Determinants of Non-Farm Enterprise Participation Among Agricultural Households in the Philippines

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Most empirical studies have focused on the non-farm labor component of the rural non-farm economy. But equally important are the non-farm enterprises in the rural economy. There is no clear picture of the non-farm enterprise participation (NFEP) of agricultural households in the Philippines. This study fills this gap by determining the prevalence and patterns of NFEP, and by identifying the factors affecting participation and size of non-farm enterprises among agricultural households. This study uses microdata from the 2015 Family Income and Expenditure Survey covering households whose main source of income is agriculture-related activities. Logit and ordinary least square regressions are used. Results show that one out of every five agricultural households engage in some form of non-farm enterprise. But such participation is considered limited and minimal per household. The contribution of the non-farm enterprise cannot be considered marginal in comparison to other sources. Participation in non-farm enterprises and the size/scale thereof are related to factors, such as age, education, marriage, family size, agricultural income, access to credit, cash support, access to basic utilities, access to communication, and main source of income. Policy interventions promoting non-farm enterprise are discussed.

Keywords: Non-farm enterprise, participation, logit regression, Philippines

1 Introduction

The Philippine Statistics Authority (PSA) (2017, para. 2) reports that farmers and fishermen have the highest incidence of poverty at 34% in 2015. The sector is characterized by low labor absorption, diminishing productivity, seasonal unemployment, and underemployment (Sanchez, 1994). This situation puts pressure on agricultural households to seek alternative sources of income (Davis, 2003). One option for the household is to engage in non-farm activities in the form of employment or business (Lanjouw & Lanjouw, 2001).

The growth of rural non-farm activities and income is documented around the world. In the 1990s, the contribution of rural non-farm activities to total household income has ranged from 32 to 42% in Asia, Africa, and Latin America (Reardon et al., 1998). This contribution has increased from 40 to 60% in the 2000s (Davis, 2003). This level of contribution is expected to grow over time (Fox & Pimhidzai, 2013; Haggblade, Hazell, & Reardon, 2005). Non-farm activities are seen as a means to reduce poverty by increasing income and non-farm employment (Haggblade et al., 2005).

Participation in rural non-farm activities is a process that leads to structural transformation in the rural area. It allows for the transfer of labor and capital from the agriculture sector to the manufacturing and service sectors. Thus, the rural non-farm economy and its activities are an essential part of economic growth (Haggblade et al. 2005).

Participation in a non-farm enterprise can be motivated by choice, necessity, or risk management (Barrett, Reardon, & Webb, 2001; Winters et al., 2009). But the demarcation between these motivations is not clear as they can simultaneously arise within the households. These motivations are indirectly unobservable and can be only inferred from other measurable factors. Empirical studies have shown individual, household, and community-level variables correlating with participation in a non-farm enterprise, such as wealth, education, access to credit, and proximity to an economic center (Freese, 2010; Osondu, Obike, & Ogbonna, 2014, p. 165; Sanusi, Dipeolu, & Momoh, 2016, p. 71; Shehu & Abubakar, 2015). But the empirical literature is still uncertain as to the relationship between some of these factors and non-farm entrepreneurship. Wealth, for instance, can motivate the households both ways. The poor rural household can benefit more from a non-farm enterprise, and they are motivated because of necessity, however, wealthier rural households are in a better position to engage in a non-farm enterprise because of the availability of resources to further accumulate wealth (Davis,

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2003). Similarly, access to credit is an important source of funds that may encourage non-farm entrepreneurship; yet, others may find it an expensive source of capital due to interest payments (Malek & Usami, 2009; Osondu et al.,2014).

Empirical studies on non-farm enterprises in Southeast Asia are very limited. Particularly, there is no known empirical study in the Philippine context. Prior studies on non-farm activities have focused only on non-farm labor (Estudillo, Ramos, & Otsuka, 2009; Reyes, 1991; Sanchez, 1994,). There is no clear picture of non-farm entrepreneurship among agricultural households in the country. This study fills this gap by answering two main questions:

(1) What is the prevalence and pattern of non-farm enterprise participation (NFEP) among agricultural household in the Philippines? and
(2) What are the factors related to participation in a non-farm enterprise?

