household income structure in rural Viet Nam, 2016-2018.

Source: authors' compilation

By contrast, the distribution of income from informal wage-earning employment (i.e. paid jobs without a formal labour contract) is skewed in favour of poorer households in rural Viet Nam, while agricultural and other incomes have the same distribution. The distribution pattern in Figure 1 suggests that livelihoods diversifying toward non-farm employment or formal wage-earning work enable rural households to increase their economic wellbeing.

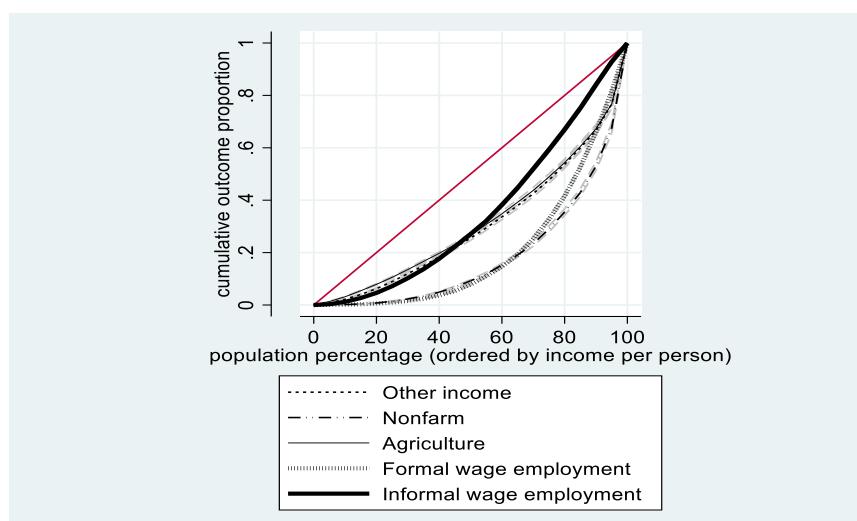


Figure 2: The distribution of income sources by income group

Source: authors' compilation

Table 2 reports the econometric results from the fractional logit and logit regression models for factors affecting the extent of non-farm occupations and the decision to engage in non-farm work. The results are presented in the form of average marginal effects (AME), which means that effects are calculated for each observation in the data and then averaged. The marginal effect shows the change in the predicted value of a dependent variable when changing one independent variable — either a change in continuous variables or a discrete change in a categorical variable — while holding other variables at specified values. The AME of formal loans in Table 2 confirms that a 10% increase in the number of formal loans would increase the share of non-farm income by one percentage point (p -value = 0.008). A similar effect is also found for the decision to engage in non-farm work, with the AME at 0.015. This suggests that the probability of being employed in non-farm work increases by 1.5 percentage points, given a 10% increase in the value of formal loans (p -value=0.000). However, we found no similar effect in the case of informal loans.

Table 2. Factors affecting non-farm employment, 2016-2018

Explanatory variables	Level of non-farm activity (% of total household income)			Non-farm activity (1=yes; 0=no)		
	AME	SE	P-value	AME	SE	P-value
Formal loans	0.010	0.001	0.008	0.015	0.001	0.000
Informal loans	0.000	0.000	0.351	0.001	0.000	0.123
Manual skilled job	0.025	0.001	0.000	0.036	0.002	0.000
Non-manual low-skilled job	0.048	0.001	0.000	0.042	0.000	0.000
Non-manual skilled job	0.002	0.000	0.000	0.003	0.001	0.000
Marital status	0.004	0.002	0.078	0.009	0.004	0.017
Gender	0.011	0.004	0.001	0.006	0.006	0.311
Ethnicity	0.087	0.006	0.000	0.134	0.009	0.000
Education	0.024	0.004	0.000	0.049	0.006	0.000
Household size	0.055	0.004	0.000	0.149	0.006	0.000
Dependency ratio	-0.015	0.002	0.000	-0.036	0.003	0.000
Annual cropland	-0.030	0.001	0.000	-0.037	0.003	0.000
Perennial cropland	-0.008	0.000	0.000	-0.009	0.001	0.000
Horticultural cropland	-0.007	0.001	0.000	-0.009	0.001	0.000
Party membership	-0.005	0.000	0.000	-0.006	0.001	0.000
Women's union	-0.001	0.000	0.003	-0.002	0.001	0.006
Farmers' association	-0.002	0.001	0.132	0.000	0.002	0.979
Year 2018	-0.007	0.003	0.008	-0.015	0.004	0.00
Inland communes	0.005	0.003	0.107	0.012	0.005	0.009
Access to roads	0.031	0.008	0.000	0.044	0.012	0.00
Availability of transportation	0.007	0.003	0.012	0.010	0.005	0.026
Nonfarm job opportunities	0.013	0.005	0.008	0.021	0.007	0.005
Natural disasters	-0.001	0.001	0.578	-0.001	0.001	0.619
Pseudo R2	0.140			0.160		
Observations	47,428			47,428		

