

Research Article

DETERMINANTS OF THE ABILITY OF FARM HOUSEHOLDS TO BUY AGRICULTURAL MATERIALS ON CREDIT FROM THE SUPPLIER IN HAU GIANG PROVINCE

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ABSTRACT

The aim of this study is to analyze the determinants of the ability of farm households to buy agricultural materials on credit from the supplier in Hau Giang province, thereby proposing solutions to improve this situation. With the use of data of 210 farm households in Hau Giang province collected over the period of 2019-2020, this study applies Logit regression model to investigate the determinant factors of the access to trade credit and Tobit regression model to examine the decisive factors of the amount of trade credit granted to farm household by supplier of agricultural materials. The results of logit model show that the household's ability to buy agricultural inputs on account has a positive correlation with average income, the relationship between the household and the agent and access to bank loans. The results of Tobit model indicates that several factors have positive, statistically significant relationships with the amount of deferred payment for agricultural inputs by farm households, including: the value of agricultural land, average income, the relationship between the household and the agent and access to bank loans. However, this study has not found any statistically significant associations between the duration of living in the locality, the distance from the farm household to the agent, the householders' experience in farming, the age of the household head and the access to trade credit nor the amount of deferred payment in buying production materials of farm households. Considering the results, several recommendations are given for farm households, suppliers of agricultural materials, local government and authorities to increase the use of trade credit in the study area.

Keywords: Trade credit, delayed payment, agricultural materials, farm household, Vietnam.

INTRODUCTION

Agriculture, farmers, and rural areas always play an important role in the economy of Vietnam. The Party and State have determined that agricultural development and constantly improving farmers' lives are the top strategic tasks. Credit issue is a key ingredient in the comprehensive development of agriculture and rural areas. In the agricultural sector, capital is an indispensable input and a decisive factor in production and business. Farmers need capital to buy seeds as well as agricultural materials and to hire labor, etc. in order to ensure seasonality, to avoid risks and thereby increase income. In addition to their own accumulated capital, so as to finance needed agricultural production activities, farmers often borrow from banks. However, it is a fact that most farm households have difficulty in accessing to formal credit from financial institutions in their area (Duy *et al.*, 2012; Khoi *et al.*, 2013). Therefore, the fact that suppliers of agricultural inputs provide trade credit for farmers has brought an opportunity for farmers with budget constraints to purchase much needed inputs for production without having to borrow money from banks or other financial institutions. Purchasing on credit is a form of deferred payment based on trust between the buyer and the seller. Trade credit is an effective way for sellers to sell goods faster at a higher price and to reduce inventory cost. Trade credit also allows buyers with budget constraints to purchase more goods. In addition, interest rates charged on trade credit from suppliers to farmers tend to be lower than interest rates charged on usury. Besides that, trade credit encourages farmers to concentrate on production, to improve

the quality of agricultural products in order to create stable income for their family. Hau Giang province is located in Mekong Delta and agricultural production is the main economic activity in this province. Most local residents engage in agricultural activities, so it is necessary for these households to have enough capital to finance agricultural production. Thus, the activity of buying agricultural materials on account from suppliers is quite common in rural areas. However, there have not been many studies on this form of informal financing conducted in Hau Giang province. Stemming from the above fact, it is necessary to carry on a more in-depth study on the determinant factors of access to trade credit and the decisive factors of the amount of delayed payment in purchasing production materials by farm households in Hau Giang province, thereby proposing solutions to increase access to credit as well as to increase the amount of trade credit granted to farm households to finance needed agricultural materials.

LITERATURE REVIEWS

The issue of trade credit has become a topic of broad public interest, numerous researchers as well as policy makers have conducted studies on this topic. Fisman and Raturi (2004) investigated the relationship between monopoly power and credit provision by using data on the supply relationships of firms in five African countries. The data of 960 firms with 2,311 relationships used in this paper came from surveys administered by the Regional Program on Enterprise Development (RPED) at the World Bank, during 1992-1995. With the application of random effects and fixed effects model, the research results showed that monopoly power is negatively associated with credit provision, and that this correlation is stronger in older supplier