This study primarily makes a contextual contribution. The case of the Philippines offers an interesting setting. The expansion of the country's economy is characterized by decreasing output and employment share of the agricultural sector (Briones, 2017). Despite the significant contribution of the sector to employment, its output share is only 10%. The agricultural sector comprises a larger percentage of those considered poor. Inclusive growth in the sector requires a rather complicated direction. Migration of agricultural workers is seen to induce an increase in wage and salary (Briones, 2017). An important consideration is the engagement of households in non-farm activities. Most non-farm enterprises in the country are small and informal in nature (Bersales & Llarina, 2019). Informal and unregistered non-farm enterprises do not primarily benefit from government programs and financing institutions. Labor policies, regulation, and registration requirements are seen to discourage the formalization of the small-scale enterprise (de Soto, 1989; Hampel-Milagrosa, 2014). The country's business environment is not really conducive for these enterprises to grow (Hampel-Milagrosa, 2014). Very few micro- and small-sized enterprises manage to grow and upgrade to the next level (Berner, Gomez & Knorringa, 2008). Despite these challenges, participation in a non-farm enterprise and entrepreneurship, in general, is seen as a starting point in increasing productivity and income of the households, and serving as a pathway out of poverty (Cudia, Rivera, & Tullao, 2019).

This study is different from other empirical studies in four ways. First, the sample is not only limited to farm households but also considers households that are involved in other agricultural activities (e.g., fishing, hunting, forestry). Most empirical studies focus only on farm households. Agricultural activity, however, is not only limited to farming and crop gardening in the Philippines given its archipelagic nature. Second, this paper classifies the households' main sources of income and includes them as a factor in the analysis. The uncertainties and circumstances faced by households who mainly rely on agricultural salary/wages are different than those who mainly rely on profit from agricultural production. Third, this study considers agricultural income in lieu of total income found in other studies. This factor reflects the productivity of the agricultural activity which may stimulate non-farm entrepreneurship. Lastly, this study explores the factors affecting the size of a non-farm enterprise where size is proxied by expenses attributed to the enterprise. Most studies use binary models (Alemu & Adesina, 2017; Asfaw, Simane, Hassen, & Bantider, 2017; Dary & Kuunibe, 2012; Kurniati, 2013; Nagler & Naude, 2017; Tafesse, Balta, & Weldeyohannes, 2015). The analysis gives preliminary insights on the factors contributing to the growth of a non-farm enterprise.

This study uses data from the 2015 Family Income and Expenditure Survey (FIES) from the PSA. The sample includes households whose main sources of income are agricultural salary and wage, crop farming, forestry, hunting, and fishing. Factors affecting the likelihood of households engaging in a non-farm enterprise are determined using a logit regression. The marginal effects are then computed to determine the impact of the factors on the probability of participating in a non-farm enterprise. Lastly, an ordinary least square (OLS) regression is used to determine the factors related to scale or size of the non-farm enterprise.

2   Literature Review

2.1   Definition of Non-Farm Enterprise

Defining a non-farm enterprise must start first by clarifying what is considered as a non-farm activity in the rural area. Barrett et al. (2001) define non-farm activities using sectoral classification.

Most national accounting systems categorize the economic sector into primary, secondary, and tertiary. Agricultural, mining, and other extractive activities belong to the primary sector. The secondary sector covers manufacturing activities, while the tertiary sector covers service activities. This study follows closely the sector classification of the Philippine economic system, which are agriculture, industrial, and service sectors. All activities, which are outside the agriculture sector, are considered non-farm (Barrett et al., 2001). The 2015 FIES considers the following activities as non-farm activities: wholesaling and retailing; manufacturing; community, social and related services; transportation and storage services; mining and quarrying; construction; and other entrepreneurial activities not elsewhere classified. Therefore, any business involved in these activities is considered a non-farm enterprise, regardless of the scale (Davis, 2003).

2.2   Empirical studies on the determinants of NFEP
These empirical studies are organized geographically, i.e., by region/continent, to emphasize differences in the results attributable to context and scope. The primary objective of these studies is to identify the factors affecting the decision to engage in a non-farm enterprise or non-farm self-employment. The variables used in this study are drawn from these empirical studies.

2.2.1   African Studies
The context of most empirical studies in NFEP is in Africa. This is because of the many development issues faced by most countries on the continent. Participation in non-farm enterprises is seen to be pro-poor, as it helps alleviate poverty, provides employment, and slows down rural to urban migration (Lanjouw & Lanjouw, 2001).

