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ABSTRACT

In this paper, we explore employment decision of Vietnamese farmers as having five choices: staying on the farm exclusively, staying in the village but partially engaging in local off-farm activities, and working outside the home region for a certain period, in which destination options are Hanoi, Ho Chi Minh City and Other which combines the remaining places. This choice model departs from the existing literature in several aspects. Firstly, previous papers focused mainly on the population that takes off-farm jobs or migrate, that are dichotomous employment choice. More importantly, most existing papers using the random utility model ignore factors in the destination areas. They assume implicitly that either migrants choose their destination randomly or that all migrants face exactly the same migration choices. In our paper, we allow multi-destination possibility, and examine impacts of distance, wages and social network on migrants' decisions. The indirect utility of a given migration option is modeled as a function of choice attributes and individual specifics. Choice attributes for each migration option include wage in destination area, transport between origin and destination area which is proxied by the corresponding distances, and social network of the migrants, while those for farm and non-farm option mainly include agricultural prices and local job creation opportunities. Individual specific include age, education, gender, marital status, share of children and elderly in the household.

The data used in this research are the Vietnam Living Standard Survey (1998) which is until now the only available data set that provides information on the migrant destinations. We start by estimating determinants of wage in destination areas using full information maximum likelihood to overcome selection bias. Then, we predict wages of those who do not currently work for wage. Finally, we run a conditional logit estimation with predicted wage being one of the explanatory variables to examine probability of migration to each location choice and of taking off-farm employment. Our results show that wage and network have significantly positive effects on all migration choices, while distance negatively affects them. Impact magnitude however differs across destination locations.

Keywords: migration, choice attributes, off-farm employment, random utility model, conditional logit

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1. INTRODUCTION

Vietnam's rural economy has substantially been diversifying over the past two decades. Rural labors have been migrating and taking local off-farm activities to seek non-farming income. The rural migration and off-farm sector has grown rapidly and became an important source of employment and income for rural households.

With a large pool of internal migrants (most from rural to urban areas), labor migration no doubt is a serious concern for Vietnamese policy makers and researchers. Migrant labors have been bringing tremendous changes to Vietnam's economy. In the villages where these migrants come from, the remittance is an important component of the rural revenue. In the cities, they are building skyscrapers, preparing foods and providing domestic services.

Several studies have been carried out to analyze migration patterns along with other aspects of socio-economic development in Vietnam (Guest 1998, Djamba et al. 1999, Goldstein et al. 2001, GSO and UNFPA 2005, and Dang 2005). Other studies examine the determinants of migration (Trinh 1998, Dang and Le 2001, Dang et al. 1997, 2006, and Nguyen, T. L. 2001) and its consequences (Do and Nguyen 1998, Le, V.T. 1998, and Nguyen, D.V. 2001). Studies on migration in Vietnam have been based on nationwide statistics (Dang et al. 1997), large-scale survey data (White et al. 2000, Dang and Le, 2001, Goldstein et al., 2001, Nguyen, D.V., 2001, and Nguyen and White 2002, Dang and Nguyen 2006) and small-scale survey data (Truong et al.1996, Doan et al. 1998, Do and Nguyen 1998, Guest 1998, Dang et al. 2005, Nguyen 2005). Among those data, the Vietnam Living Standard Surveys (1993, 1998, 2002 and 2004) are considered to be the most representative surveys for the whole population of the country containing very comprehensive information on household and commune background characteristics. However the Vietnam Living Standard Surveys of 1993 and 2002 have no information on migration status of the respondents and therefore current migration studies have been mostly based on the VLSS 1998 (GSO 2000, Le, X.B. 2001, and Nguyen, T. 2002) and VHLSS 2004 (Nguyen et al. 2007).

In addition to migration, off-farm employment has become an increasingly important source of employment for the rural population during the 1990s. Van de Walle and Cratty (2003) reveal that the incidence of farm-only household has decreased from 75% to 52% between 1993 and 1998. Expansion of off-farm employment is also reported by Hoang et al. (2005) and Minot et al. (2006) in the Red River Delta, and Northern Uplands, respectively. World Bank (1998, 2006) highlights an increasing share of off-farm activities in rural employment and household incomes, through the incidence of off-farm employment greatly varies across the country. Pham T. H. (2006) reveals that the trade policy reform has a noticeable impact on rural off-farm in rural Vietnam during the period 1993-2002.

