

# Landlessness, Economic Activities and Household Income in the Red River Delta, Vietnam

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## Research

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## Abstract

The main aim of the current study is to investigate the influence of landlessness and landholding on the choice of livelihoods among rural households in the Red River Delta. Among five livelihoods adopted by local households, we find that the highest income derives from formal wage earning, the lowest from agricultural and informal wage-paying livelihoods. The middle income group comprises livelihoods based on formal wage-paying jobs and other sources, and nonfarm self-employment and other income. Notably, the study provides evidence that landlessness or land shortage is not a potential barrier preventing rural households from pursuing gainful livelihoods in the Red River Delta. Specifically, households affected by landlessness or a shortage of land tend to adopt non-farm livelihoods that are more profitable than agricultural livelihoods. The finding suggests that landlessness or shortage of land should not be viewed as an absolutely negative phenomenon in the region.

**JEL codes:** K25; Q15; Q12; Q57

## 1. Introduction

Over the past three decades, Vietnam has transformed itself from an agricultural into an industrializing economy. This transformation has had the result that Vietnam, at one time one of the world's poorest countries, became a lower-middle income country by 2011. This structural transformation has emerged not only as a key driver of change in the economy but also as a major factor contributing to poverty alleviation in Vietnam (López Jerez, 2019). The initial reduction in the incidence of poverty was the result of the improved earnings of farming households. Given that 70% of the population was engaged in agriculture in 1990, agricultural growth is reflected in the rural poverty rates, from 70.9% in 1993 (López Jerez, 2019) to 18% in 2006 and 9.6% in 2018 (GSO, 2018).

While rice is the main staple and is planted everywhere Vietnam, it is mainly produced in the two "rice bowls," the Red River Delta (RRD) in the north and the Mekong River Delta (MRD) in the south. The rapid conversion of agricultural land to urban use has taken place unevenly across regions, and is found mostly in the peri-urban areas of the RRD and MRD, leading to a large decrease in the paddy rice area (Van Dijk et al., 2013). Consequently, this process has had a major effect on the livelihood of local people. On the one hand, the loss or decrease of arable land (due to urbanization) might have a negative effect on agricultural production and income. On the other hand, rapid urbanization in the peri-urban areas provides farmers with a wide range of non-agricultural opportunities, thereby enabling them to change their livelihoods and improve their economic well-being (Tran, 2014).

In Vietnam, numerous studies have examined the consequences of landlessness for rural households (Ravallion & Van de Walle, 2008) and the influence of the size of land holdings on rural household income, or poverty (Nguyen & Tran, 2014) in certain specific regions (Hoang, Tran, Nguyen, & Nguyen, 2019; Nguyen, Tran, Nguyen, & Grote, 2020; Pham, Bui, & Dao, 2010). Ravallion and Van de Walle (2008) provided economic evidence that rising landlessness did not increase poverty levels for the 1993–2004 period. Nguyen and Tran (2014) found a U-shaped relationship between landholding and household welfare among rural households, meaning that acquiring more cropland and shifting out of farming are linked with greater income and expenditure on consumption. Also, a study by Hoang et al. (2019) revealed that a lack of annual cropland is a key factor for adopting a profitable livelihood in the MRD, while annual cropland is found to have a negative link with household income in the Highland Central region (Nguyen & Nguyen, 2019).

The literature suggests that most empirical studies focus on the direct impact of cropland on household well-being, while only a few investigate its effect on the choice of livelihood in rural Vietnam. Also, to the best of my knowledge, no study exists for the Red River Delta, where cropland size per capita is the lowest, so that most rural households have diversified their livelihoods towards non-farm activities over the past decades (GSO, 2018, 2019). This gap in the literature inspired us to conduct the current research to answer two main research questions. *First*, what kinds of livelihood are adopted by local households? *Second*, are landlessness and landholdings the main factors affecting the choice of high-return livelihoods in this region?

Using the sub-sample of the Red River Delta from the Vietnam Household Living Standard Survey 2016, we find that rural households adopted five livelihood strategies, namely formal wage employment (FEW), FEW and other income sources (OIS), nonfarm self-employment (NSE), agriculture and informal wage employment (IWE). Also, both descriptive and inferential statistical analyses confirm that households that pursued agricultural or informal wage employment livelihoods, earned lower income per capita on average than those adopting any of the other remaining livelihoods. Notably, we find that households characterized by landlessness or land shortage are more likely to adopt high income livelihoods. This suggests that the lack of access to land can act as a push factor while higher returns from some non-farm activities can operate as a pull factor, combining to lead to a household's choice of livelihood.

## 2. Land Issues And Background Of The Region Of Study

### 2.1. Land reform

Agricultural de-collectivization was initiated in 1981, when farming households were allowed to sell their agricultural products after contributing a required amount of produce to the state. Then, in 1988, the adoption of Resolution 10 removed most features of collective production, transferring land use rights (LUR) from collectives to individual households, enabling farmers to lease land from the state for up to 20 years and thus securing their land tenure (World Bank, 2016). Also, land allocation from collectives to households and individuals was made subject to two main criteria: (1) the number of family members, and (2) the quality of land in terms of irrigation, distance among plots and other farming conditions (H. Nguyen, 2014). The land law of 1993 and Decree 64 (1993) progressed a step further in introducing Land Use Right Certificates (LURCs), also known as Red Books. They entitled landholders to 20 years of user rights for annual croplands and 50 years for perennial cropland. Moreover, LURCs can be traded, rented, exchanged, mortgaged and bequeathed (Van Hung, MacAulay, & Marsh, 2007). For practical land uses, LURCs are therefore quite similar to proper land titles.