Osondu et al. (2014, p. 41) use probit estimation to analyze the determinants of the decision to engage in non-farm entrepreneurship among women in Abia State, Nigeria. Women's access to markets and decision-making are linked to poverty reduction and increased productivity at the individual and household level (Morrison, Rahu, & Sinha, 2007, p. 1). The analysis reveals significant negative coefficients for age, household size, access to credit, farm experience, and significant positive coefficients for farm income and membership in a cooperative society. The non-significant variables are educational level and farm size. The study implies that younger women, with smaller household sizes, who have no access to credit, less farm experience, high farm income, and membership in cooperatives show a high likelihood of engaging in non-farm activities. The observed relationship of age and access to credit are contrary to the expectations of the researcher. It is presumed that as women get older, gain experience, and acquire skills they engage in entrepreneurship. Access to credit, on the other hand, is expected to increase the women's participation in non-farm business because of the availability of capital. The generalizability of this study is limited due to the sample focusing only on women.

Shehu and Abubakar (2015) use a richer set of variables and a nationally representative sample involving 3,257 households from a General Household Panel Survey in Nigeria. They model the decision of farm households to engage in the non-farm enterprise. They extend the study by adding community characteristics (e.g., transport) and proximity to the market as entry barriers. Using probit regression, they find positive coefficients for age, education, household size, mobile phone, electricity, social capital, formal credit, and locational factor. Their results for age, household size, and access to credit contradict the earlier study of Osondu et al. (2014) who focus on a sample of women. Furthermore, Shehu and Abubakar (2015) observe negative coefficients for gender, transport, and proximity to market. The result for gender implies that women are important in enterprise formation since they have a higher likelihood of participation than men. The result for proximity to the market suggests that those near the market are more likely to engage in the non-farm enterprise because of the presence of market agents. Selling and buying products are easier for them than for those residing far from the market.

Sanusi et al. (2016) extend the study of Shehu and Abubakar (2015) by adding wealth-related variables, such as land ownership, farm size, and asset. But they conduct the study on a smaller sample set of 354 rural households. Using multinomial logit, their analysis reveals a significant positive coefficient for age, age-squared, asset, membership in an association, and index of a communication facility, and significant negative relationship for gender, land ownership, and distance to the nearest

market. This implies that non-farm entrepreneurship is highly likely in households headed by women, with no land, and located near the market. The importance of women in the rural economy is once again supported by this study. Entrepreneurship is seen as an opportunity for those near the market, and a means of income diversification for those with no land. This result supports Shehu and Abubakar's (2015) findings on gender, age, mobile phone, social capital, and proximity to market.

Tafesse et al. (2015) take a different approach and focus on specific activities engaged by rural households. They examine factors affecting the decision of farmers to engage in handicraft and trading activities. They use probit estimation on a sample of 145 households. Results reveal that the decision to engage in trading activities is positively related to education and type of land, and negatively related to land size and age. On the other hand, the decision to engage in handicraft activities is positively related to sex and education, and negatively related to land size, type of land, and distance to the nearest market. Factors that are common between the two activities are land size and education. Interestingly, handicraft activities are dominated by males, an activity seen primarily for women.

A more recent study by Alemu and Adesina (2017) in Ethiopia uses binary dependent variable following Sanusi et al. (2016) and Shehu and Abubakar (2015). Their logit regression on non-farm entrepreneurship reveals positive significance for farming experience, active female member, tropical livestock, access to credit, access to telephone, and cooperative membership, and negative significance for land size, distance to the market, distance to a farmer's training center, and distance to the town. The results almost conform with the earlier Nigerian studies. Ethiopian rural households are most likely to engage in a non-farm enterprise if they have enough experience, an active female member, access to capital, no land, and live near to economic areas. However, this study focuses only on households who are the recipient of tropical livestock awarded by the government.

Freese (2010) examines the factors associated with participation and success in non-farm activities in Burkina Faso. He uses log of per capita non-farm income as a measure of success. Since not all households have non-farm income, he uses a two-step Heckman model to control for selection biases. He uses pooled data covering 1994, 1998, and 2003 data. The first step, a probit estimation, reveals that participation in non-farm activities is positively related to household size, working-age women, last class of household head, average last class of other working-age members, access to electricity, and access to piped water. Negative relationships are observed for land ownership, distance to the market, distance to the secondary school, and distance to the health center. The results support some findings of Osondu et al. (2014), Sanusi et al. (2016), and Shehu and Abubakar (2015).