While previous researchers focus on the population that takes local off-farm jobs or migrate, this paper explores the possible determinants of migration and off-farm simultaneously based on a random utility model supported by VLSS 1998. Most existing papers using the random utility model ignore factors in the destination areas. They assume implicitly that migrants choose their destination randomly or that all migrants face exactly the same migration choices. In this paper, we investigate determinants of migration with characteristics of destination area of migrants as main focus. They are so-called "pull" factors in the migration literature. The VHLSS 2004 does not

include information on the destination area of a migrant. We therefore use first the VLSS 1998 and next the VHLSS 2006 when it becomes available to do the analysis. For practical purposes, all destination areas need to be aggregated in some major destinations. The sample suggests two major destinations: Ho Chi Minh City that hosts 18% of the total migrants, and Hanoi where 14% of migrants choose to come. All remaining destinations are aggregated into one "Other" location. The indirect utility of the 'other' destination areas can be thought to depend on the weighted average of the factors affecting the indirect utility in each other destination area outside Hanoi and Ho Chi Minh City. This paper therefore models Vietnamese rural individuals as having five choices: staying on the farm exclusively, staying in the village but partially engaging in local off-farm activities, and migrating to one of the three destination areas as listed above. Hence, we extend the work-choice to five outcomes. This brings us advantage over the typical dichotomous choices migration or off-farm employment.

This article organizes as following. Section 2 outlines methodology. Section 3 reviews the migration pattern and off-farm employment in Vietnam. Data and explanatory variables are described in section 4. We present main results in section 6. The last section concludes this article.

2. METHODOLOGY

Discrete choice models are based on utility maximization. An individual at area i faces J choices, including moving to different area or staying at the current location either to take farm or off-farm work. In a destination choice model together with off-farm work, this means that the chosen destination or off-farm job must give the individual greater utility compared with other choices. If the utility of individual *i* choosing choice *j* is represented as U_{ij}, then choice *j* will be chosen if and only if $U_{ij} > U_{il}$ for $j \neq l$.

Because researchers do not know U_{ij}, the individual's true utility, they cannot tell for sure what an individual will eventually choose, a destination or an off-farm job. U_{ij} consists of two components, the observable and the unobservable components:

$$U_{ij} = V_{ij} + \varepsilon_{ij}.$$

U_{ij} consists of a predicted utility, V_{ij}, observable based on the choice's attributes, and an unobserved random component, ε_{ij}. If ε_{ij} were known, researchers would know U_{ij} and could tell for sure which destination or whether off-farm work would be chosen. Since researchers do not know ε_{ij}, the best they can do is predict the final outcome in terms of probability.

The probability of individual *i* choosing state *j* can be described as:

$$\begin{aligned} P(y_i = j) &= P(U_{ij} > U_{il}) \\ &= P((V_{ij} + \varepsilon_{ij}) > (V_{il} + \varepsilon_{il})) \\ &= P((\varepsilon_{il} - \varepsilon_{ij}) < (V_{ij} - V_{il})) \text{ for all } j \neq l. \end{aligned}$$

Based on McFadden (1973), if and only if ε_{ij} are independent and identically distributed (iid) with the Weibull distribution, then the probability of individual *i* choosing destination *j* can be solved as a closed-form expression of:

$$P(y_i = j) = P_{ij} = \frac{e^{V_{ij}}}{\Sigma_j e^{V_{ij}}} = \frac{e^{\alpha' Z_{ij}}}{\Sigma_j e^{\alpha' Z_{ij}}}$$

where Z_{ij} represents all the observed factors or explanatory variables and α represents parameters obtained from the model. The model therefore imposes the IIA assumption. The log likelihood function for all individuals living at the area i choosing any specific state j is

$$\ln L = \sum_j m_{ij} \ln P(m_{ij}=1)$$

where $m_{ij}=1$ if individual in area i chooses state j. This is the log likelihood function of a conditional logit specification.