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relationships. Fatoki and Odeyemi (2010) examined empirically the determinants of access to trade credit by new SMEs in the Eastern Cape Province of South Africa. Data was collected through self-administered questionnaire from 417 SMEs out of which only 71 respondents were able to access trade credit. The results of the logistic regression indicated that managerial competency, the availability of business plan, belonging to trade associations, previous relationship, location, business size, insurance and incorporation are decisive factors of access to trade credit by new SMEs in South Africa. Hermes *et al.*, (2012) used primary survey data collected through the interview of 141 wholesalers and 276 retailers to analyze the correlation between trade credit and customer switching in the context of trade transactions between wholesalers and retailers in the Tanzanian rice market. By applying a probit regression model, this study found a negative relation of trade credit and customer switching, that is, trade credit acts as a switching barrier; retailers are reluctant to move to another supplier if they depend on trade credit as a source of external finance. Getachew *et al.*, (2013) analyzed the factors determining trade credit use by taking 198 samples of private traders in Mekelle city, Tigray regional state of Ethiopia. Semi-structured questionnaire and interviews were used to collect data and binary logistic regression model was used to examine significant factors determining trade credit use. The findings highlighted that trade credit was widely practiced among private traders in Mekelle city. The study found that about 58 percent of sample traders in Mekelle city were trade credit users and about 42 percent of them were non-users. The result of binary logistic regression model showed that from owner factors, gender and education of traders significantly determined trade credit use. Similarly, business specific factors such as age of the business, length of trade relation, frequency and volume of purchase were found significant variables in determining trade credit use. Therefore, private traders and government offices that are concerned with the promotion of trade and private sector development need to take these factors into consideration in order to enhance trade credit use by private traders. In Vietnam, Le and Cao (2013) investigated factors determining the amount of delayed payment in purchasing production materials by farm households in An Giang province.

The primary data we recollected by interviewing 599 randomly selected households in An Giang province in 2011. By using a Tobit model, the results showed that the sum of money on credit for agricultural materials of households in the study area depends on the value of agricultural land, the household's per capita income, the length of business relationship with the supplier, the duration of living in the locality, and the distance from the farm household to the agent. The results revealed that since trade credit is an informal credit activity, the suppliers of production inputs try to minimize their own risk by only selling on credit to customers with strong debt-repayment capacity or to whom they have more information and can force to repay debt easily. Tran and Nguyen (2014) analyzed the factors determining the credit of 150 commercial aquaculture farms in Kien Giang province in 2011. A Logit regression model was applied to analyze factors determining the ability to use trade credit. A Tobit regression model was employed to analyze factors that determined the amount of trade credit of commercial farms. The results of logit regression model indicated that major decisive factors of the ability to use trade credit for the farm are bank credit limits, offers, acquaintance relations, on-credit buying habits, savings and age of household owner. The Tobit regression analysis showed some important factors determining the amount of credit granted to commercial farms such as bank credit limits, savings, profitability and costs of aqua cultural activities. Nguyen *et al.*, (2016) applied Probit and Tobit models to determine the determinant factors of the decision of shrimp raising farmers on buying on credit and the sum of money

on account for fishery food, veterinary medicine in Duyen Hai district, Tra Vinh province. Primary data were collected through a well-structured questionnaire from 385 randomly selected industrial shrimp farmers who have bought fishery food and veterinary medicine on credit and who have never accessed trade credit and from 68 randomly selected agents that sold fishery food and veterinary medicine in the study area. The investigation was conducted in October 2015. The empirical findings showed that average income, formal loan ability, the distance from shrimp raising areas to the agencies, farmers' age and shrimp raising time determine the farmers' decision on buying credit. Besides that, the results of the Tobit model stressed that the variables such as farmers' cultivating land, farmers' average income, the time of farmers' residence, the profit of the previous season had strong relationships with the amount of deferred payment for fishery food, veterinary medicine of the farmers. Tran *et al.*, (2018) analyzed the determinants of the access to delayed payments and the amount of delayed payment in purchasing the agricultural materials by shrimp households in Kien Giang province. The research data were collected directly from a survey of 313 shrimp households in Kien Giang province in December 2015. The result of Probit model pointed out that the determinants of the delayed payments were the value of agricultural land, the relationship between the household and the agent, the distance from the household to the agent, the number of agents in the local areas, average income and amount of formal loan. In addition, the results of the Tobit model showed that the amount of delayed payments by shrimp farming households in Kien Giang province depended on determinants such as value of agricultural land, the distance from the household to the agent, the number of agents in the local, the relationship between the households and the agent, the amount of loan of formal credit and the householders' experience in shrimp farming. Through the comprehensive review of prior studies related to the research topic, it is important to address that the significant difference in this study compared to prior studies is the study area, which is Hau Giang province. Although the activity of buying agricultural materials on account from suppliers is common in rural areas, there have not been many studies on this form of informal financing source conducted in Hau Giang province. Therefore, the authors carry on a more in-depth study on the determinant factors of access to trade credit and the decisive factors of the amount of delayed payment in purchasing production materials by farm households in Hau Giang province. The authors believe that the empirical evidence of this study is able to provide new insights about the trade credit in rural areas of Vietnam.

