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Investment of rice farming households in Thailand and Vietnam

Chaniporn Leartlam, Suwanna Praneetvatakul*, Isriya Bunyasiri†

Department of Agricultural and Resource Economics, Faculty of Economics, Kasetsart University, Bangkok 10900, Thailand

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Abstract

Agricultural investment plays an important role in improving production efficiency and income of farmers. However, Thai farmers have lower investment than Vietnam farmers. Study on investment in Thailand is still limited. This paper aims to analyze the factors determining investment in Thailand and Vietnam. Data of 2,414 households in rice farming in Thailand and Vietnam are obtained from TVSEP. The analysis is performed using multinomial logit regression model. Farm households are grouped into 4 categories based on their investment i.e. non-investment, agricultural investment, non-agricultural investment and mixed investment. The results indicated that 40 percent of Thai rice households did not invest and they are those who have low rice planted area and low wealth. By contrast, more than 40 percent of Vietnam rice households invested in agriculture and small scale enterprises (SSEs). Most of them are large farm area and high-income farmers. The result of the econometric analysis revealed that increasing the level of education and financial literacy are significant factors explaining household investment activities in Thailand. For Vietnam, elderly farmers with a lot of experience, enhancing the level of education, increasing in remittances are significant factors stimulating investment. The finding of the study calls for the government to support the farmers' organizations and their network as well as the idea of large-scale farming and financial knowledge in order to motivate them to invest more in the future.

Introduction

The livelihood of households in Thailand and Vietnam depends greatly on rice, which is a major crop in both countries. Although both Thailand and Vietnam are leading rice exporting countries, rural poverty remains a predominant issue. Rural poverty, as measured by headcount ratios was at 13.9 percent for Thailand and 18.6 percent for Vietnam in 2014 (World Bank, 2014). An increase in investment plays a key role in improving productivity and income of farmers, hence reducing poverty. In terms of productivity, a comparison of rice yields between the two countries shows that the average yield between 2006–2016 in Vietnam was 5.41 tons/ha, whereas it was 3.02 tons/ha in Thailand (Vietnam's Rice Caught Between Two Models of Development, 2018). Irrigation investments and the promotion of hybrid rice have been the main sources of the advancement of rice production in Vietnam (Xie & Napasintuwong, 2014).

Investment is a very important factor on agricultural production capacity and production. Nevertheless, an alarming trend is being observed, household investment in agriculture has been declining, especially in rural areas (Adimassu & Kessler, 2012; Zepeda, 2001). Consistent with literature, (Hohfeld & Waibel, 2013; Wilder, 2018) low agricultural investment and productivity in Thailand have among other things, been attributed to problems with land ownership, wealth and labor allocation (Hohfeld & Waibel, 2013). Along with a lack of rural infrastructure as well as small farm sizes, incentives for acquiring income-generating assets dominate

* Corresponding author.
E-mail address: suwanna.p@ku.th (S. Praneetvatakul).
† Co-first author.
E-mail address: fecoiyb@ku.ac.th (I. Bunyasiri).

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large parts of the agricultural investment in Vietnam. So, productive investments in agriculture do offer a way out of poverty for rural households (Wilder, 2018). Moreover, the extent of investments has implications for distribution of wealth in rural areas in the future. This fact emphasizes the crucial role that the investment behavior of households plays a key function in rural development.

Our hypothesis argues that a higher proportion of households invest in agriculture in Vietnam. Determinants of factors affecting investment in Thailand differs from those in Vietnam. In addition, rural households in both countries do not solely rely on farm income to ensure their livelihoods, but also on non-farm income. Investments in agricultural and non-agricultural assets play a key role in increasing productivity and income. However, the studies to explore determinants of investment decisions of rural households in both countries are limited. The literature suggests that the intensity of household investment in Thailand is mainly driven by land ownership and farm size. These factors allow households easier access to credit and economies of scale enable larger investments. In Vietnam, livestock and credit are drivers of household investment. These alternative sources of income ensure smooth investment and consumption. Most studies show that wealth and specialization in agriculture favors investments in general, while remoteness, age of the household head and female headship hinder them. Large agricultural investments are additionally favored by land and labor availability in agriculture, savings and education. Consequently, the factors affecting household investment differ by country.