3. MIGRATION AND OFF-FARM EMPLOYMENT IN VIETNAM

It is well-known that it is difficult to define migration because it involves both a time and spatial dimension which need to be defined carefully in turn, and also migration studies often use different definitions because they rely on different data sources. In this paper, we define a migrant as someone who had gone away to work for at least one month in the past 12 months.

Reardon et al. (2001) define off-farm employment as any types of employment outside agriculture. In this study, Vietnam's RNFS consists of all economic activities in the rural areas which are different from farming.[1] More specifically, we base on one's main job to determine their job choice. Someone is said to have farming activities as the job choice if his/her main job in the past 12 months is agricultural, forestry, and fishery. Off-farm activities will include personal services, protection and sales, skilled manual workers, assemblers and machine operators, and unskilled workers.

4. DATA AND EXPLANATORY VARIABLES

Descriptive statistics of the sample is provided in table 1. By examining the distribution of migration destination, we choose two specific locations, Ho Chi Minh City and Hanoi that host 18% and 14% respectively of total migrants of the whole country, and one integrated location called "Other" that combines all remaining destination in our analysis.

In terms of choice attributes, the indirect utility function of farming option is a function of land and capital holding, of input and output prices, which include fertilizer (ure and npk), rice and paddy in this paper. The utility of non-farming option would be a function of local job creation opportunities, such as existence of enterprises and trade activities in the commune, and the chance for local residents to get access to adequate infrastructure such as electricity, pass-by carway, etc.

Most importantly, the indirect utility of a given migration option is a function of employment opportunities in destination area, wage in destination area, available network in destination area, access to social services in destination area, living conditions in destination area, transport between origin and destination area, etc. In the scope of this paper, due to availability of data, we will consider three attributes: wage in destination area, distance between origin and destination, and network in destination area.

[Table 1 and 2 about here]

[1] Alternatively, off-farm workers could be somebody who works on her/his own farm or is hired by the others to work on their farms as farmer laborer.

4.1 Wage in destination areas

For grouped data analysis, one needs to consider wage (or income in case of non-formal work) for every one, no matter the job choice she/he makes. Our data provides us information on wage of some of those who migrate (56%, 74% and 51% for Hanoi, Ho Chi Minh City and Other respectively), do off-farm activities (48%) and do farming (25%). We need to predict wage of the remaining people if they choose one specific option.

To estimate determinants of wage and predict, we face the truncation issue: we can only observe one's wage if she works, or if market wage is higher than her reservation wage. Hence OLS estimation performed on observable wages would lead to biased estimators. The correct model would be specified by two equations: labor participation and wage determination. The labor participation in each option is determined as follows:

$$D_i^* = \mu Z_i + \eta_i \quad for \quad all \quad i$$
$$D_i = 1 \quad if \quad D_i^* > 0,$$
$$D_i = 0 \quad otherwise$$

In this equation, Z_i are individual characteristics that affect the latent variable D_i*, hence potentially the job choice option, but not the level of earnings. The earning equation completes the model:

$$\ln w_i = \gamma X_i + \omega_i \quad for \quad D_i = 1$$

Assuming a joint normal distribution for all the disturbances, the system represented by equations above can be jointly estimated using (i) either the Heckman two-stage procedure, with probit estimation in the first stage to estimate the labor participation equation, and OLS with an inverse Mills ratio for selection bias correction in the second stage to estimate the wage equation, or (ii) the full information maximum likelihood method. Both procedures generate consistent estimators; however FIML estimators will be more efficient. In this paper, we therefore adopt FIML to yield consistent and efficient values for coefficients μ and γ, as well as for the standard deviations σ of disturbance ω. It also yields estimates for the correlation coefficients between η and ω, called ρ.