RESEARCH METHODOLOGY

Sample Selection

Data used in this research consist of both secondary and primary data. Secondary data are gathered from the General Statistics Office and other relevant agencies and organizations. Data are also collected from books, newspapers, specialized journals, websites, scientific research and other data sources related to the topic in 2019 and 2020. By using stratified random sampling method, primary data were collected from direct interviews with farmers in Long My district, Vi Thuy district, Vi Thanh provincial city, Chau Thanh A district, Chau Thanh district in Hau Giang province during the first three months of 2021. This study uses non-probability sampling method because it saves survey costs, saves time, and it is convenient for selecting respondents, and collecting data quickly. The selected sample size is 210 as it ensures the generalizability of the study. According to the data of the Statistical Yearbook, the sample structure is described in Table 1 below.

Table 1. The Sample Size

District/Provincial City	Population	Observation			Proportion (%)
		Can access to trade credit	Cannot access to trade credit	Total Observation	
Vi Thanh	97,200	50	13	63	30
Long My	164,900	32	10	42	20
Vj Thuy	96,500	28	14	42	20
Chau Thanh	85,429	5	16	21	10
Chau Thanh A	107,700	29	13	42	20
Total	551,729	144	66	210	100

Source: Results from the survey data of 210 farm households, 2020

Table 2. Description of Independent Variables in the Logit Regression Model and the Tobit Regression Model

Variables	Measurement Methods	Expected Signs	References
Panel A: Logit regression model			
Agricultural land value (X_1)	The value of agricultural land (million VND)	(+)	(1), (8)
Income (X_2)	Per Capita Income (million VND/person/year)	(+)	(5),(7),(8)
Length of trade relationship with agent (X_3)	Length of trade relationship between farm household and agent (years)	(+)	(5),(6),(8)
Duration of living in the locality (X_4)	Duration of living in the locality of farm household (years)	(+)	(5),(9)
Distance from farm to agent (X_5)	Distance from farm household to agricultural material agent's office (kilometers)	(-)	(1), (7),(8)
Access to bank loan (X_6)	Dummy variable, 1 = farmer gets bank loan, 0 = farmer does not have bank loan	(+)	(2), (3),(8)
Experience of household head (X_7)	Working duration in agricultural sector of farm household head (years)	(+)	(4)
Age of household head (X_8)	Age of farm household head (years old)	(-)	(7)
Panel B: Tobit regression model			
Agricultural land value (X_1)	The value of agricultural land (million VND)	(+)	(5),(8)
Income (X_2)	Per Capita Income (million VND/person/year)	(+)	(5), (7)
Length of trade relationship with agent (X_3)	Length of trade relationship between farm household and agent (years)	(+)	(5), (8)
Duration of living in the locality (X_4)	Duration of living in the locality of farm household (years)	(+)	(5), (9)
Distance from farm to agent (X_5)	Distance from farm household to agricultural material agent's office (kilometers)	(-)	(5), (8)
Access to bank loan (X_6)	Dummy variable, 1 = farmer gets bank loan, 0 = farmer does not have bank loan	(+)	(6),(7), (8)
Experience of household head (X_7)	Working duration in agricultural sector of farm household head (years)	(+)	(8)

Notes: (1) Fatoki and Odeyemi (2010); (2)Burkart and Ellingsen (2004); (3) Fabbri and Menichini (2010); (4) Getachew *et al.*, (2013); (5) Le and Cao (2013); (6) Tran and Nguyen (2014); (7) Nguyen *et al.*, (2016); (8) Tran *et al.*, (2018); (9) Pike *et al.*, (2005).