Most studies on these aspects used cross-sectional data, whereas longitudinal data may provide a better foundation to examine the impact of long-term household investment. In addition, there is limited research that compares investments of remote and poor households in Thailand and Vietnam. Such households face constraints such as poor infrastructure, limited planting area, and low access to credit.

The paper aims to explore investment and analyze the factors affecting investment decisions of rice farming households in Thailand and Vietnam. Investment in this paper is defined as the purchase of a durable good for a price above 5000 THB or 1.5 mil VND (249 USD), which households will use for longer than only one season or year.

This paper consists of four sections. The first section provides a review of farm-households investment by considering household conditions in Thailand and Vietnam. The second section covers a theoretical model, the data and applied methodology. The third section provides the econometric results from Thailand and Vietnam. Finally, the fourth section summarizes empirical findings and policy implications.

Literature Review

Farm-Household Investment Review

Household investment decisions are subject to several factors such as demographic, socio-economic characteristics, initial productive capital and collective action and rice policy. These conditions can explain the investment behaviour of households. Empirical research shows that household characteristics dominate investment, older farmers are likely to invest less than younger farmers who are often less risk averse, more flexible in their decisions and more open to adopting new ideas and technology (Ayamga, Yeboah, & Ayambila, 2016). Higher levels of education can lead to higher investment (Orji, 2013). In addition, education is generally related to innovativeness and managerial ability (Brase & LaDue, 1989). Moreover, farmers with more family labor, having surplus agricultural labor forces, may tend to invest in agricultural production (Gao, 2012). Risk aversion is considered as a key barrier to investments and causes households to be less willing to undertake investments that have high expected returns (Rosenzweig & Binswanger, 1992). Farm structure and capital endowment are factors that affect investment. The greater the area of farmland operated by households is, the more conducive it is to give an economic effect (Gao, 2012) with land tenure security enabling farmers make long-term agricultural investment to improve investment efficiency and promote access to credit (Do & Iyer, 2008). Socio-economic characteristics are an important factor in the investment decision, especially in developing countries. Credit constraints, lack of credit and insufficiency of credit are a major problem for farmers and hinder investment (Hohfeld & Waibel, 2013). In addition, non-farm income is a factor that increases investment. This allows households to reduce their credit limiting and ensures they are able to deal with various risks and to provide financial support to farmers (Barrett, Reardon, & Webb, 2001). Collective action and rice policy can explain the investment, social capital encourages farmers to participate in different groups, share experience, have collective action within the village, and work together (Adimassu & Kessler, 2012). Farmers who are members of the government association, have better access to credit, information, infrastructure, and training for farmers (Ayodeji, Remi, Adebayo, & Ayodeji, 2017). Therefore, farmers are willing to increase their investment.

In summary, the factors affecting household investment are diverse. In general, rural households often face many obstacles and restrictions; they have low capacity to invest. Moreover, many Thai rice farmers are still considered under the low-income group, have lower productivity and less opportunity to improve their lives. Therefore, the analyzing determinants of investment decisions of rural households is crucial and will be very useful for the policy makers to improve the situation of investment in the future.

Methodology

Theoretical Framework

A model of household consumption and investment

Our model of household consumption and investment considers a household maximizing its utility over a two-period planning horizon. Utility is defined over a composite consumption good (C) and housing services (H). The household has an initial endowment of financial resources (W_0), which is augmented with borrowed funds (L). These resources can be used in the first period for consumption (C_0),

investment in productive assets (I) (farm investment) and investment in housing (h) (off-farm investment). Other initial endowments are capital (K_0), land (A_0) and housing (H_0). In the second period, if no change in the land endowment occurs, the augmented capital stock (that is, initial capital plus first period investment) is combined with the initial land endowment to produce output. Consumption in the second period is then the value of output minus debt repayment. However, if agriculture is recollectivized or the land is taken away (an event with probability P), then the farmer receives only some fixed future income Y, all debt is cancelled, and production capital is taken over by the state. Then, maximization of expected value of utility subject to Equations (1), (2) and (3) is (Feder, Lau, Lin, & Luo, 1990)

$$\text{Max}_{i,h}\ U_0(W_0 + L - I - h) + V_0(H_0) + (1 - P) * U_1 [F(K_0 + I, A_0) - (1 + r) * L] + P * U_1(Y) + V_1(H_0 + h) \quad (1)$$