### 2.1. Background of the region of study

Our study focuses on the Red River Delta (RRD), which is a flat plain in the northern part of Vietnam. It is surrounded by mountains in the east and west and by hills in the north. The Delta is created by recent alluvium deposited by the two main rivers, namely the Red River and its distributaries, and the Thai Binh River. The Delta is characterized by a slight slope from the northwest to the southeast, from 15 m down to sea level, and by a quite unpronounced topography, including the alternation of natural levees and depressions (Devienne, 2006). The RRD has long been a densely populated wet-rice cultivation area (Labbé, 2019), and is often referred to as the “cradle of Vietnamese civilization” (Seto, 2005).

The region includes ten provinces, namely Bac Ninh, Ha Nam, Ha Noi, Hai Duong, Hai Phong, Hung Yen, Nam Dinh, Ninh Binh, Thai Binh, and Vinh Phuc. It covers 21000 km<sup>2</sup> and is home to 21 million people, with a very high population density of 1090 people/km<sup>2</sup> on average (Labbé, 2019). Annual cropland covers about 41.7% of the RRD’s total area, slightly less than that of the Mekong River Delta (MRD) (43.5%) but much higher than that of other regions. Also, the region had the largest area of irrigated annual cropland (93.7%), followed by the MRD (92.3%), the North Central and Central Coastal regions (73.1%), the Southeast (66.5%), Central Highlands (54.4%) and Northern Midland and Mountain regions (44.2%). The region is endowed with good human capital, with 32.4% making up its trained labour force (15 years of age and above) in 2019, higher than the average level for the whole country (22.8%) and that of all other regions (GSO, 2019).

The official data show that over the 2008–2018 period, the RRD always attained the second highest income and second lowest poverty levels, just behind the Southeast region (GSO, 2018). Specifically, in 2018 the monthly household per capita income for the RRD was 4.775 million Vietnamese dong (VND), lower only than that of the MRD (5.526 million VND) but much higher than the average level for the whole country (3.874 million VND) and that of all other regions. Also, the poverty rate in 2018 was much lower in the RRD (1.9%) than in all other regions, except for the Southeast (0.6%) (GSO, 2018).

### 3. Data And Analytical Methods

#### 3.1. Dataset

Our study utilizes a sample of 6227 households in the RRD, drawing on secondary data from the 2016 VHLSS. The dataset contains rich information on various characteristics of households and their family members, and includes details about demography, education, employment, income activities, housing and expenditure, and ownership of various types of land. Data from multiple files were collapsed, re-organized, merged and finally combined in one file that could be used for both descriptive and inferential statistics.

#### 3.1. Analytical methods

First, we use descriptive statistics for summarizing the main characteristics of households, including various parameters such as mean, median, standard deviation, and frequency. We then employ cluster analysis to categorize households into various clusters or groups of livelihoods and use five income sources (measured by percentage) as input variables for this analysis, namely (1) agricultural income (cultivation, fishery and livestock, forestry); (2) formal wage income (wage-paying work with a formal labor contract); (3) informal wage income (wage-paying work without a formal labor contract); (4) nonfarm self-employment income (non-agricultural self-employment activities) and (5) other sources (remittances, public/private transfers, rentals and interest, etc.).

Our cluster analysis follows two steps. First, the optimal number of clusters was determined via the Calinski–Harabasz pseudo-F stopping-rule index (Halpin, 2016), which showed that the highest pseudo-F value was 4616.67 for the five-cluster solution. We then used the K-mean cluster to identify households according to mutually exclusive livelihoods. Some main features of the five livelihoods are given in Table 1.

Because livelihood choice is a response variable with five categories, we use a multinomial logit (MLM) model to investigate the impact of landlessness and land shortage on livelihood choice, with the choice of an agricultural livelihood as the base or reference group. Following previous studies (Hoang et al., 2019; Tran, Lim, Cameron, & Vu, 2014), our model controls for various individual and household characteristics. Some commune and provincial variables are also controlled for in the regression analysis. In Equations 1 and 2,  $LC_i$  is the livelihood choice of a household<sub>*i*</sub>;  $X_i$  represents a vector of individual and household characteristics, such as household size, dependency ratio, the age, gender and education of the heads of household<sub>*i*</sub>. The landlessness of household<sub>*i*</sub> is denoted by a dummy variable.  $Z_i$  includes three socio-economic commune variables, namely the rates of formal wage employment, informal wage employment and nonfarm-self-employment at the commune level, and nine provincial dummy variables controlling for provincial fixed effects. A description and definition of these variables are provided in Table 2.