Dary and Kuunibe (2012) examine cultural variables, such as religion. They explore whether religion is a significant determinant of rural non-farm economic activities in Ghana. Each religion differs in its belief about farming, money, women, business, and family. They use logit estimation and find the most significant individual-level variables, such as sex, age, marital status, education, vocational training, belongingness to a group, and location (p. 160). Religion is not significant. Those who are likely to engage in a non-farm enterprise are women, young, unmarried, with education and training, belonging to a group, and living in Wa Municipal which is close to the regional capital. Belongingness to a group is a sociological variable that is similar to Alemu and Adesina's (2017) variable on cooperative membership.

Nagler and Naude (2017) conduct a larger-scale analysis involving six countries (Ethiopia, Malawi, Niger, Nigeria, Tanzania, and Uganda). They use a data set from the Living Standard Measurement Survey-Integrated Surveys in Agriculture. They examine the prevalence, patterns, and determinants of NFEP, and extend it by examining their performance through productivity, survival, and exit. They conduct their analysis per country and use probit estimation to identify the determinants of non-farm entrepreneurship. The variables that are significant in at least half of the countries are age, marital status, read and write, number of adults, income, food shortage, and rooms. Only age, education, and the number of adults have consistent coefficient signs, while the rest vary. A variable worth noting is food shortage. They find that households who have experienced a food shortage in the last 12 months are more likely to engage in a non-farm enterprise in Uganda but less likely for Malawi and Niger (p. 178). Due to necessity, households are pushed to diversify their income through non-farm enterprises in some countries in Africa. In general, the study shows differences in the determinants of non-farm entrepreneurship per country.

2.2.2   Latin American Studies

Few empirical studies have also been conducted in Latin American countries. These countries have similarities to the Philippines in culture and tradition because of their history of Spanish colonization.

Escobal (2001, p. 497) observes that 51% of the income of rural households is derived from off-farm activities in Peru. His empirical analysis involves the identification of determinants of income shares from several sources. Using Tobit double censored estimation, the positive determinants of income share from self-employment non-agricultural activities are education, access to electricity, access to credit, and local land productivity, and the negative determinants are livestock, distance to the local market, and several location variables. Land productivity is a critical factor for rural households, because it primarily determines the income from agricultural production. However, the said variable is not significant in Sanusi et al.'s (2016) study. Results for other variables, such as education, access to electricity, access to credit, and distance to the local market, conform with other African studies discussed earlier (Freese, 2010; Osondu et al., 2014; Sanusi et al., 2016; Shehu & Abubakar, 2015).

Vasco and Tamayo (2017) also conduct an empirical study in Ecuador. Their objective is to analyze the determinants of non-farm employment and non-farm earnings (p. 53). Although non-farm employment is different from non-farm enterprising, their analysis involves modeling non-farm earnings through principal occupation type. The dependent variable includes non-farm self-employment which is similar to non-farm business or enterprise. Their study differs with the addition of race as a variable. They use a Dubin-McFadden two-step estimation procedure in modeling principal occupation type and data from the 2010 National Survey of Employment. Results show that the likelihood of non-farm self-employment has a positive relationship with age, female, primary education, female head, wealth, telephone, and selected locational variables. A negative relationship is observed for university education, male and female adults, land ownership, and the race Muntobio (who are mestizos in the coastal areas of Ecuador). Being a Muntobio decreases the likelihood of engaging in non-farm business (Vasco & Tamayo, 2017, p. 62). They are an ethnic group known for their ranching activities, and therefore are heavily dependent on agriculture. It is also intuitive that individuals who do not have a university education engage in non-farm self-employment. Those without a college degree opt to put up a business because they cannot find high paying jobs.

2.2.3   Asian Studies

Asia is very diverse and rich in cultural practices. Unconventional factors, such as the political position of farmers, psycho-socio-cultural factors (e.g., marriage relationship and work effort or fate), innovation, and risk factors, have been examined in some empirical studies.