First order conditions for optimum require

$$-U'_0 + (1 - P) * U'_1 * F_k = 0 \quad (2)$$

$$-U'_0 + V'_1 = 0 \quad (3)$$

where F_k is the marginal productivity of capital. Some possible reasons for the investment in housing are not related to any of the factors potentially inhibiting productive investment (e.g., demographic, income elasticity). But it is also possible that some of the factors bind incentives for productive investment (e.g., tenure security, credit, and farm size). The effect of credit on both types of investment is positive, an increase in availability of credit to household would lead to an additional investment. An increased risk to land rights will lead to less farm investment and higher off-farm investment. Higher initial productive capital and housing have a negative direct effect on investment in these items, but positive cross-effects. A larger farm size is also associated with a larger allocation of credit. As returns to scale are increasing, farm size positively influences investment (Feder et al., 1990). In summary, finance, farm structure, capital endowment, and housing service (or off-farm activities) can explain the investment behaviour of households. When households accumulate initial capital, sufficient access to credit and land right, productive investment in agriculture will provide an opportunity to enhance income-generating livelihoods, and thereby alleviate poverty.

Data

This paper is based on three years of household panel data in three provinces in Thailand and Vietnam, which was collected under the project "Poverty dynamics and sustainable development: A long-term panel project in Thailand and Vietnam". Leibniz University Hannover, University of Goettingen, and the Deutsche Forschungsgemeinschaft (DFG) implemented the project (Thailand Vietnam Socio Economic Panel, 2013; Thailand Vietnam Socio Economic Panel, 2016). The samples consist of 1,330 rice-farming households in Thailand and 1,084 in Vietnam. The data were gathered from three provinces in Thailand, namely Buriram, Ubon Ratchathani and Nakhon Phanom. The provinces in Vietnam were Ha Tinh, Thua Thien Hue and Dak Lak. These studied areas were selected by considering the following criteria i.e. low per capita income, variation in development potential, high dependence on agriculture, and existence of special risk factors (Hardeweg, Klasen, & Waibel, 2013).

Within the provinces in Thailand, a three-stage cluster sampling procedure on sub-district, village and household level was carried out. For Vietnam, a three-stage stratified cluster sampling generated the sampling households. The survey instrument was conducted using a comprehensive questionnaire covering detailed information on household members, risks, land, agriculture, livestock, off-farm/self-employment, investment, and finances.

Analytical Technique

In this study, we applied multinomial logit model to investigate the effect on each type of investment activity in Thailand and Vietnam on the relationship between the investment decisions and farm-household characteristics, farm structure, financial situation, and social and development policy. The theoretical framework of the multinomial logit model has each household i faced with j different investment activities at time t. The household receives a certain level of utility from each investment activity and chooses the alternative that maximizes its utility. The multinomial logit model can be written as (shown in Equation (4)) (Long & Freese, 2001)

$$ln\Omega_{m|b}(x) = ln\frac{\Pr(y=m|x)}{\Pr(y=b|x)} = x\beta_{m|b}\ for\ m = 1\ to\ J \quad (4)$$

where b is the comparison group. Since, $ln\Omega_{b|b}(x) = ln1 = 0$, it must hold that $\beta_{b|b} = 0$. That is the log odds of an outcome compared to itself is always 0. These J equations can be solved to compute the predicted probabilities (shown in Equation (5)) (Long & Freese, 2001)

$$Pr(y = m|x) = \frac{\exp(x\beta_{m|b})}{\Sigma_{j=1}^{J}\exp(x\beta_{j|b})} \quad (5)$$

We have four outcomes and estimate the model using the "non investment" outcome as the base category. The assumption is the Independence of Irrelevant Alternatives (IIA) was violated, the IIA assumption means that adding or deleting alternative outcome categories does not affect the odds among the remaining outcomes (Suriya, 2009). To determine the effect of variables in the probability scale we need to compute marginal effect (Bowen & Wiersema, 2004). A multinomial logit model was used to analyze the data and apply a simulated maximum likelihood estimator to obtain the investment activities. The investment activities have no natural ordering. The empirical model used is described in Equation (6).

$$CINV_{i,t-3} = f[C, E, F, P] \quad (6)$$

where $CINV_{i,t-3}$ denotes the investment activities of households (1 = agricultural investment, 2 = non-agricultural investment, 3 = mixed investment and, 0 = non investment) at time t-3 (2013). We can specify the explanatory variables of model (6) in Table 1.