$$LC_i = B_0 + B_1 X_i + B_2 \text{Landlessness}_i + B_3 Z_i + u_i$$

1

$$LC_i = B_0 + B_1 X_i + B_2 \text{Landholdings}_i + B_3 Z_i + u_i$$

2

### 4. Results And Discussion

#### 4.1. Background of household characteristics

Table 1 describes the income structure of five livelihoods that were classified by cluster analysis. It shows that 29% of the total household sample pursued a livelihood from nonfarm self-employment and other sources, followed by those with an informal wage livelihood (20%). The proportion of households adopting a formal wage-paying livelihood is 18%, which is equal to the number of those pursuing a livelihood from formal wage-paying jobs and other

sources, while those following an agricultural livelihood account for 15% of total households. On average, formal wage income makes up about 26% of total household income, followed by other income (20%), agricultural income (20%), informal wage income (17%) and nonfarm self-employment income (16%).

Table 1  
Proportion of income by source, by livelihood

Income sources/livelihood	Informal wages	Formal wages	Agriculture	Nonfarm self-employment	Other	Obs
Formal wage livelihood	1%	84%	7%	1%	7%	1122
Formal wage and other sources	14%	49%	13%	12%	12%	1173
Nonfarm self-employment & other income livelihood	2%	3%	10%	40%	46%	1878
Agricultural livelihood	3%	5%	70%	5%	17%	978
Informal wage livelihood	68%	4%	15%	5%	8%	1270
Total	17%	26%	20%	16%	21%	6381
Source: Authors' estimations from the 2016 VHLSS.						

On average, formal wage-earning employment contributes about 84% of total household income for those with a formal wage-paying livelihood. This employment provides about 49% of total household income among households with a livelihood from formal wages and other sources, and the other remaining sources contribute 51%. About 40% and 46%, respectively, of total household income, on average, derive from nonfarm self-employment and other income among those living from nonfarm self-employment and other income. Agricultural activities contribute about 70% while the remaining sources account for 30% of total income for those with an agricultural livelihood. Finally, for those with an informal wage-earning livelihood, an average of 68% of their total income was earned from informal wage-paying work and 15% from agriculture, whereas 17% came from other sources.

Table 2 provides some of the major characteristics of households by livelihood. On average, 78% of total households are headed by men. The figure is higher for households whose livelihood comes from formal wages and other sources (84%) and lower for those living from nonfarm self-employment and other sources (69%). The average age of household heads is about 54.25 years for the whole sample. However, the average age is highest for those with a nonfarm self-employment livelihood (59 years) and lowest for those with an informal wage-earning livelihood (49 years). The average number of family members is 3.45 for the whole sample, 4.06 for households living from formal wages and other sources, but only about 3.00 for those living from agriculture or nonfarm self-employment and other income. The average dependency ratio is about 0.45 for all households, but the highest figure is 0.55 for those living from nonfarm self-employment and other income, whereas the lowest is 0.31 for those adopting an informal wage-paying livelihood.

Regarding the education level of household heads, the data in Table 2 show that for the whole sample, each household head had attained an average of about 9 years of formal schooling. The highest level of education among household heads is recorded for households adopting a formal wage-earning livelihood (10.81 years), followed by those with a livelihood from formal wage earning and other sources (9.64 years), while the lowest level of education is found among those whose livelihood depends on nonfarm self-employment and other income (8.03 years). The average size of annual cropland is about 1584 m<sup>2</sup> per household for all households. However, the largest and smallest average size, respectively, is found for those living from agriculture (2801 m<sup>2</sup>) and livelihoods deriving from nonfarm self-employment and other income (1090 m<sup>2</sup>). Households depending on an agricultural livelihood also owned more perennial cropland and water surfaces than did those in other livelihood groups. On average, about one fifth of all households do not own any annual cropland. The percentage of households without annual cropland is found predominantly among those with formal wage-earning livelihoods (37%) and with livelihoods from nonfarm self-employment and other income (28%).

Table 2  
Summary statistics of included variables

Household livelihood	Formal wages		Formal wages & other sources		Nonfarm-self-employment & other income		Agriculture		Informal wages		All	
	Mean	SD	Mean	SD	Mean	SD	Mean	SD	Mean	SD	Mean	SD
Household and commune characteristics												
Gender of household head (1 = male; 0 = female)	77%		84%		69%		82%		83%		78%	
Age of household head (years)	54.41	14.68	52.03	12.50	58.90	16.21	54.66	11.07	48.97	11.59	54.25	14.19
Marital status of household head (1 = single; 0 = married)	2%		1%		3%		3%		3%		2%	
Education of household head (years of formal schooling)	10.81	3.47	9.64	3.04	8.02	3.36	8.65	2.70	8.39	2.71	8.99	3.27
Dependency ratio (number of dependents/household size)	0.45	0.33	0.36	0.29	0.55	0.38	0.39	0.36	0.31	0.26	0.43	0.35
Household size (number of family members)	3.72	1.55	4.06	1.48	2.92	1.62	3.05	1.47	3.75	1.37	3.45	1.58
Annual cropland (m <sup>2</sup> )	1124	1704	1678	1873	1091	1236	2801	3234	1734	1449	1584	1973
Perennial cropland (m <sup>2</sup> )	54	332	80	459	58	412	242	1188	79	823	93	674
Aquaculture land (m <sup>2</sup> )	41	477	88	764	58	698	897	5137	52	375	183	2069
Annual crop, landless (1 = yes; 0 = no)	37%		17%		28%		6%		13%		21%	
Perennial crop, landless (1 = yes; 0 = no)	95%		93%		95%		88%		95%		94%	
Aquaculture, landless (1 = yes; 0 = no)	97%		94%		97%		82%		96%		94%	
Formal wage employment opportunities <sup>a</sup>	59%		56%		42%		43%		43%		48%	
Informal wage employment opportunities <sup>b</sup>	29%		34%		31%		29%		42%		33%	
Nonfarm self-employment opportunities <sup>c</sup>	27%		31%		37%		26%		28%		31%	
Source: Author's estimations from the 2016 VHLSS. <sup>a, b, c</sup> the proportion of households with at least one member engaging in formal wage-earning employment, informal wage-earning employment and nonfarm self-employment at the commune level, respectively.												