The estimated parameters can be used to predict the earnings that currently not working individual would have if she works for wage, taking into account both their observable and unobservable characteristics. The prediction involves the density function $\phi(.)$ and the accumulated density function Φ(.) of a normal distribution, evaluated at $\widehat{\mu X}$. Let $\phi(i)$ and Φ(i) be those values. We then predict earnings of those who do not currently work for wage for each job choice option by the following formula:

$$\ln \hat{w}_i = \hat{\gamma} X_i + \hat{\rho}\hat{\sigma} \frac{\phi_i}{1\text{-}\Phi_i} \quad \text{for i = 0.}$$

4.2 Network in the destination

Social network at the destination is measured in this paper by the number of people who come to the same destination from the same origin. Then we use a category variable for network, which is 1 if the count number is less than 5, 2 if the count number is less than 9, but at least 5, etc. For those who reside and choose to do either farming or non-farming in the local area, we assume they have the higher level of social network than the highest network if they had moved, which is 7.

4.3 Distance between origin and destination

In this paper, we take distance data from Vietnam's Road Map. This is the provincial level data. Future measurement of the distances at closer level (district or commune) would improve results.

5. EMPIRICAL RESULTS

5.1 Determinants of wage/income

Among those who choose farming, only 25% report income. Regression results show that characteristics and production facilities are main determinants of income from farming. In fact, income in this case is positively determined to be made by younger male and married people with higher education, higher experience, more land and capital holding, and more access to electricity. This is a meaningful finding economically.

With observation of income/wage of 48% of farmers who choose to do off-farming activities, we find evidence that wage from off-farming activities are positively determined to be higher for younger male and married people with higher education and higher experience. Furthermore, it is also statistically shown that more access to electricity or having nearby-enterprise would generate higher income for non-farming individuals. Interestingly, we find that off-farm working people would have higher wage if working for non-state sector (e.g. private or FDI sector) than working for public sector.

Regression results also shed light that many individual characteristics are important determinants of wage earner migrants. In fact, we find that returns to many individual characteristics such as gender, age, experience and education vary across destinations. For example, we find that education and age has the largest impact on wage in Ho Chi Minh City, and smallest impact in Hanoi. In addition, regressions also suggest that working in non-state sector generates higher wage than in state sector.

[Table 3 about here]

The estimation of wage also enriches the rate of return to education literature. Regressions allow us to compare rate of return to education among choice options, which has never been done in the existing literature. Return to education is larger in Ho Chi Minh City than in Hanoi. This fact could reinforce the attractiveness of Ho Chi Minh City as a hosting location for migrants.

Furthermore, analysis of wage contributes also to the literature of wage differentials between public and private sectors. Regression provides proofs that public sector pays more than non-private sector if off-farm job is chosen, while the opposite would hold if migration to any destination is chose. In both Ho Chi Minh City and Hanoi, non-public sector is more efficient, hence generating a higher pay-off, than the public sector. One could adopt similar methodology to investigate wage differential across sectors in more details.

5.2 Probabilities of choosing one job option

Regression results give evidence that three attributes are very important in job and location choice decision in rural Vietnam. All three estimated coefficients are statistically significant with the expected sign. Individuals are more likely to choose destinations that generate high earnings. They are also more likely to choose destinations that are closer to the origin. In addition, the destination with stronger social network is more likely to attract them to move in.

We have evidence that individual characteristics are important determinants of job and location choice. In fact, younger workers would be more likely to choose off-farm, or migration to Ho Chi Minh City or Other than older ones. In addition, it is logical to find that married workers have less incentives, hence less likely to migrate to Ho Chi Minh City or Other, while more likely to take off-farm job. Furthermore, males are less likely to take farm job than females.

In terms of capital, we find statistical supports that having more buffalos and cows make workers more likely to take farm and off-farm jobs. Also, access to car way makes migration decision to be taken more easily.

Relating to agricultural prices, when input price increases, workers find less encouraged to do farming, and also off-farm job, while output price enhances local job. One could base on these price coefficients to investigate effects of trade protection/liberalizantion on rural workers' decision. Paddy price pressure as observed now may encourage both farm and off-farm jobs, as suggested by regression results in this paper.

[Table 4 about here]

5.3 Predicted probability of choosing one job option

It is well-known that due to non-linear structure, the coefficients in the conditional logit estimation are not directly related to the marginal effects. Also, there are ready to use STATA code to generate marginal effects. Hence one has to calculate predicted probability of taking one specific option manually.