Table 1 Description and impact of variables included in model: Among rice farming of HHs in Thailand and Vietnam in period 2013–2016

Variables	Description	Unit	Expected sign
1. Rice Farming Household Characteristics (C)			
AGE_{t-3}	Age of household head in 2013	years	–
EDU_{t}	Education level of household head in 2016	years	+
$FLABOR_{t-3}$	Number of household members working in own agriculture in 2013	No.	+
$RISKATT_{t-3}$	Amount household invests in a business if household had just won a lottery in 2013	100USD	+
2. Farm structure and Capital endowment (E)			
$TENSEC_{t-3}$	Type of land tenure security in 2013 (1 = Title deed, NS5, NS3, NS3K, 0 = others)	dummy	+
$FSIZE_{t-3}$	Rice planting area in 2013	ha	+
$FLOCA_{t-3}$	Access to irrigation in 2013 (1 = access , 0 = no access)	dummy	+
$LIVESTOCK_{t-3}$	Livestock production in 2013 (1 = yes , 0 = no)	dummy	+
$OWNMAC_{t-3}$	Own machinery for rice planting in 2013 (1 = owned, 0 = others)	dummy	+
3. Financial Situation (F)			
$SHARINCAG_{t-3}$	Share of Income from agriculture to Total income of household in 2013	percent	+
$INCOFFFARM_{t-3}$	Income from off-farm wage in 2013	100USD	+
$INCSSE_{t-3}$	Income from small scale enterprise in 2013	100USD	+
$SAVING_{t-3}$	Amount of household saving in 2013	100USD	+
$REMITT_{t-3}$	Amount of money the household received from relatives or friends in 2013	100USD	+
$CREDCONS_{t-3}$	Household applied for credit in 2013 (1 = partially or fully rejected, 0 = completely accepted)	dummy	–
$FINLIT_{t-3}$	Financial literacy level of household in 2013 (mathematical measure related finance)	score (0–8)	+
4. Collective action and Rice Policy (P)			
$LOCALCLUB_{t-3}$	Membership within community in 2013 (1 = member, 0 = non-member)	dummy	+
$RICEPOLICY_{t-3}$	Government compensation for rice farmers in 2013	100USD	+

Results

Investment Status of Rice Farming Households in Thailand and Vietnam

Table 2 illustrates the four investment activity categories of rice farming households in Thailand and Vietnam during 2013 to 2016. In Thailand it was found that 37.52% of households do not make the investment, followed by non-agricultural investment (32.26%), mixed investment (18.87%), and agricultural investment (11.35%). For Vietnam, 42.99 % of households make the mixed investment, followed by non-agricultural investment (30.72%), no investment (14.94%), and agricultural investment (11.35%). It reveals that agricultural investment in both countries is lowest, compared to other types.

We also observed differences in the nature of the investments as foreseen. While agricultural investments in farm equipment dominate other investments in Thailand and Vietnam, Vietnamese farmers stated that they plan to invest in livestock (30.39%), irrigation (16.18%), and land (9.80%). The amount of intention to invest in livestock, land, and irrigation among Thai farmers is very low (14.49% livestock, 12.56% land, and 7.25% irrigation). Thus, it could be concluded that Vietnamese farmers have higher investments than Thai farmers do (Figure 1).

Table 2 Households in different investment activities (2013–2016)

Households	Thailand	Vietnam
Non investment	499 (37.52%)	162 (14.94%)
Agricultural investment	151 (11.35%)	123 (11.35%)
Non-agricultural investment	429 (32.26%)	333 (30.72%)
Mixed investment	251 (18.87%)	466 (42.99%)
Total	1,330 (100.00%)	1,084 (100.00%)

Source: Own calculations based on TVSEP (2016)