Table 3 compares the level of per capita household income across livelihood groups. For the whole sample, each household earned a monthly average and median per capita income of about 2.73 million VND and 2.37 million VND, respectively. The highest income levels are recorded for households with formal wage-earning livelihoods while the lowest level of mean and median income (3.140 and 2.899 million VND) is found for those with informal wage-earning livelihoods (2.258 million VND) and agricultural livelihoods (1.789 million VND), respectively.

Table 3  
Summary statistics of household income per capita, by livelihood

Livelihoods	Mean income	Median income	SD
Formal wage employment	3140	2899	1471
Formal wages & other sources	2986	2741	1324
Nonfarm self-employment & other income	2790	2126	2422
Agriculture	2389	1789	2062
Informal wage employment	2258	2061	1057
All	2723	2370	1837

Table 4  
Comparing household per capita income, by livelihood

Row Mean-Column Mean	1. Formal wages	2. Formal wages & other sources	3. Nonfarm self-employment & other income	4. Agriculture
2. Formal wages & other sources	-217			
p-value	0.052			
3. Nonfarm self-employment & other income	-311	-94		
p-value	0.00	1.00		
4. Agriculture	-775	-558	-464	
p-value	0.00	0.00	0.00	
5. Informal wages	-958	-740	-647	-183
p-value	0.00	0.00	0.00	0.23

Table 4 compares the differences in per capita income across livelihood groups using the Bonferroni method for pairwise multiple comparisons. The second column shows that the income gap is negative and statistically significant (at 10% or lower levels), confirming that all other livelihoods secured lower income than did a formal wage-earning livelihood. Also, the results in columns 3 and 4 indicate that those living from agriculture and informal wages earn less, on average, than do those choosing the remaining livelihoods. Finally, we find no statistical evidence for the income difference between those in agricultural and those in informal wage-earning livelihoods. The results in Tables 3 and 4 suggest that a formal wage-earning livelihood is the highest-earning strategy while the lowest return is found for agricultural or informal wage-earning employment strategies. The results also suggest that shifting from an agricultural livelihood to any other would significantly improve household income, except for an informal wage-earning livelihood.

## 4.2. Factors associated with livelihood choice

The multinomial regression estimates for the impact of landlessness and landholding on livelihood choice are given in Tables 5 and 6, respectively. We report and interpret the results in terms of relative risk ratios (RRRs). In our study, the RRR of a coefficient shows how the likelihood of a household choosing a given livelihood (the comparison group) can be compared to the likelihood of that household choosing an agricultural livelihood (the reference livelihood) with changes in explanatory variables. For instance, an  $RRR > 1$  shows that the likelihood of a household choosing a formal wage-earning livelihood relative to the probability of choosing an agricultural livelihood increases as the explanatory variable increases. An  $RRR < 1$  indicates that the probability of the household choosing a formal wage-earning livelihood relative to the likelihood of choosing an agricultural livelihood decreases as the explanatory variable increases (UCLA, 2020)

Table 5 shows that the RRRs of landlessness in all livelihood choices are greater than one and statistically highly significant. For example, holding all other variables constant, the likelihood of choosing an informal wage-earning livelihood (relative to an agricultural livelihood) is 2.76 times higher for a household without annual cropland than for those with annual cropland. A similar but greater impact is found when other remaining livelihoods are chosen: 7.30 times for a formal wage-earning livelihood, 4.41 times for a livelihood based on nonfarm self-employment and other income, and 3.50 times for livelihoods dependent on formal wage-earning and other sources, respectively. A similar effect is also observed in the case of perennial cropland and aquaculture land. Our research provides evidence that landlessness acts as a push factor inducing rural households to engage intensively in the rural nonfarm sector. Also, the higher returns from most nonfarm activities suggest that the rural nonfarm sector functions as a pull factor encouraging rural households to diversify their livelihoods towards non-farm activities. Our finding is consistent with that in peri-urban areas of Hanoi, that farmland loss (due to urbanization) increases the likelihood of rural households choosing non-farm livelihoods that are more profitable than farm activities (Tran, et al., 2014).