Estimation Method

Besides descriptive statistical analysis, the article employs Logit regression model to investigate factors determining the ability of farmers to buy agricultural inputs on account and Tobit regression model to examine factors determining the amount of delayed payment in purchasing agricultural materials by farm households.

The Logit model is proposed as follows:

$$Ln \left(\frac{P(Y=1)}{P(Y=0)} \right) = \beta_0 + \beta_i X_i + u_i \tag{1}$$

Where Y is the dependent variable, which is the ability of the household to be approved for the purchase of agricultural materials on credit and takes the value of 1 if the farmer accesses to trade credit and the value of 0 if the farmer does not access to trade credit, $P(Y=1) = P_0$ is the probability that the farm household buys agricultural materials on account, $P(Y=0) = 1 - P_0$ is the probability that the farm household does not buy agricultural materials on account, X_i are the independent variables, which are factors determining the ability of farmers to purchase agricultural inputs on credit, β_i are the estimated coefficients of the independent variables, β_0 is the intercept, u_i is the error term, Ln is the natural logarithm($e = 2.714$).

The Tobit model is proposed as follows:

$$Y_i = \begin{cases} \beta_0 + \beta_i X_i + u_i, & Y_i > 0 \\ 0, & Y_i \leq 0 \end{cases} \tag{2}$$

assume $u_i \sim IN(0, \sigma^2)$

Where Y_i is the dependent variable, which is the amount of money purchased on credit by the farm household, X_i are the independent variables, which are factors determining the amount of delayed payment in purchasing agricultural materials by farm households, β_i are the estimated coefficients of the independent variables, β_0 is the intercept, u_i is the error term

The regression model is proposed as follows:

$$Y_i^* = \beta_0 + \sum_{i=1}^k \beta_i X_i + u_i \tag{3}$$

Where Y_i is the dependent variable, X_i are the independent variables, β_i are the estimated coefficients of the independent variables, β_0 is the intercept, u_i is the error term. In the Logit regression model, the dependent variable is the ability of the household to be approved for the purchase of agricultural materials on account and the independent variables are factors determining the farmer's access to trade credit. In the Tobit regression model, the dependent variable is the amount of money purchased on credit by the farm household and the independent variables are factors determining the amount of trade credit granted to farm households. The description of the independent variables in the Logit and Tobit regression model is presented in Table 2.

RESULTS AND DISCUSSION

The Use of Informal Credit by Farmers in Hau Giang Province

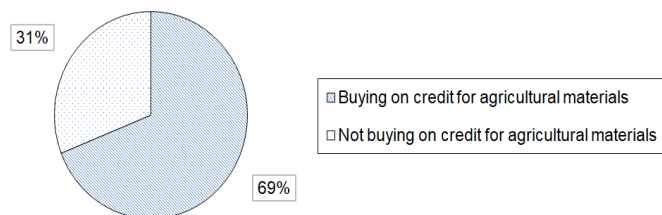
Out of the 210 surveyed households, 166 respondents had accessed credit and 44 farm households did not access to credit. This finding indicates that most farmers in Hau Giang province do not have enough capital to finance their farming activities, so they have to borrow money. As can be seen in Table 3, farmers in Hau Giang province prefer informal sources of credit.

Table3. Sources of Credit for Farm Households in Hau Giang Province

Sources of Credit	Observation	Proportion (%)
Formal	111	52.86
Semi-formal	14	6.67
Informal	152	72.38

Source: Results from the survey data of 210 farm households, 2020

The survey of 210 farmers has obtained positive results when all respondents have requested to buy agricultural inputs on account in the year 2020. Based on the results in Figure 1, the majority of farm households can access trade credit to meet the needs of agricultural production.