[Table 5 about here]

The simulation results show that 1% increase in (ln)wage/income would increase the probability of migration to Ho Chi Minh City by 0.01%, that of migration to Other by 0.05%, and that of off-farm work to 0.15%. Given that wage increase, the probability of choosing farming would be a lot lower (0.2%), and actually no one would choose to switch to farming. For Hanoi as a destination, only a few would feel more comfortable to migrate in, that leads to the probability of choosing to migrate to Hanoi slightly reduces in general. This fact could be explained in a number of ways. Sampling error is a major issue for Hanoi. We have so few observations of migrants to Hanoi. Secondly, all migrants to Hanoi that we could observe take informal work in non-public sector, which in turn suggest the low qualification and very possibly unstable work status. These migrants having lowest education level reinforces our arguments. This problem could explain some other awkward results for Hanoi that we have mentioned in the above sections.

Regarding social network, networking being stronger by 1% would increase the likelihood of migrating to Ho Chi Minh City by 0.01% and to Other by 0.007%. It seems like problem persists for Hanoi as a destination due to sampling error.

6. CONCLUSIONS

A dilemma Vietnam faced on its route to sustainable development is how to absorb the large number of surplus agricultural labors with a delicate balance of efficiency and social fairness. Based on a household survey data set, the VLSS 1998, this paper analyzes determinants of the decision of Vietnamese farmers on whether to stay exclusively on farm, take local off-farm jobs, migrate to Ho Chi Minh City, Ha Noi or the remaining places that are so-called "Other". We contribute to the existing literature of migration in Vietnam, on the one hand, by building a discrete destination choice model, which has never been done before. On the other hand, we add to the migration analysis an additional choice of local off-farm working. We reinforce results that migrants are more likely to go to close destination, with strong social network and for higher income. Network and earnings play also an important role in decision of choosing local off-farm jobs.

Further studies will be benefited by examining VHLSS 2006 and other surveys with more extensive information. We might be able to explore alternative approaches to conditional logit which is subject to the main concern of its assumption of independence from irrelevant alternatives (IIA).

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Table 1: Descriptive statistics of the sample

Variable	Whole Sample	Farm activities	Off-farm activity	Migrate to Hanoi	Migrate to HCMC	Migrate to other places
Number of observations	8692	6901	1249	69	90	383
Individual characteristics						
Wage/Income	1322	1140	1520	2391	2546	1661
	(1495)	(1154)	(1848)	(2424)	(2477)	(1883)
Education	3.21	3.21	3.11	2.32	4.32	3.21
(Years of Schooling)	(3.55)	(3.57)	(3.42)	(3.24)	(3.88)	(3.59)
Experience	6.32	5.81	8.69	9.64	5.39	7.38
(years)	(11.75)	(11.67)	(12.55)	(9.64)	(8.87)	(10.31)
Age	34.12	34.93	31.31	27.32	29.67	30.82
(years)	(15.99)	(16.32)	(14.49)	(9.69)	(14.29)	(13.81)
Economic sector	.998	1.00	.995	1.00	.978	.987
(1=non-state, 0= state)	(.039)	(.00)	(.074)	(.00)	(.146)	(.114)
Gender	.49	.46	.53	.70	.56	.70
(1=male; 0=female)	(.50)	(.50)	(.50)	(.46)	(.50)	(.46)
Marital status	.60	.62	.53	.51	.42	.49
(1=married, 0=single)	(.49)	(.49)	(.50)	(.51)	(.50)	(.50)
Ethnic	.85	.82	.95	1.00	.96	.92
(1=Kinh, 0=others)	(.36)	(.38)	(.21)	(.00)	(.20)	(.27)
Household characteristics						
Household size	5.55	5.53	5.60	4.70	6.01	5.64
	(1.99)	(2.00)	(1.97)	(1.08)	(1.99)	(1.91)
Share of children in HH	.30	.30	.29	.32	.27	.28
	(.21)	(.21)	(.21)	(.22)	(.18)	(.20)
Share of elderly in HH	. 092	.097	.082	.053	.061	.070
	(.184)	(.192)	(.163)	(.111)	(.106)	(.139)
Highest education	7.01	7.02	7.15	6.05	8.29	6.38
	(3.38)	(3.37)	(3.38)	(3.11)	(3.20)	(3.48)
Land (m^2)	2289.95	2244.39	2844.92	377.55	1705.2	1782.92
	(4442.16)	(4591.7)	(4088.5)	(337.35)	(2557.38)	(3149.35)
Buffalo	.32	.35	.23	.06	.16	.16
	(1.29)	(1.29)	(1.51)	(.29)	(.63)	(.61)