Table 5  
Multinomial logit estimates for the impact of landlessness on livelihood choice in the Red River Delta, Vietnam

Explanatory variables	Formal wages		Formal wages / other sources		Nonfarm self-employment & other income		Informal wages	
	RRR	SE	RRR	SE	RRR	SE	RRR	SE
Gender	0.59***	(0.108)	0.78	(0.140)	0.75**	(0.108)	0.88	(0.129)
Age	1.02***	(0.006)	1.00	(0.007)	1.00	(0.007)	0.97***	(0.007)
Marital status	0.94	(0.369)	0.53	(0.213)	0.74	(0.230)	1.20	(0.385)
Education	1.30***	(0.029)	1.13***	(0.023)	0.99	(0.018)	0.96**	(0.018)
Dependency ratio	1.56**	(0.267)	0.92	(0.157)	2.48***	(0.376)	0.73	(0.243)
Household size	1.50***	(0.068)	1.56***	(0.077)	1.02	(0.055)	1.25***	(0.090)
<i>Annual crop, landless</i>	7.30***	(1.482)	3.50***	(0.659)	4.41***	(0.840)	2.76***	(0.659)
<i>Perennial crop, landless</i>	5.05***	(1.176)	2.46***	(0.487)	3.62***	(0.715)	2.60***	(0.512)
<i>Aquaculture, landless</i>	8.05***	(1.711)	4.72***	(0.956)	3.87***	(1.344)	5.35***	(1.146)
Formal wage employment opportunities	126.62***	(44.880)	82.72***	(27.797)	1.91*	(0.663)	2.65***	(0.877)
Informal wage employment opportunities	3.60***	(1.484)	23.17***	(8.408)	6.12***	(2.242)	211.04***	(73.890)
Nonfarm self-employment opportunities	1.63	(0.603)	8.28***	(2.737)	31.59***	(10.566)	5.73***	(1.908)
Vinh Phuc	1.15	(0.319)	1.41	(0.372)	1.36	(0.359)	1.13	(0.283)
Bac Ninh	1.18	(0.355)	1.49	(0.416)	1.72*	(0.512)	1.00	(0.260)
Hai Duong	1.58*	(0.406)	2.75***	(0.686)	1.92***	(0.467)	1.84***	(0.412)
Hai Phong	0.97	(0.293)	1.62*	(0.417)	1.27	(0.361)	1.03	(0.279)
Hung Yen	1.34	(0.344)	1.96***	(0.469)	1.50*	(0.349)	1.63**	(0.382)
Thai Binh	2.15***	(0.566)	3.08***	(0.759)	1.80**	(0.436)	2.42***	(0.570)
Ha Nam	1.53	(0.479)	2.63***	(0.727)	1.54	(0.412)	1.79**	(0.473)
Nam Dinh	1.30	(0.362)	1.87**	(0.498)	1.46	(0.353)	1.61**	(0.370)
Ninh Binh	0.69	(0.165)	1.04	(0.256)	0.78	(0.194)	1.12	(0.251)
Constant	0.00***	(0.000)	0.00***	(0.000)	0.01***	(0.012)	0.02***	(0.015)
Pseudo R2	0.17							
Observations	6,272							
Notes: Robust standard errors in parentheses*** p < 0.01, ** p < 0.05, * p < 0.1. Estimates are adjusted for sampling weights and clustered at the commune level. Hanoi is the reference group.								

Table 6  
Multinomial logit estimates for the impact of landholding on livelihood choice in the Red River Delta, Vietnam

Explanatory variables	Formal wages		Formal wages /other sources		Nonfarm self-employment & other income		Informal wages	
	RRR	SE	RRR	SE	RRR	SE	RRR	SE
Gender	0.69**	(0.127)	0.89	(0.159)	0.87	(0.124)	1.00	(0.145)
Age	1.02***	(0.008)	1.00	(0.008)	1.00	(0.009)	0.97***	(0.008)
Marital status	0.66	(0.262)	0.40**	(0.159)	0.56*	(0.180)	0.93	(0.297)
Education	1.29***	(0.029)	1.12***	(0.023)	0.99	(0.018)	0.95**	(0.018)
Dependency ratio	0.95	(0.176)	0.62***	(0.113)	1.62***	(0.293)	0.52*	(0.192)
Household size	1.69***	(0.083)	1.73***	(0.095)	1.14**	(0.067)	1.37***	(0.106)
Annual cropland	0.36***	(0.027)	0.48***	(0.034)	0.43***	(0.033)	0.53***	(0.041)
Perennial cropland	0.44***	(0.052)	0.57***	(0.050)	0.51***	(0.053)	0.60***	(0.058)
Aquaculture land	0.43***	(0.040)	0.53***	(0.041)	0.58***	(0.079)	0.50***	(0.042)
Formal wage employment opportunities	101.66***	(36.905)	69.20***	(24.077)	1.62	(0.586)	2.27**	(0.773)
Informal wage employment opportunities	3.42***	(1.464)	22.71***	(8.515)	5.93***	(2.320)	210.70***	(76.750)
Nonfarm self-employment opportunities	0.90	(0.363)	5.30***	(1.912)	18.36***	(6.627)	3.91***	(1.285)
Vinh Phuc	1.04	(0.296)	1.26	(0.338)	1.22	(0.331)	1.01	(0.265)
Bac Ninh	1.67*	(0.498)	1.95**	(0.554)	2.30***	(0.696)	1.27	(0.339)
Hai Duong	1.80**	(0.500)	3.13***	(0.833)	2.21***	(0.582)	2.04***	(0.507)
Hai Phong	1.16	(0.348)	1.89**	(0.493)	1.50	(0.426)	1.19	(0.325)
Hung Yen	1.75**	(0.484)	2.46***	(0.626)	1.88**	(0.468)	1.95***	(0.479)
Thai Binh	2.37***	(0.658)	3.32***	(0.896)	1.97**	(0.554)	2.59***	(0.635)
Ha Nam	1.93**	(0.608)	3.20***	(0.891)	1.92**	(0.510)	2.10***	(0.555)
Nam Dinh	1.59	(0.476)	2.16***	(0.619)	1.76**	(0.455)	1.81**	(0.446)
Ninh Binh	1.18	(0.321)	1.63*	(0.434)	1.32	(0.360)	1.65**	(0.405)
Constant	0.01***	(0.003)	0.01***	(0.006)	1.39	(0.864)	1.35	(0.824)
Pseudo R2	0.17							
Observations	6,272							
Notes: Robust standard errors in parentheses. *** p < 0.01, ** p < 0.05, * p < 0.1. Estimates are adjusted for sampling weights and clustered at the commune level. Hanoi is the reference group.								