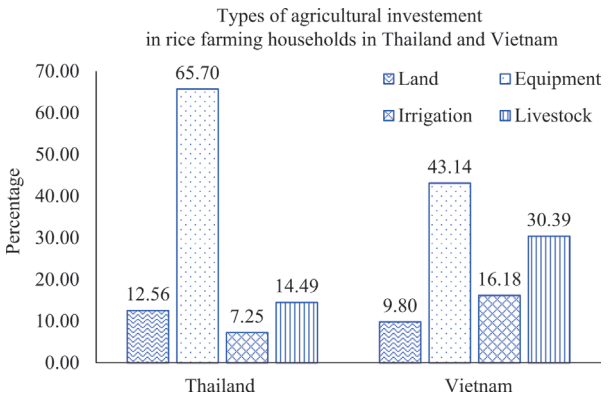

Figure 1 Types of agricultural investment in rice farming households in Thailand and Vietnam in 2016

When considering the households with investment activity (Table 3), older household heads with less education tend to reduce investment. These heads are considered as risk averse. In contrast, young household heads with high education and who find it acceptable to take risk lead to invest in agriculture and non-agriculture. In Thailand and Vietnam, farmers who invest in agriculture have an average family labor of 2.27 and 2.31 respectively. Farmers who do not make investments have the smallest farm size (2.63 and 0.32 hectare for Thailand and Vietnam respectively) and around 9 percent of rice planting areas are located in irrigated areas. Vietnamese farmers who have non investment raise livestock more than 90 percent of the time and less than 8 percent own the machines for their farm. It could be explained concisely that farmers who do not make investments are poorly endowed in terms of resources, farm size, access to irrigation, or machinery for rice planting.

Regarding the financial situation in Thailand and Vietnam, farmers who do not make investments have low income from off-farm (2,044 and 1,352 US dollars for Thailand and Vietnam respectively) and self-employment activities (1,728 and 377 US dollars for Thailand and Vietnam respectively), whereas, mixed investment in both countries has the highest income from off-farm and self-employment. This indicates that wealthier farmers often make more investments. Most of them do not face credit constraints since the major source of the mixed investments likely comes from savings (4,087 and 1,072 US dollars for Thailand and Vietnam respectively) and remittance (3,041 and 1,006 US dollars for Thailand and Vietnam respectively). Farmers who make mixed investments have an average score of financial literacy (defined as mathematical measure related interest rate, risk, finance and short calculation tasks) of 4.79 and 5.73 in Thailand and Vietnam respectively, which indicates the ability of financial management and households i.e. more financial literacy leads to more investment.

Rice policy in Thailand and Vietnam is different, Thai government offered income guarantee insurance for rice farmers. In Vietnam, the government also offers input support program for rice farmers e.g. 60 percent of fertilizer cost or lower price of new rice variety. Rice farmers registered in the government support program; they received the highest level of compensation payment from the government support program with 525.92 and 4.11 US dollars for Thailand and Vietnam respectively. Nevertheless, Vietnamese farmers receive lower compensation payment than Thai farmers. Therefore, farmers who are members of a government association will be able to increase their investment.

Table 3 Descriptive statistics of investment activities in Thailand and Vietnam

Variable	Thailand				Vietnam			
	Non invest	Ag invest	Non-Ag invest	Mixed invest	Non invest	Ag invest	Non-Ag invest	Mixed invest
Age of HH head$_{t-3}$ (years)	59.75	58.07	56.39	57.39	57.38	52.43	52.71	50.16
Education level of HH head$_{t}$ (years)	4.82	5.68	5.38	5.85	5.11	6.19	6.49	7.27
Farm Size$_{t-3}$ (ha)	2.63	3.60	2.97	3.75	0.32	0.49	0.36	0.50
Access to irrigation$_{t-3}$ (1 = access, 0 = no access)	0.09	0.11	0.10	0.08	0.85	0.80	0.87	0.88
Livestock$_{t-3}$ (1 = yes, 0 = no)	0.71	0.77	0.75	0.70	0.90	0.87	0.90	0.92
Own machinery$_{t-3}$ (1 = owned, 0 = others)	0.35	0.42	0.39	0.41	0.08	0.16	0.06	0.18
Share of Income from agriculture$_{t-3}$ (%)	43.06	45.31	40.75	64.59	40.80	46.84	38.37	42.92
Income from off-farm wage$_{t-3}$ (100USD)	20.44	32.78	24.98	31.40	13.52	15.23	17.12	17.72
Income from SSE$_{t-3}$ (100USD)	17.28	23.60	28.86	69.27	3.77	4.94	10.21	13.39
Saving$_{t-3}$ (100USD)	12.87	20.51	17.23	40.87	2.58	5.28	9.31	10.72
Remittances$_{t-3}$ (100USD)	9.07	9.94	11.56	30.41	5.81	8.39	13.72	10.06
Financial literacy$_{t-3}$ (score: 0–8)	4.09	4.76	4.62	4.79	4.34	5.03	5.23	5.73
RICEPOLICY$_{t-3}$ (USD)	220.96	525.92	265.47	338.24	1.78	4.11	1.42	2.01