Dutta's (2007) study in West Bengal, India reveals family support, marriage relationship, innovation, and risk as positive determinants of being a non-farm entrepreneur. Family support is seen to be an important source of capital. Marriage relationship, on the other hand, pertains to a close member of a family, such as a sister or daughter engaged to someone who is a non-farm entrepreneur. A matrimonial alliance between families is created by marriage, which may include the sharing of resources and expertise. This increases the chances of the household to engage in a non-farm enterprise. Moreover, the significance of risk in the analysis supports the notion that a risk-loving person has higher chances of engaging in a non-farm business. An interesting negative significant variable in his result is the belief about fate and work effort. Those who believe in fate and destiny have a higher likelihood of engaging in a non-farm enterprise.

Malek and Usami (2009) conduct an empirical study in Bangladesh. Their approach is similar to that of Escobal (2001) where they identify determinants of the non-farm self-employment income share. Their sample consists of 214 randomly selected households. Only three factors are found to be significant, namely, landholdings, education, and migration. Landholding is positively associated with non-farm self-employment income; those with landholdings are financially capable households that can easily enter the market (Malek and Usami, 2009, p. 146). Interestingly, education is negatively associated with non-farm self-employment income; according to them, education is not important because non-farm self-employment is informal in nature (Malek and Usami, 2009, p. 146). Migration remittance is also negative, which means that money from abroad is not used as capital to engage in non-farm self-employment activities. Many of the expected household and community level variables

are not significant in this study (Malek and Usami, 2009). Variables found to be significant in the selected African studies, such as gender, age, access to credit, membership in an organization, village type, are included in the analysis but are found not to be significant.

In Thailand, Chawanote (2012) observes that having a non-farm enterprise is a result of push factors. He uses a two-step ordered probit model where the first step examines the determinants of having a non-farm enterprise. He observes negative significant coefficients for asset, agricultural land, number of household members, college education, and farm income. Conditions, such as less asset, less agricultural land, few household members, no college education, and low farm income, push household towards non-farm entrepreneurship. He also observes that if enterprises are a result of push factors, their growth is limited because income is used for consumption instead of further investments. Most of the significant factors in this study are household-level factors.

Kurniati (2013) conducts a study in Indonesia using variables similar to that of Dutta's (2007) study. Using logit estimation, he finds significant negative coefficients for land tenure, wealth, marriage relationship, and the type of parents' work. The negative signs of land tenure and wealth imply that engagement in a non-farm enterprise is primarily due to necessity which supports Chawanote's (2012) findings. Individual-level variables, such as age, gender, and marital status, do matter in participation in non-farm enterprises.

2.2.4   Synthesis of the Empirical Studies

The determinants of non-farm enterprise differ by country. But the observed recurring significant variables (though varying in signs) are age, sex, marital status, education, access to credit, access to utilities, access to communication, proximity to economic areas, and wealth represented by land ownership and land size. There are considerable efforts made to include factors coming from other social sciences, such as sociology, psychology, and anthropology, and they have the potential to be significant determinants. But most of these factors are limited in national surveys and can only be available in small sample surveys.

Empirical studies in Asia, particularly in Southeast Asia, are limited. No empirical study is available in the Philippines. Therefore, this study is conducted to contextually contribute to the empirical literature. But this study makes some extensions in distinction from other existing empirical studies. First, the sample is not only limited to farm households but also considers households that are involved in other agricultural activities (e.g., fishing, hunting, forestry). Most empirical studies focus only on farm households. But agricultural activity is not only limited to farming and crop gardening in the Philippines given its archipelagic nature. Second, this paper classifies the households' main sources of income and includes them as a factor in the analysis. The uncertainties and circumstances faced by households relying mainly on agricultural salary/wages are different than those who mainly rely on profit from agricultural production. Third, this study considers agricultural income in lieu of total income found in other studies. This factor reflects the productivity of the agricultural activity which may stimulate non-farm entrepreneurship. Fourth and last, this study explores and provides a preliminary understanding of the factors affecting the size of the non-farm enterprises of households. Most studies confine their analysis to the participation aspect. However, non-farm enterprises do vary in size as some manage to grow while others do not.

2.2.5   Expected Signs of the Determinants of NFEP

Table 1 summarizes the factors hypothesized to be related to NFEP. In terms of the individual profile of the household head, male, age, and education are expected to have positive signs except for those who are single. A male household head is an important human resource primarily because they bear the responsibility of providing for the household in many cultures. In cases of surplus, earnings of the male household may contribute to business capital. Male household heads are also seen to be the managers of non-farm enterprises. Women have been found to have lower rates of non-farm entrepreneurship (Rijkers & Costa, 2012, Abstract).