The RRRs of land variables in Table 6 are smaller than one and statistically highly significant. They indicate that households with more agricultural land are less likely to pursue non-agricultural livelihoods or, in other words, more likely to concentrate their livelihood in agricultural activities. Specifically, as can be seen in Fig. 1, the slope-downward line depicts the declining probability of pursuing the formal wage or nonfarm-selfemployment & other income livelihoods as the annual cropland size increases. Our research findings are line with previous findings in Vietnam (Hoang et al., 2019; Tran et al., 2014) and in several developing countries (Carletto et al., 2007; Davis, 2003; Ellis, 2000; Jansen, Pender, Damon, & Schipper, 2006; Rahut, Jena, Ali, Behera, & Chhetri, 2015). As already discussed, agricultural livelihoods tend to offer lower income than do other livelihoods, except for informal wage-earning livelihoods. Combined, the findings here suggest that land shortage is not a barrier hindering farmers from pursuing higher return livelihoods in the Red River Delta. Notably, this finding contrasts with that for the Mekong River Delta by Hoang et al. (2019), who found that lack of access to land was a potential obstacle to taking up profitable livelihoods. This difference may reflect the fact that profitable nonfarming activities are more available or generally have lower barriers to entry in the Red River Delta than in the Mekong River Delta.

We also find that some household characteristics are closely linked with livelihood choice. Male-headed households are less likely to adopt a formal wage-earning livelihood. Households with more members are more likely to pursue a non-agricultural livelihood or, in other words, are less likely to specialize in farming activities. This suggests that agricultural production may not require more family labour, possibly as a result of agricultural mechanization in the Red River Delta. As shown in Fig. 2, households whose heads attain better education also have more opportunities to choose a formal wage-earning livelihood or a livelihood from a formal wage-paying job and other sources, which offer high-return nonfarming activities. For instance, one additional year of formal schooling for a household head increases the relative probability of choosing a formal wage-earning livelihood by 29%, and that of choosing a livelihood from



a formal wage-paying job and other sources by 12%. Similar findings are also observed in some peri-urban areas of Hanoi (Tran et al., 2014) and the Mekong River Delta (Hoang et al., 2019), where better education enables rural households to diversify their livelihoods towards high-return activities that often require higher levels of human resources.

As expected, we find that the likelihood of a household choosing a given livelihood is strongly associated with livelihood opportunities in the commune where the household lives. For instance, Table 6 shows that with a one percentage point increase in formal wage employment opportunities, the relative probability of a household choosing a formal wage-earning livelihood increases by about 4.7%, holding all other variables constant in the model<sup>1</sup>. We also find that livelihood opportunities vary considerably across provinces. With the same household characteristics, rural households who live in Hai Duong, Bac Ninh, Hung Yen, Thai Binh and Ha Nam are more likely to pursue high return livelihoods than are those in rural Hanoi.

<sup>1</sup>Exp (4.621634\* 0.01) = 1.047301. Note that 4.621634 is the multinomial logit coefficient that can be obtained by taking the log of the RRR of 101.66, and RRR can be obtained by exponentiating the multinomial logit coefficient.

## 4. Conclusion And Policy Implications

The main aim of the current study is to investigate the impact of landlessness and landholding on the choice of livelihoods among rural households in the Red River Delta. The paper uses micro-data from the 2016 VHLSS and econometric analysis. Using cluster analysis, we first discover what types of livelihoods are pursued by local households. We then compare per capita income across livelihoods in order to understand which brings a higher return. Finally, we measure the role of landlessness and landholding in choosing livelihoods, controlling for other household and commune characteristics.