Note: Robust standard errors in parentheses. *** p<0.01, ** p<0.05, * p<0.1. Estimates are accounted for sampling weights and are clustered at the commune level.

Source: authors' compilation

The results of the Heckman selection model estimates in Table 3 also reveal a positive effect of formal loans on non-farm income, albeit the effect is relatively small. A 10% increase in the value of formal loans would increase the amount of non-farm income by 0.26%.

The results in Table 2 also reveal several other determinants of non-farm activities. Higher employment levels are closely linked with the probability and extent of non-farm employment. For instance, household heads switching from unskilled to skilled manual work increase their households' non-farm employment probability and extent by 2.5% and 3.6%, respectively. The corresponding effects are 4.8% and 4.2% for those with non-manual low-skilled jobs. In addition, household heads with an additional year of formal schooling increase the extent of their non-farm employment by 2.4% and the probability of taking such work by 4.9%.

Similarly, Table 3 also indicates the positive effects of education and occupation levels on the amount of non-farm income. We also find that some household characteristics are strongly associated with non-farm employment. Specifically, the existence of an additional family member increases the probability of a household engaging in non-farm employment by 1.50% and the proportion of non-farm income by about 5.50%. We find that households with more land are less likely to earn more income from non-farm activities.

This study shows a negative though small effect from membership in socio-political groups on non-farm employment. Finally, the coefficient of the year dummy variable in Table 3 is 0.218 and is highly statistically significant. This shows that, on average, each rural household earned an amount of non-farm income, which is about 22% higher in 2018 than in 2016.

Discussion

Our study provides evidence that access to formal credit positively affects non-farm activities, both in scope and the decision to seek such work in rural Viet Nam. The mechanism by which access to formal credit affects non-farm activities can be explained in several ways. First, securing a more significant number of loans means that households have more financial resources to establish new non-farm activities or expand existing ones. Second, in the absence of formal credit, rural households must rely on their own savings or borrow from informal sources (e.g. relatives, friends, or money lenders). Such informal loans tend to be charged at higher interest rates or are limited in size (Tran & Dinh, 2021).

Consequently, informal loans are not suitable for investment in non-farm activities that require long-term capital. This is why informal loans do not have a positive effect on non-farm activities in our research.

In general, our research finding supports the results of previous studies of several developing countries such as rural Cambodia (Do et al., 2019), Bangladesh (Raihan & Haque, 2018), Ethiopia (Berhe, 2020) and several other developing countries (Chowdhury, 2017; Khandker, 1996), that also concluded access to formal credit helps promote the growth of the rural non-farm economy.

Table 3. Factors affecting the level of non-farm income (Heckman selection model)

	The amount of non-farm income (log)		Non-farm participation	
	Coefficient	SE	Coefficient	SE
Formal loans	0.026***	(0.005)	0.045***	(0.004)
Informal loans	-0.035***	(0.010)	0.009	(0.008)
Manual skilled job	0.237***	(0.024)	0.351***	(0.017)
Non-manual low-skilled job	0.556***	(0.034)	1.407***	(0.025)
Non-manual skilled job	0.257***	(0.057)	0.151***	(0.041)
Marital status	0.008	(0.038)	0.064**	(0.026)
Gender	0.202***	(0.030)	-0.000	(0.023)
Ethnicity	0.535***	(0.052)	0.231***	(0.029)
Education	0.037***	(0.003)	0.020***	(0.002)
Household size	0.166***	(0.007)	0.131***	(0.005)
Dependency ratio	-0.445***	(0.035)	-0.391***	(0.024)
Annual cropland	-0.072***	(0.006)	-0.031***	(0.005)
Perennial cropland	-0.011	(0.008)	-0.033***	(0.005)
Horticultural cropland	-0.065***	(0.014)	-0.032***	(0.009)
Party membership	-0.223***	(0.043)	-0.293***	(0.032)
Women's union	-0.061	(0.041)	-0.117***	(0.031)
Farmers' association	-0.119***	(0.023)	-0.004	(0.017)
Year 2018	0.218***	(0.039)	-0.050*	(0.027)
Inland communes	0.030	(0.026)	-0.019	(0.020)
Access to roads	0.146***	(0.056)	0.046	(0.040)
Availability of transportation	0.045*	(0.025)	-0.003	(0.019)
Nonfarm job opportunities	0.147***	(0.038)	-0.017	(0.025)
Natural disasters	0.001	(0.010)	-0.004	(0.006)
Non-farm network (% of households with non-farm activities within a commune)			2.894***	(0.046)
athrho	-0.075***			
lnsigma	0.047***			
Constant	6.800***	(0.116)	-2.475***	(0.075)
Observations	47,428		47,428	