Age also plays an important factor because it is positively correlated with experience. As household heads become older, they have higher chances of acquiring skills and knowledge that can be used in business (Khatun & Roy, 2012). However, several empirical studies, such as those of Dary and Kuunibe (2012) and Tafesse et al. (2015), observe a negative relationship between age and

participation in non-farm enterprises. The physical capabilities of the household head also decrease as age increases. This decreases the chances of the household engaging in a non-farm enterprise. Thus, the relationship between age and NFEP can go both ways.

Skills and knowledge are also acquired through education. The quality of human capital is enhanced through the number of years spent in school. More educated individuals are seen to work in high-paying jobs and have the skills to manage small- and medium-sized enterprises (Elbers & Lanjouw, 2001). A positive relationship has been observed by Escobal (2001) between education and self-employment in non-agricultural activities in the rural area of Peru. Thus, the relationship between education and non-farm enterprise is expected to be positive.

Marriage is a motivation for farmers to engage in non-farm enterprises to have higher incomes to support the wife (Dutta, 2007). Matrimonial alliances are also formed between the individuals and their families that may involve the sharing of resources that can lead to business engagement (Dutta, 2007). The spouse can be considered an additional human resource in the household. Therefore, an unmarried household head (single) is expected to have less likelihood of engaging in a non-farm enterprise. However, a counterargument is that a single household head is pushed to engage in business to survive. Without the help of a partner, the individual is forced to take measures to sustain himself/herself. Nagler and Naude (2017) observe mixed signs for marriage in the six African countries they examined. Thus, the sign of the variable single is uncertain or could be negative or positive.

For the household profile, all variables are expected to have positive signs except for agricultural income.

Households with more members need more resources, thus the members are pushed to seek alternative sources of income (Khatun & Roy, 2012). When household members are earning, they can also actively contribute to the income of the household which can be a source of business capital. A positive relationship between family size and NFEP is therefore expected (Tafesse et al., 2015).

A close proxy for wealth is house ownership. Owning a house means that the household is fairly financially capable and has a higher access to capital, which may increase the chances to engage in a non-farm enterprise. Housing ownership also relieves the households of monthly expenditure, allowing them to save and form capital for startup (Cardak & Wilkins, 2009). Thus, a positive relationship is expected between housing ownership and NFEP.

Access to credit is considered a form of social capital (Ellis, 2000). Credit is usually provided by an institution, such as cooperatives and banks, and is considered a valid source of capital that allows households to diversify their income (Khatun & Roy, 2012). Some cooperatives even provide training to member households to improve their skills in starting up and managing their own enterprise. Escobal (2001) finds a positive relationship between self-employment in non-agricultural activities and access to credit in Peru. Thus, it is expected that households with access to credit have higher chances of participating in non-farm enterprises.

Some households benefit from cash support coming from members of the family working in other places domestically or abroad. Such support can be used as start-up capital (Malek & Usami, 2009). Investment in businesses is encouraged among individuals working overseas taking into consideration that working abroad is only on a contractual basis. Agricultural households receiving cash support have a higher likelihood of engaging in non-farm business.

Access to utilities, such as electricity and water, is also seen to positively stimulate NFEP because they are important factors of production (Escobal, 2001; Freese, 2010; Shehu & Abubakar, 2015). A household may be motivated to purchase equipment used for small-scale manufacturing because of electricity.

Access to communication is an integral part of business. Communication enhances the exchange of information and networking, which is critical in the early stages of an enterprise. Information on production processes and the market may encourage the household to venture into other business (Alemu & Adesina, 2017; Shehu & Abubakar, 2015).

The relationship between agricultural income and NFEP is uncertain. Those with lower agricultural income are pushed to seek an alternative source to support their needs. Hence, they have higher chances of participating in non-farm enterprises with lower entry barriers. A counterargument is also intuitive. An agricultural household with sufficient agricultural income may exploit opportunities and may further want to accumulate wealth. Higher agricultural income is associated with higher agricultural productivity, which is an important pathway out of poverty and subsistence

farming (Barrett, 2008). With enough capital to spend, the household may consider investing in non-farm enterprises. Therefore, low and high agricultural income households have the motivation to participate in non-farm enterprises.