Source: Results from the survey data of 210 farm households, 2020

Fig.1. Proportion of Households Access to Trade Credit

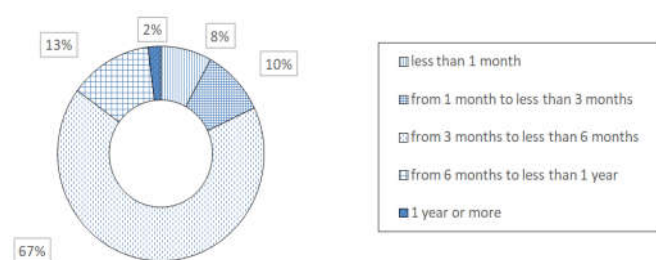
The survey results also show that 84.72% of households purchased fertilizers on account, while the next popular agricultural materials are pesticides (44.44%) and seeds (15.97%). By contrast, less than 5% of farm households bought livestock and poultry feed on credit. (See Table 4)

Table4. Type of Agricultural Materials Purchased on Account in Hau Giang Province

Type of Agricultural Materials	Observation	Proportion (%)
Seeds	23	15.97
Fertilizers	122	84.72
Livestock and poultry feed	6	4.17
Pesticides	64	44.44
Others	8	5.56

Source: Results from the survey data of 210 farm households, 2020

The results from the survey also point out that farmers often sell their agricultural products right after they harvest to pay off the debt to agricultural material stores or agents. Since the majority of respondents in the surveyed area participate in rice production, the most common duration for trade credit agreements is from 3 months to less than 6 months, which is relatively short. (See Figure 2)



Source: Results from the survey data of 210 farm households, 2020

Fig.2. Trade Credit Duration in Hau Giang Province

Through direct interview with 210 farmers, the authors found that out of 144 households who had purchased production materials on credit in the year 2020, the average amount of deferred payment granted by suppliers of production materials to farmers was 23.9 million VND and the highest figure was up to 70 million VND. When accessing informal credit sources, farmers often have to bear higher interest rates compared to when accessing formal credit sources, so they only take out an informal loan in urgent situations to maintain their agricultural production. Additionally, since trade creditors do not require collateral, the amount of deferred payment granted to farm households is often within the allowable limit, which depends on the degree of business

relationship between trade creditor and farmer, in order to ensure the full repayment of principal and interest.

Descriptive Statistics of Independent Variables Used in the Logit and Tobit Model

Table 5. Descriptive Statistics of Independent Variables Used in the Logit and Tobit Model (Obs. = 210)

Variables	Mean	Standard Deviation	Minimum	Maximum
Agricultural land value (X ₁)	752.76	508.43	270	3,600
Income (X ₂)	28.05	13.78	13	95
Length of trade relationship with agent (X ₃)	6.93	4.07	0	30
Duration of living in the locality (X ₄)	28.73	22.32	2	85
Distance from farm to agent (X ₅)	8.62	2.66	5	15
Access to bank loan (X ₆)	0.53	0.50	0	1
Experience of household head (X ₇)	17.31	13.53	2	50
Age of household head (X ₈)	47.09	13.11	27	85

Source: Results from the survey data of 210 farm households, 2020

Table 5 illustrates mean, standard deviation, minimum and maximum value of the independent variables used in the regression models. On average, each household owns about 733.62 m² of cultivated areas and the average agricultural land value is approximately 752.76 million VND. Besides that, there is a big difference in the value of farmland owned by households in the study area. Specifically, the highest and the lowest value are 3.6 billion VND and 270 million VND, respectively. The reason why some farm households possess such large amount of land value is because they save a lot of money over the years and have wide relationships, so they have more opportunities to buy more land from other farmers who cannot use those cultivated lands efficiently at lower price, after that they will find ways to improve the land quality in order to utilize this valuable asset more efficiently. The results in Table 5 also reveal that the average income of farm households is more than 28 million VND/person/year. The disparity in per capita income between households is quite large since farm households operating in the multi-crop production can enhance economic efficiency and generate higher income than households specializing in the single-crop production. From the results in Table 5, it can be seen that the length of trade relationship between farmer and agent is averaged at nearly 7 years and the average duration of living in the locality of the household is about 29 years. In fact, many farmers in the study areas were born and raised in Hau Giang province and other farmers have moved to the local area for a long time, so they have established deep and wide relationships with agricultural materials agents or stores. In addition, it can be clearly seen from Table 5 that the average distance between farming area and agent's office is 8.62 km, which is quite far. This may have a great impact on the understanding of agricultural material agents about farmers, which might influence the decision to offer trade credit to farm households. The results in Table 5 also show that the working duration in agricultural sector of farm household head is averaged at more than 17 years, the farm households with the shortest and longest working duration are 2 years and 50 years, respectively. Agricultural production is the main sector in Hau Giang province; therefore, many households have engaged in farming activities for a long time and have gained ample experience in this field. The average age of the household head is slightly above 47 years old; the youngest person is 27 years old and the oldest is 85 years old. This finding indicates that majority of the respondents are middle-aged.