Note: Robust standard errors in parentheses. *** p<0.01, ** p<0.05, * p<0.1. Estimates are accounted for sampling weights and are clustered at the commune level.

Source: authors' compilation

We found that households with better education are more likely to earn higher levels of non-farm income. The same finding has been observed in China by Huang et al. (2009) and in Cambodia by Do et al. (2019), who found that households with better education tend to move out of farming and specialize in non-farm activities. In general, our finding suggests that the level of education and occupation emerge as the main conditions for non-farm activities. The result supports the previous finding in rural Vietnam (Tran & Dinh, 2021) and some other developing countries (Berhe, 2020; Do et al., 2019; Raihan & Haque, 2018). Also, we found that households headed by members of the Kinh/Hoa group are more likely than those headed by ethnic minorities to take up non-farm work and increase the extent of such work.

Having more land diminishes the probability and extent of non-farm employment because such households tend to specialize in agricultural activities and thus are less likely to take non-farm employment, also confirmed by Tran et al. (2016) and Walle & Cratty (2003). We found a negative though small effect from membership in socio-political groups on non-farm employment. Finally, non-farm income levels are also influenced by specific commune characteristics. Households living in inland communes or communes with access to roads are more likely to engage in non-farm activities. These findings are consistent with those in previous studies in Viet Nam (Tran et al., 2016), Cambodia (Do et al., 2019), Ethiopia (Berhe, 2020) and Peru (Escobal, 2001).

Conclusion and policy implications

Our study has investigated the role of formal and informal loans in non-farm occupations in rural Viet Nam. We found that, on average, households with non-farm employment have higher levels of education and occupation than those without. Notably, the former secured a more significant number of formal and informal loans than the latter. However, those without non-farm occupations have more land than those with such employment. We also found that the distribution of non-farm income is skewed toward the better off. This suggests that while diversifying toward non-farm activities may increase household income, it may increase income inequality among rural households.

Our study provides evidence that households securing a larger number of formal loans are more likely to engage in non-farm occupations, at the same time increasing the extent of such employment. A useful implication here is that government policies aimed at improving the access of rural households to formal credit would promote the growth of the rural non-farm economy, which in turn increases the economic wellbeing of these households. The reason is that the rural non-farm economy creates more jobs and higher income than farming activities (Tran & Vu, 2020).

In line with the empirical literature on the rural non-farm economy (Tran, 2014), our study confirms that some household characteristics, such as education, occupation, and assets, are closely linked with the decision to undertake non-farm work and the extent to it. In particular, better education strongly increases the probability and extent of non-farm occupations. As mentioned previously, households engaging in non-farm activities earn a higher income than those that do not. Combined, the findings suggest that government policies should provide more opportunities for access to better education and occupations in rural Viet Nam. This would provide rural households with a greater likelihood of engaging intensively in profitable non-farm activities, which in turn would enhance their economic wellbeing.

At the commune level, it is evident in our study that the availability of non-farm job opportunities and roads increases the likelihood of participating in non-farm work. This implies that the presence of non-farm opportunities and roads

may indirectly affect economic welfare due to their positive effect on the growth of the rural non-farm sector. Therefore, a policy recommendation here is to promote non-farm occupations and also expand access to roads in rural areas.

We recognize that our research has certain limitations. For example, because some unobservable factors may impact both access to credits and non-farm activities, our econometric model may suffer from self-selection bias. This implies that future research should use instrumental variables or randomized control trial procedures to address this possible bias. Also, the study's findings would be more convincing if they were supported by specific primary data on the link between credit and non-farm activities. As a result, this shortcoming suggests a fascinating area for further investigation.

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