Differences in the main source of income of the household are proposed to affect the decision to engage in non-farm enterprises. Households relying only on agricultural salary/wage are generally poor because of the low salary/wage they receive (Lanjouw, Quizon, & Sparrow, 2001). Agricultural laborers do not have access to important agricultural inputs, such as land and capital, to engage in their own agricultural production as owners or tenants. On top of that, the seasonality of the agricultural production leaves themselves unemployed in certain periods. This may force the household to seek alternative sources of living. Therefore, households whose main sources of income are agricultural salary and wage have higher chances of engaging in non-farm enterprises.

Table 1. Factors related to NFEP

Variable	Expected Sign	Authors
Individual Profile		
MALE	+	Rijkers and Costa (2012)
AGE	+/-	Dary and Kuunibe (2012)
		Khatun and Roy (2012)
		Tafesse et al. (2015)
EDUCATION	+	Elbers and Lanjouw (2001)
		Escobal (2001)
SINGLE	+/-	Dutta (2007)
		Nagler and Naude (2017)
Household Profile		
FAMILY SIZE	+	Khatun and Roy (2012)
		Tafesse et al. (2015)
HOUSE OWNERSHIP	+	Cardak and Wilkins (2009)
ACCESS TO CREDIT	+	Ellis (2000)
		Escobal (2001)
		Khatun and Roy (2012)
CASH SUPPORT	+	Dutta (2007)
		Malek and Usami (2009)
ACCESS TO ELECTRICITY	+	Escobal (2001)
		Freese (2010)
		Shehu and Abubakar (2015)
ACCESS TO WATER	+	Freese (2010)
ACCESS TO COMMUNICATION	+	Alemu and Adesina (2017)
		Shehu and Abubakar (2015)
AGRICULTURAL INCOME	?	Barrett (2008)
AGRI. SALARY AND WAGES	+	Lanjouw et al. (2001)

3   Methodology and Data

3.1   Data

Data from the 2015 FIES Volume 2 are used in the study. The FIES is a nationwide survey that is conducted every three years. The questionnaire has four major parts, namely, food expenditure, non-food expenditure, income, and household details. The food expenditure section collects information on household purchases of food items, such as, but are not limited to, vegetables, crops, meat, eggs, and beverages, among others. The non-food expenditure section, on the other hand, gathers information on items, such as, but are not limited to, clothing, appliances, services, housing, and non-durable items. The income section solicits information about actual income and its sources. This includes income from agricultural and non-agricultural sources, receipts from abroad and domestic, and income from enterprises, among others. The household details section captures the demographic aspect, such as age, gender, education, and marital status of the household head. Details, such as family size, type of house, number of equipment and gadgets, and access to utilities, are also included in this part. Geographic information is only available at the regional level, hence, information on distance to the

city and economic areas is not available. There are 41,544 households included in the 2015 survey. The data are available at the PSA with the proper request through channels at the University of the Philippines Virata School of Business.

3.2   Sample of the Study

The sample is limited to agricultural households. These are households whose main sources of income are agriculture-related activities. The 2015 FIES has an indicator variable (AGIND) which classifies the household as agricultural or not. The total number of agricultural households using the indicator variable is 9,018. However, this indicator variable includes some households whose main sources of income are not agricultural activities (e.g., remittances from abroad, pensions). Hence, a new indicator variable is created limiting the sample to households whose main sources of income are salary and wages from agriculture, crop farming and gardening, livestock and poultry raising, fishing, and forestry and hunting, or a combination of these. The total number of samples reduces to 8,701 households. Table 2 presents the distribution of the household samples from agricultural sources of income. The main sources of income for most agricultural household samples are crop farming and gardening.

Table 2. Distribution of household by agricultural source of income

Main Source of Income	Frequency	Percent
Salary and Wages Agriculture	3,290	37.81
Crop Farming and Gardening	4,009	46.08
Livestock and Poultry Raising	153	1.76
Fishing	1,117	12.84
Forestry and Hunting	132	1.52
Total	**8,701**	**100.00**

3.3   Variable Definition

NFEP is an indicator variable (1 if the household has a non-farm enterprise, 0 otherwise) (Alemu & Adesina, 2017; Nagler & Naude, 2017; Osondu et al., 2014). The household is considered to be participating in a non-farm enterprise if the members are engaged in one or more of the following activities: wholesaling and retailing; manufacturing; community, social, and related services; transportation and storage services; mining and quarrying; construction; and other entrepreneurial activities not elsewhere classified. Participation in these activities can be verified in the 2015 FIES through the gross income received by the households and expense attributed to these entrepreneurial activities in the income section of the survey.