Source: Own calculations based on TVSEP (2013 and 2016)

Table 4 Marginal effects of multinomial logit model for the investment activities among rice farming of households in Thailand and Vietnam in period 2013–2016

Variable	Thailand				Vietnam			
	Non invest	Ag invest	Non-Ag invest	Mixed invest	Non invest	Ag invest	Non-Ag invest	Mixed invest
Age of HH head$_{t-3}$ (years)	0.0037	0.0006	-0.0040***	-0.0003	0.0034	0.0009**	0.0007***	-0.0051***
Education level of HH head$_{t}$ (years)	-0.0169	0.0049**	0.0013*	0.0106***	-0.0097	-0.00003**	-0.0071**	0.0168***
HH member working in own agriculture$_{t-3}$ (number)	-0.0054	-0.0026	0.0205	-0.0125	-0.0049	0.0191	-0.0078	-0.0064
Risk attitude of HH$_{t-3}$ (100USD)	0.000005	0.00001	-0.00001	-0.00001	0.000001	-0.00001	-0.00002	0.00003
Tenure Security$_{t-3}$ (1 = title deed, 0 = others)	-0.0144	-0.0057	-0.0072	0.0274	0.0008	-0.0312	0.0138	0.0166
Farm Size$_{t-3}$ (ha)	-0.0203	0.0071***	-0.0038	0.0170***	-0.0563	0.0185*	-0.0768	0.1146**
Access to irrigation$_{t-3}$ (1 = access, 0 = no access)	-0.0071	0.0208	0.0190	-0.0328	-0.0100	-0.0640	0.0545	0.0195
Livestock$_{t-3}$ (1 = yes, 0 = no)	-0.0337	0.0205	0.0433	-0.0301	0.0010	-0.0574	-0.0192	0.0756
Own machinery$_{t-3}$ (1 = owned, 0 = others)	-0.0336	0.0134	-0.0007	0.0209	-0.0124	0.0235	-0.1562	0.1450
Share of Income from agriculture$_{t-3}$ (%)	-0.0003	0.0011	-0.0077	0.0069	-0.0623	0.0229*	-0.0398	0.0793**
Income from off-farm wage$_{t-3}$ (100USD)	-0.0006	0.0002**	0.0001	0.0003*	-0.0006	-0.00005	-0.0002	0.0009
Income from SSE$_{t-3}$ (100USD)	-0.0002	-0.00003	0.0001	0.0001*	-0.0013	-0.0010	0.0005**	0.0017***
Saving$_{t-3}$ (100USD)	-0.0007	0.0001	-0.00001	0.0006***	-0.0013	-0.00003	0.0003	0.0010
Remittances$_{t-3}$ (100USD)	-0.0012	-0.0001	0.0008*	0.0006*	-0.0017	0.0001**	0.0013***	0.0003**
Credit constraints$_{t-3}$ (1 = yes, 0 = no)	0.0353	0.0901	-0.0446	-0.0808	-0.0345	0.0447	0.0601	-0.0704
Financial literacy$_{t-3}$ (score: 0–8)	-0.0168	0.0032*	0.0078**	0.0058**	-0.0147	-0.0071	-0.0078*	0.0296***
LOCALCLUB$_{t-3}$ (1 = member, 0 = no member)	-0.0271	0.0266	-0.0196	0.0200	-0.0155	0.0202	-0.0274	0.0227
RICEPOLICY$_{t-3}$ (100USD)	-0.0016	0.0012	-0.000007	0.0003	-0.0355	0.1362	-0.1813	0.0805
n	1330				1084			
LR χ^2 (54)	151.31				78589.03			
Prob>χ^2	0.0000				0.0000			
Pseudo R^2	0.0439				0.0850			
Log likelihood	-1645.9956				-423126.9			

Note: Base outcome: Non investment.