Among five livelihoods identified via cluster analysis, we find that the highest income is earned by formal wage-paying livelihoods and the lowest derives from agricultural and informal wage-earning livelihoods. The middle-income group comprises livelihoods from formal wage-paying jobs and other sources, and from nonfarm self-employment and other income. We provide evidence that landlessness or land shortage is not a potential barrier preventing rural households from pursuing gainful livelihoods in the Red River Delta. Notably, households affected by landlessness or land shortage tend to adopt non-farm livelihoods that are more profitable than an agriculture. The finding suggests that landlessness or land shortage should not be viewed as an absolutely negative phenomenon in the region. The reason is that the situation may encourage land-limited households to engage intensively in profitable non-farm activities, which in turn reduce their dependence on farmland and improve their income.

We also find a number of additional factors determining a profitable livelihood. Better education increases the probability of a household adopting a livelihood related to formal wage-earning employment, which brings much higher income than agricultural or informal wage-paying livelihoods. Also, livelihood choices are found to be influenced by job possibilities at the commune level. For example, in a commune with greater opportunity for nonfarm self-employment, a household is more likely to pursue a livelihood from nonfarm self-employment and other income. In addition, we observe that livelihood opportunities vary considerably across provinces.

## Declarations

## Conflict of Interest Statement:

The authors agree that this research was conducted in the absence of any self-benefits, commercial or financial conflicts and declare absence of conflicting interests with the funders.

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## Appendix

### Appendix 1: Livelihood by province

Province	Formal wages	Formal wages & other sources	Nonfarm-self-employment & other income	Agriculture	Informal wages
Ha Noi (839)	22%	17%	26%	12%	23%
Vinh Phuc (493)	19%	18%	27%	11%	25%
Bac Ninh (493)	17%	25%	34%	7%	16%
Hai Duong (718)	20%	21%	28%	15%	16%
Hai Phong (494)	21%	26%	25%	12%	16%
Hung Yen (644)	20%	20%	31%	14%	16%
Thai Binh (855)	17%	14%	31%	17%	20%
Ha Nam (525)	15%	19%	30%	19%	17%
Nam Dinh (795)	11%	13%	34%	16%	26%
Ninh Binh (525)	13%	16%	27%	22%	22%
All (6381)	18%	18%	29%	15%	20%