Determinants of the Access to Trade Credit of Farm Households in Hau Giang Province

To test for normality of residual errors, the article uses Skewness-Kurtosis test with the null hypothesis (H₀): the residuals have a

normal distribution. The result of Skewness-Kurtosis test shows that P-value is 0.0000, which is less than a significance level of 0.05, thus, the residuals of the model are not normally distributed. Hence, the application of the Logit regression model in this study is appropriate.

Table 6. Estimated Results of the Logit Regression Model

Variables	β values	dY/dX
Agricultural land value (X_1)	0.0015728	2.36e-06
Income (X_2)	0.0463503	0.0070363*
Length of trade relationship with agent (X_3)	0.1629833	0.0705959***
Duration of living in the locality (X_4)	0.0233431	-0.0007857
Distance from farm to agent (X_5)	0.1137369	-0.0122753
Access to bank loan (X_6)	0.5969419	0.1657698***
Experience of household head (X_7)	0.0535339	-0.00142
Age of household head (X_8)	0.0469218	0.0030575
Constant	1.766579	-7.031568***
Number of Observations	210	
Log Likelihood	-43.906847	
LR χ^2	173.63	
Prob > χ^2	0.0000	
PseudoR ²	66.41%	

Notes: * and *** indicate statistical significance at the 10% and 1% level, respectively. Since this study uses cross-sectional data, there is no presence of autocorrelation. The result from Collin test shows that multicollinearity is no issue in this model with all VIF values being less than 10. The result from Breusch – Pagan test implies that there is no presence of heteroscedasticity since P-value = 0.8879. Source: Author's calculations

As can be seen from the regression results in Table 6, the factor of income (X_2), length of trade relationship with agent (X_3), and access to bank loan (X_6) have statistically significant and positive relationships with the access to trade credit of farm households. The relations of these three independent variables and the ability of farm households to purchase agricultural materials on credit from the supplier can be explained as follows:

As expected, the positive relationship between the per capita income of farm household and the access to trade credit exists. Due to formal credit rationing, farmers usually turn to trade credit to obtain production inputs needed for ensuring harvests. Household's income is one of the most important requirements that farmers have to meet in order to successfully access trade credit. High and stable income is the basis for timely payment. Thus, the higher the income of the household, the greater the opportunity for accessing trade credit. This is clearly shown through the research results in Table 6 that the estimated coefficient is positive ($\beta_2 = 0.0070363$) at the significance level of 10 percent. This empirical finding is in accordance with previous studies conducted by Tran *et al.*, (2018); Fatoki and Odeyemi (2010). From the estimated results in Table 6, it can be seen that the length of trade relationship between farmer and supplier has a positive correlation with the ability of farm households to purchase agricultural materials on account from the supplier with the estimated coefficient ($\beta_3 = 0.0705959$) at the significance level of 1 percent. This result is in line with the original assumption and the prior study of Le and Cao (2013). The longer the farmer has known the owner of the agricultural materials stores, the higher the probability of being approved for the trade credit, and vice versa. It is true that when the relationship between farm household and agent lasts longer, the agent has better understanding about the household head. Consequently, the agent can easily assess the household's repayment capacity, thereby deciding whether to approve the purchase on credit or not. The estimated result in Table 6 shows that access to bank loan is positively correlated with access to trade credit of farm households in our sample with the positive estimated coefficient ($\beta_6 = 0.1657698$) at the significance level of 1 percent. This finding is completely consistent with the original assumption and the