Figures in parentheses (.) are standard deviations

Table 2: Commune characteristics

Variables	Obs	Mean	Std. Dev.	Min	Max
Whole sample					
enterprise	8692	.3979521	.4895036	0	1
trade_ville	8995	.2574764	.4372683	0	1
car_way	8995	.8050028	.3962206	0	1
price_ure	8692	2172.151	226.249	240	3500
price_npk	8692	1865.206	1350.166	130	13000
price_rice	8692	3389.62	432.5798	2100	4400
price_paddy	8361	2246.162	305.335	1450	3000
Farm					
enterprise	6901	.3850167	.4866345	0	1
trade_ville	6901	.2407149	.4275474	0	1
car_way	6901	.8156939	.3877607	0	1
price_ure	6901	2181.966	224.0791	240	3500
price_npk	6901	1789.736	1238.629	130	13000
price_rice	6901	3382.409	432.0353	2100	4400
price_paddy	6641	2254.977	305.0197	1450	3000
Off-farm					
Enterprise	1249	.4859888	.5000038	0	1
trade_ville	1249	.3416149	.4744354	0	1
car_way	1249	.7670807	.4228554	0	1
price_ure	1249	2119.696	239.7593	240	3000
price_npk	1249	2022.162	1080.389	130	13000
price_rice	1249	3411.721	417.4081	2100	4400
price_paddy	1210	2209.835	298.2344	1450	3000
Migration to Hanoi					
Enterprise	69	.3188406	.4694413	0	1
trade_ville	69	.2173913	.4154928	0	1
car_way	69	.826087	.3818115	0	1
price_ure	69	2185.652	170.2894	1950	2600
price_npk	69	4642.174	5596.931	400	13000
price_rice	69	3367.391	360.0272	2500	4200
price_paddy	68	2257.5	246.7845	1700	2800
Migration to Ho Chi Minh City					
Enterprise	90	.4333333	.4983118	0	1
trade_ville	90	.344086	.4776442	0	1
car_way	90	.9677419	.1776423	0	1
price_ure	90	2163.556	153.5228	1950	2500
price_npk	90	2078.556	724.4286	700	3200
price_rice	90	3475.911	489.9173	2500	4400
Migration to Other					
Enterprise	383	.3498695	.4775524	0	1
trade_ville	383	.2741514	.4466692	0	1
car_way	383	.689295	.4633876	0	1
price_ure	383	2165.953	219.9216	1850	3500
price_npk	383	2162.768	1604.572	400	13000
price_rice	383	3431.196	481.1642	2100	4400
price_paddy	370	2224.73	327.6178	1450	2800