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## Figures

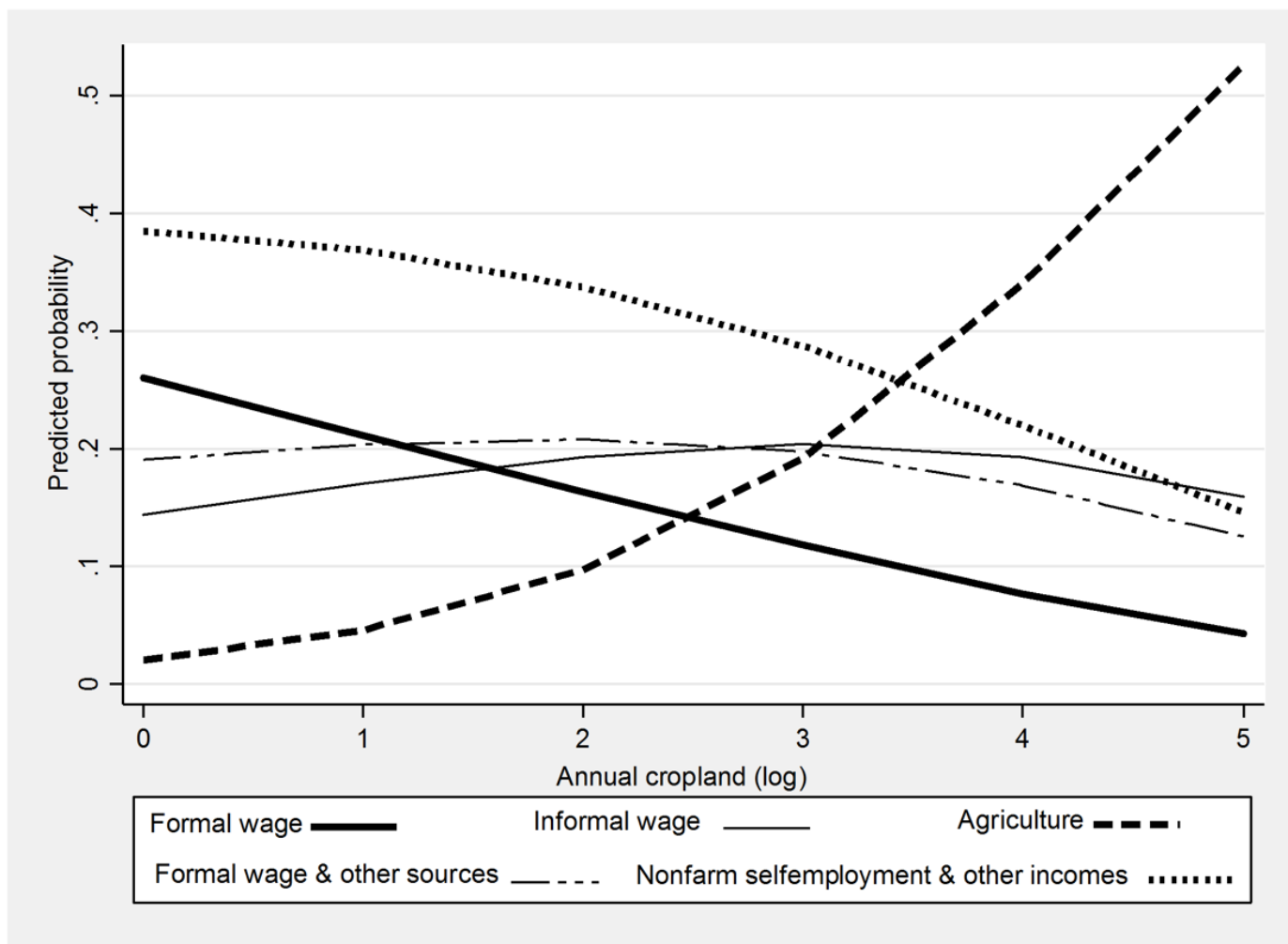


Figure 1

Predicted probabilities of choosing various livelihoods by annual cropland

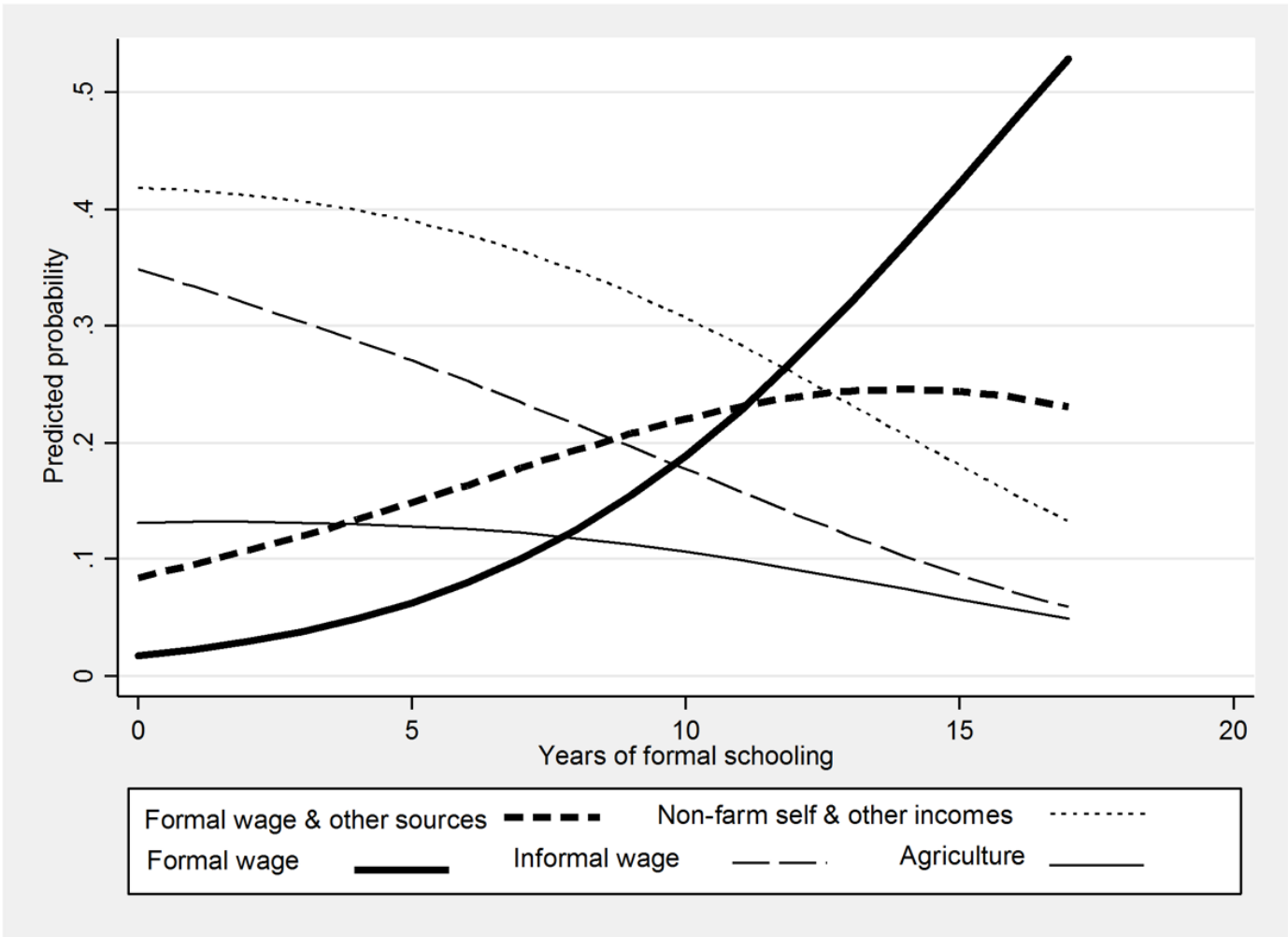


Figure 2

Predicted probabilities of choosing various livelihoods by years of formal schooling