study of Fabbri and Menichini (2010); Tran *et al.*, (2018). Farm households who have a loan at bank or other financial institutions will be easily access to trade credit because they are usually considered as creditworthy. Agricultural material agents believe that customers who have accessed to bank loans are less risky, thus these buyers are easier to be approved for purchasing production materials on account. However, this study has not found the statistically significant associations among the value of agricultural land, the duration of living in the locality, the distance from farm household to agent, the householders' experience in farming, the age of the household head and the ability of farm household in Hau Giang province to buy production materials on account without making immediate cash. In Hau Giang province, each household can cultivate one or more plots of land in different areas, and farmland is often far away from agricultural supply store. In addition, farmer can rent other people's land for cultivation, so the owner of agricultural materials agent cannot accurately decide whether to offer trade credit to farm household based on the value of farmland owned by the household head. Turning to the duration of living in the locality of farm household, the estimated coefficient of this variable is not statistically significant and has the negative correlation with the probability of being approved for trade credit, which contrasts with the initial hypothesis. This result implies that the duration of living in the locality tends to have no considerable relationship with the access to trade credit of farm household in the study area. The results in Table 6 also suggest that distance from farm household to agent is not statistically significant to account for the variation of the ability of farm households to purchase agricultural materials on account from the supplier. This result can be attributed to the fact that Hau Giang province has many canals and road traffic system has been significantly improved, therefore, distance is no longer an obstacle affecting the trading activities among farm households and agricultural supply stores. Besides that, due to the fierce competition environment, the offering of trade credit is implemented by many agricultural supply stores. These reasons may explain why distance is not dramatically correlated with the agent's decision to provide trade credit to farmers in Hau Giang province. Similarly, householders' age and experience in farming are also not decisive factors of the household's ability to purchase production materials on account. In fact, most respondents are local residents who have lived in Hau Giang province for many years and have participated in agricultural economics since they were young. Aside from that, the ages of household heads are very diverse. Hence, the perception that elderly farmers usually have valuable assets, much farming experience, and wide social relationships, so these farmers can easily access to trade credit is not suitable in this study. The decision made by agricultural materials stores to grant trade credit to farmer is mainly based on the length of relationship between agent and farm household.

Determinants of the Amount of Differed Payment in Purchasing Agricultural Materials of Farm Households in Hau Giang Province

Table 7. Estimated Results of the Tobit Regression Model

Variables	β values	dY/dX
Agricultural land value (X_1)	0.0041105	0.0086652**
Income (X_2)	0.1275074	0.4814843***
Length of trade relationship with agent (X_3)	0.2896433	1.471919***
Duration of living in the locality (X_4)	0.0768455	0.0543129
Distance from farm to agent (X_5)	0.387437	-0.5673379
Access to bank loan (X_6)	2.198533	12.81638***
Experience of household head (X_7)	0.1190249	0.0453557
Constant	4.470231	-22.33471
Number of Observations	210	
Log Likelihood	-608.39623	
LR χ^2	215.36	

Prob $>\chi^2$	0.0000
PseudoR ²	15.04%

Notes: ** and *** indicate statistical significance at the 5% and 1% level, respectively.
Source: Author's calculations

It can be clearly seen from the regression results in Table 7 that the factor of agricultural land value (X_1), income (X_2), length of trade relationship with agent (X_3), and access to bank loan (X_6) have statistically significant and positive correlations with the amount of deferred payment in purchasing agricultural materials by farm households in Hau Giang province. The correlations of these four determinants with dependent variable can be explained as follows:

Firstly, the research results in Table 7 show that agricultural land value (X_1) is positively correlated with the amount of delayed payment granted to farm households with the estimated coefficient ($\beta_1 = 0.0086652$) at the significance level of 5 percent. It is true that arable land is one of the valuable assets of farmer, the land size considerably determines the amount of money purchased on account by farm households. This means that household who owns plenty of valuable arable land often operates in large scale, as a result, they need a large amount of agricultural material to ensure stable cultivation. Therefore, they usually request great deal of deferred payment, vice versa. This result supports the study of Le and Cao (2013); Tran *et al.*, (2018).