Table 3: Labor participation and wage estimation

Variables	**Farm**	**Off-farm**	**Migration to Hanoi**	**Migration to HCM City**	**Migration to Other**
	Obs = 6970	Obs = 2506	Obs = 291	Obs = 140	Obs = 528
		Determinants of wage/income		**Dependent variable: lnwage**	
Edu	.0101615	.008616	.0522826	.0868037	.0691297
	(0.98)	(0.67)	(1.93)*	(1.75)*	(2.61)***
Exper	.0144033	.001288	.0327671	-.0112565	.0059171
	(3.99)***	(0.24)	(2.00)**	(-0.85)	(0.48)
Age	.0810415	.2144166	.0974913	.2593492	.1977202
	(6.37)***	(12.99)***	(2.05)**	(4.80)***	(6.56)***
Age_square	-.001054	-.0027154	-.0010812	-.003323	-.0023961
	(-6.90)	(-12.77)***	(-1.97)**	(-5.27)***	(-6.09)***
Esector		-.6793254	1.948141	.8976485	.5870663
		(-2.68)***	(2.59)**	(1.34)	(1.12)
Land	.0000255				
	(2.30)**				
Machine	.0290269				
	(2.82)***				
Buffalo	.1012542				
	(3.09)***				
Gender	.4541257	.5295477	-.2741106	.2366628	.3994386
	(6.30)***	(6.22)***	(-1.09)	(0.76)	(2.07)**
Marital status	.0622522	-.8020501	-.4523072	-.7328506	-.104361
	(0.58)	(-6.91)***	(-1.36)	(-2.00)**	(-0.46)
Ethnic	.3459892	.7445761	2.500289	1.073685	1.344237
	(3.51)***	(4.96)***	(2.85)***	(1.61)	(4.63)***
Electricity	.9686346	1.18673			
	(6.00)***	(4.39)***			
Price_npk	-.0001143	.7391828			
	(-2.97)***	(7.22)***			
Price_paddy	-.0002253				
	(-1.30)				
Price_rice	.0007266				
	(5.92)***				
		Labor Participation			
Edu	.0148229	.0164858	.0260301	.1395427	.0992867
	(2.72)***	(2.01)**	(1.14)	(3.44)***	(4.94)***
hhedu	-.006852	-.0491036	.00517	-.0686948	-.0470825
	(-1.16)	(-6.17)***	(0.28)	(-1.49)	(-2.11)**
Exper	.0777438	.0610751	.0806896	.0549875	.090306
	(19.56)***	(10.20)	(3.58)***	(2.75)***	(5.51)***
Expersquare	-.0016369	-.0012543	-.0013418	-.0005855	-.001903
	(-17.00)***	(-8.64)	(-2.63)***	(-2.17)**	(-4.29)***
Land	-1.91e-06	-.4296258			
	(-0.43)	(-3.15)			

Machine	-.008297 (-1.86)*	-.2139827 (-1.65)			
Buffalo	-.0155498 (-1.08)	.0271986 (3.19)			
Childshare	-.2153665 (-2.50)**	-.4296258 (-3.15)***	-1.202261 (-2.69)***	.5063756 (0.60)	-1.485776 (-4.85)***
Eldershare	.5704504 (6.76)***	-.2139827 (-1.65)*	-.9305741 (-2.15)**	.9046136 (0.98)	-1.538146 (-3.91)***
hhmember	.0570331 (11.04)***	.0271986 (3.19)***	.0708296 (1.94)*	-.0914105 (-2.39)**	-.0374133 (-1.77)*
Electricity		.0225974 (0.14)			
Enterprise		.3944997 (7.22)***			
Car_way		-.2666386 (-4.40)***			
Trade_ville		-.1700943 (-3.05)***			
Price_ure	-.0001276 (-2.73)	-.0001907 (-2.81)***			
Price_paddy	-.0002432 (-2.83)***	-.0000215 (-0.20)			
Price_rice	.0003565 (5.69)***	.0001164 (1.50)			
Constant	-1.824416 (-9.84)	.063669 (0.20)	-1.130091 (-3.90)	.7735167 (1.66)	.7887083 (3.62)

z values in parentheses, (*), (**) and (***) shows significance at 10%, 5% and 1%, respectively.

Table 4: Conditional (fixed-effects) logistic regression

Conditional (fixed-effects) logistic regression — Number of obs = 41980
LR chi2(43) = 17848.03
Prob > chi2 = 0.0000
Log likelihood = -4588.824 — Pseudo R2 = 0.6604