* $p < 0.1$. ** $p < .05$. *** $p < .01$.

Source: Own calculations based on TVSEP (2013 and 2016)

Determinants of Different Investment Activities

Our multinomial logit model results show (Table 4) that education level statistically explains the investment activities in both Thailand and Vietnam. The explanation for this is that education enables to households to adopt new practices or technology. Vietnamese households whose heads have attained higher educational levels are more likely to invest in mixed investments but are less likely to partake in agricultural and non-agricultural investment. Age of the household head discourages non-agricultural investment for Thailand. In general, the younger household heads are more likely to invest, while age of household head encourages agricultural investment and non-agricultural investment for Vietnam.

Farm size, income from small-scale enterprises (SSEs), remittances and financial literacy are statistically significant in explaining the investment activities in Thailand and Vietnam. In terms of farm size, households with large farm size are better in mixed and agricultural investment for Thailand and Vietnam. Regarding income from SSEs, a one unit increase in income will increase the likelihood to have mixed investment in Thailand by 0.01 percent, while increasing the likelihood to have mixed and non-agricultural investment in Vietnam by 0.17 percent and 0.05 percent. In Thailand, a one unit increase in remittance will produce 0.08 percent and 0.06 percent increase to the probability of having non-agricultural and mixed investment, while remittance positively influences all types of investment in Vietnam. Households with more financial literacy tend to invest in mixed investments but tend to invest less in non-agriculture in Vietnam. For Thailand, financial literacy significantly increases the probability of investing in all investment activities. Households with higher off-farm income and savings in 2013 invested more in mixed and agricultural investment in Thailand, while the share of agricultural income positively influences mixed and agricultural investment in Vietnam.

In summary, this study contributes to better understanding factors driving investment activities of rice farming household in Thailand and Vietnam. Agricultural investment has the lowest proportion of total investment activities in both countries. Moreover, agricultural investments tend to be undertaken by higher educated and financial literacy. In addition, the mixed investment is likely to increase more in the future for Thailand. Wealthier households invest more on the

mixed investment type than poor households. In Vietnam, higher share of agricultural income helps increasing the agricultural investments and the mixed investments. In addition, remittances are the crucial factor for all household investment activities in Vietnam, which is similar to Thailand apart from in terms of agricultural investment. It is possible that remittances are not largely used for their consumption or housing but could be turned into investment. Thus, it is possible to use remittances to increase the capital for agricultural investment in Thailand and Vietnam.

Conclusion and Recommendation

This study estimated the investment decisions of rice farming households in Thailand and Vietnam. Thai farmers invest lower than Vietnamese farmers, particularly agricultural investment is very low. Higher figures in terms of education level, farm size, off-farm income and financial literacy tend to increase the likelihood of agricultural investment for Thailand, whereas, the age of the household head, farm size, share of agricultural income and remittances favored agricultural investment in Vietnam. As expected, income is an important determinant of investment decisions. We also find that remittances play a key role in household investment in both countries. Our results suggest that education and financial literacy are key variables that can be used to promote investment, as higher educational levels and financial literacy are associated with higher probability of mixed investments. In conclusion, rice farmers with higher human capital, rice planting area and financial literacy were more likely to invest. Therefore, this study derives the following policy implications:

1. Bank for Agricultural and Agricultural Cooperatives should strengthen farmers' knowledge especially regarding financial literacy in order to enhance household investment decisions and allow them to properly manage their finances e.g. policy makers could increase the levels of financial literacy with educational programs targeting young farmers. Hence, financial literacy would be an important factor that could reduce credit constraints of remote rural households. Moreover, the Thai government should support young smart farmers, since these farmers tends to invest more in the future.

2. Department of Agricultural Extension and the Agricultural Land Reform Office should support the concept of large farms in order to ensure appropriate management, improvement of irrigation systems, and development of new technologies for production inputs for Thai farmers. This would allow farmers to be able to invest more.

3. Department of Agricultural Extension should promote off-farm job opportunities, e.g. small agribusiness or agricultural services because off-farm income is an important factor that encourages Thai farmers to invest more in agriculture.

Conflict of Interest

There is no conflict of interest.

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