The second decisive factor of the amount of deferred payment in the Tobit model is per capita income of farm household (X_2), which is statistically significant at the significance level of 1 percent. As expected, this explanatory variable has a positive relationship with the amount of delayed payment with the estimated coefficient ($\beta_2 = 0.4814843$) (see Table 7). This empirical result is in line with the previous study conducted by Le and Cao (2013); Nguyen *et al.* (2016). These authors also stated that household's income is the main source of debt repayment for agricultural supply store, so supplier of production materials can offer greater amount of trade credit to farm household that have high level of per capita income because of less risk. Another determinant factor of the amount of deferred payment is length of relationship between farm household and agent (X_3), which is statistically significant at the significance level of 1 percent. This factor is positively associated with the amount of deferred payment granted to farmer with the estimated coefficient ($\beta_3 = 1.471919$). This empirical result is consistent with original assumption and the prior study of Le and Cao (2013); Tran *et al.*, (2018). It is evident that when farmer and supplier keep their long-term relationship, it is easier for supplier to determine the risk level as well as the amount of deferred payment when providing trade credit to farmer.

Last but not least, it can be seen from the results in Table 7 that access to bank loan (X_6) is positively correlated with the amount of money purchased on credit with the estimated coefficient ($\beta_6 = 12.81638$) at the significance level of 1 percent. This result indicates that farm households that have accessed to formal credit are considered as creditworthy and have been appraised by bank or other financial institution, so these household can easily be granted trade credit with a larger amount of deferred payment than households that do not have bank loan. This empirical finding is similar to original hypothesis and the previous studies such as Tran and Nguyen (2014); Nguyen *et al.*, (2016); Tran *et al.*, (2018).

However, similar to the regression results of the Logit model in Table 6, this study has not found statistically significant associations among the duration of living in the locality, the distance from farm household to agent, the householders' experience in agricultural economics and

the amount of deferred payment in purchasing agricultural materials of farm households. Since P-value for each coefficient of these variables is quite high, it can be concluded that these factors are not decisive factors in determining the amount of trade credit granted to household in the study area of Hau Giang province (See Table 7).

Conclusion

Based on the primary data of 210 farm households in Hau Giang province in 2020, the study employs the Logit regression model to investigate factors determining the access to trade credit and Tobit regression model to examine the determinants of the amount of deferred payment in purchasing agricultural materials by farm households. The results of the Logit model show that the household's ability to buy production inputs on account has a positive correlation with households' income, the relationship between the household and the agent and access to bank loans. The results of the Tobit model indicates that several factors have positive and statistically significant associations with the amount of deferred payment for agricultural inputs of farm households, including: the value of agricultural land, households' income, the relationship between the household and the agent and access to bank loans. The empirical findings of the study also imply that since sellers face more risk when granting trade credit to buyers, the suppliers of agricultural materials must try to minimize their own risk by only accepting large amount of deferred payment or offering trade credit to farm households who have high income, good debt repayment capacity and own valuable agricultural land, or to whom the suppliers have long-term relationships and can easily force to repay the debt. In order to increase the use of trade credit and the amount of deferred payment granted to farm households in the study area, this study proposes some recommendations for local government, for agents and for farm households, which are mentioned in the next section.

Recommendations

For Local Government and Authorities

The authorities should have a plan to recognize trade credit as a formal credit source under the management of government, should form a legal foundation for all kinds of trade credit contracts to resolve any disputes in accordance with the law in order to protect the interests of agricultural materials agents and farmers. Local organizations should organize more training sessions, seminars, trade fairs, agricultural exhibitions and form agricultural associations, cooperatives, or support funds to help individual farm household strengthen relationship with other farm households and suppliers, access formal and informal financing sources, improve the efficiency of agricultural production and consumption.

For Agricultural Materials Agents

The suppliers of agricultural materials should focus on expanding their business networks and distribution systems to reduce information asymmetry between buyers and sellers. In order to reduce default risk, agents of agricultural materials should pre-screen customers before offering trade credit and sign credit contracts on a legal basis with farm households who purchase agricultural materials on credit. The suppliers should offer larger amount of trade credit to farm households who have high income, good debt repayment capacity and own valuable agricultural land, or to whom the suppliers have long-term relationships and can easily force to repay the debt.

For Farm Households

Farmers should operate in the multi-crop production to enhance farming efficiency and to generate higher income. Farmers should build trust and strengthen relationship with financial institutions and suppliers of agricultural materials. Farmers should actively take part in seminars and meetings organized by local authorities to improve their knowledge of new farming techniques in order to use agricultural materials effectively, reduce costs, and maximize profit. Moreover, farmers should participate in agricultural programs and projects to receive support from preferential policies.

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