choices	Coef.	Std. Err.	z	P>|z|	[95% Conf.	Interval]
D2	.5037677	.358846	1.40	0.160	-.1995575	1.207093
D3	**-7.700042**	1.309442	-5.88	0.000	-10.2665	-5.133582
D4	**-2.749653**	.930879	-2.95	0.003	-4.574142	-.9251636
D5	-.1499882	.5708328	-0.26	0.793	-1.2688	.9688236
Lnwage	**1.12687**	.0421938	26.71	0.000	1.044172	1.209568
Distance	**-.0005192**	.0001505	-3.45	0.001	-.0008142	-.0002242
Network	**.101777**	.0095008	10.71	0.000	.0831557	.1203982
edu 2	**-.0248025**	.0104541	-2.37	0.018	-.0452922	-.0043129
edu 3	**-.1481888**	.0445513	-3.33	0.001	-.2355077	-.0608699
edu 4	.0374191	.0305031	1.23	0.220	-.022366	.0972041
edu 5	**-.1060056**	.0164444	-6.45	0.000	-.1382361	-.0737751
age 2	**-.1000355**	.0157349	-6.36	0.000	-.1308753	-.0691957
age 3	.1410756	.082023	1.72	0.085	-.0196865	.3018378
age 4	**-.1788119**	.048369	-3.70	0.000	-.2736134	-.0840104
age 5	**-.0606377**	.0257058	-2.36	0.018	-.11102	-.0102553
age_2square	**.0011823**	.0001934	6.11	0.000	.0008032	.0015614
age_3square	**-.0029984**	.0012067	-2.48	0.013	-.0053636	-.0006332
age_4square	**.0021672**	.0005943	3.65	0.000	.0010023	.0033321
age_5square	**.0006677**	.0003261	2.05	0.041	.0000286	.0013068
marital 2	**.4180387**	.1077688	3.88	0.000	.2068156	.6292617
marital 3	.0471121	.4270538	0.11	0.912	-.7898981	.8841222
marital 4	-.0292619	.3474261	-0.08	0.933	-.7102046	.6516808
marital 5	**-.6295684**	.1680125	-3.75	0.000	-.9588668	-.3002699
gender 2	**.3146194**	.0715463	4.40	0.000	.1743912	.4548477
gender 3	**2.06648**	.3039047	6.80	0.000	1.470838	2.662122
gender 4	**1.354583**	.2355163	5.75	0.000	.8929798	1.816187
gender 5	**1.300687**	.1218622	10.67	0.000	1.061841	1.539532
land 1	8.58e-06	.000017	0.50	0.614	-.0000248	.000042
land 2	**.0000539**	.000018	2.99	0.003	.0000186	.0000892
buffalo 1	**.3648809**	.0998196	3.66	0.000	.169238	.5605237
buffalo 2	**.2921854**	.1073628	2.72	0.006	.0817582	.5026125
enterprise 2	**-.2436702**	.0831685	-2.93	0.003	-.4066774	-.080663
enterprise 3	.0056289	.3147493	0.02	0.986	-.6112684	.6225262
enterprise 4	-.0611282	.2577597	-0.24	0.813	-.566328	.4440716
enterprise 5	**.30629**	.1244499	2.46	0.014	.0623726	.5502074
car_way 2	**-.3866992**	.0879283	-4.40	0.000	-.5590355	-.2143628
car_way 3	.1635559	.3586814	0.46	0.648	-.5394466	.8665585
car_way 4	**1.413148**	.4399942	3.21	0.001	.5507756	2.275521
car_way 5	**-.7460472**	.1296897	-5.75	0.000	-1.000234	-.49186
price_npk 1	**-.0001544**	.0000229	-6.74	0.000	-.0001993	-.0001095
price_npk 2	**-.0001419**	.0000271	-5.24	0.000	-.000195	-.0000888
price_padd 1	**.0005631**	.000167	3.37	0.001	.0002358	.0008905
price_padd 2	.0002034	.000193	1.05	0.292	-.000175	.0005817

Choices: 1 for farm; 2 for off-farm; 3, 4, 5 for migration to Hanoi, Ho Chi Minh City and Other respectively. Bold type shows significance at 5%.

Table 5: Predicted Probability

Predicted Probability	Lnwage			Network		
	Mean (Std)	**Min**	**Max**	**Mean (Std)**	**Min**	**Max**
Farm	-.2025 (.124)	-.4725	0	.0179 (.0224)	-.1659	.0985
Off-farm	.1451 (.0921)	0	.4715	-.0352 (.0235)	-.2150	0
Migration to Hanoi	-.0016 (.0231)	-.2359	.0659	-.0005 (.0059)	-.0568	.0177
Migration to HCMC	.0105 (.0259)	-.0005	.3637	.0112 (.0248)	1.27e-09	.2505
Migration to Other	.0486 (.0552)	-.0022	.3904	.0065 (.0247)	-.1376	.0968