Table 3 summarizes the definition of the factors related to NFEP. Most factors are defined as a dummy variable except for age, family size, cash support, and agricultural income. Although coded in an ascending manner, each level of education is treated as a dummy variable with "no school" as the reference category. Cash support and agricultural income are also converted to their natural logarithm. A square of these variables is also included in the logistic regression to determine if there is non-linearity in the relationship. Ellis (1999) notes that income diversification is highly likely in the two extremes of the income bracket. Low-earning households are motivated to engage in non-farm enterprises because of necessity. Those in the upper-income bracket are motivated to engage in non-farm enterprises to accumulate wealth.

Table 3. Factors related to NFEP

Variable	Definition
Individual Profile	
MALE	1 if male, 0 otherwise
AGE	Actual age of the household head in years
EDUCATION	0 no school
	1 pre school
	2 elementary
	3 high school
	4 post high school
	5 college
	6 post baccalaureate
SINGLE	1 if single, 0 otherwise
Household Profile	
FAMILY SIZE	Actual number of member in the family
HOUSE OWNERSHIP	1 if own house and lot, 0 otherwise
ACCESS TO CREDIT	1 if loan payment is positive, 0 otherwise
LNCASH SUPPORT	Natural logarithm of total cash support from abroad and domestic
ACCESS TO ELECTRICITY	1 if electricity expenditure is positive, 0 otherwise
ACCESS TO WATER	1 if water supply expenditure is positive, 0 otherwise
ACCESS TO COMMUNICATION	1 if communication expenditure is positive, 0 otherwise
LNAGRICULTURAL INCOME	Natural logarithm of total income from agricultural activities
AGRI. SALARY AND WAGES	1 if main source of income is salary and wages in agriculture, 0 otherwise

3.4   Empirical Strategy
3.4.1   Binary Model

The binary nature of the dependent variable NFEP induces the use of the discrete choice regression model more specifically binary regression models. The interest is to determine the probability of an event occurring given a full set of explanatory variables (Wooldridge, 2011). For this study, the concern is to determine the probability that the agricultural household is engaged in a non-farm enterprise given selected individual and household level variables.

This study uses logistic (or logit) regression, although other models, such as the linear probability model (LPM) and probit model, are available. The choice is the researcher's prerogative since they all give similar estimates. But the probit and logit model has an advantage over the LPM because the said models ensure the resulting probability is from 0 to 1. The logistic regression model of the dependent variable Y (i.e., NFEP) with regressors X (i.e., individual and household level variables) takes the form (Gujarati & Porter, 2008):

$$P_i = E(Y_i = 1 | X_i) = \frac{1}{1 + e^{-(\beta_0 + \beta_1 X_1 + \ldots + \beta_k X_k)}} = \frac{1}{1 + e^{-z_i}} = \frac{e^{z_i}}{1 + e^{z_i}} \qquad (1)$$

where $Z_i = \beta_0 + \beta_1 X_1 + \ldots + \beta_k X_k$ and P_i is a non-linear function of Z_i. The last part of the equation is known as the cumulative logistic distribution function.

The coefficient of Z_i can be estimated using maximum likelihood. With large samples, the maximum likelihood estimator is consistent and normally distributed. The t-statistics and confidence interval can be determined as usual (Stock & Watson, 2015). Direct interpretation similar to that of the linear regression is not applicable in the logit model. Instead odd ratios or marginal effects are computed. The estimated coefficients are used for their sign and statistical significance (Wooldridge, 2013). This study computes for average marginal effects to examine which variables have the significant impact on the probability of having a non-farm enterprise. Model fit can be assessed by using the pseudo-R squared and percent correctly predicted. However, in binary model regression, the goodness of fit is of secondary importance (Gujarati & Porter, 2008). The signs and statistical/practical significance of the estimated coefficient take precedence (Gujarati & Porter, 2008).

3.4.2   OLS Model

The main objective of this study is to identify the factors affecting participation of agricultural households in a non-farm enterprise where participation in non-farm is a binary response variable. However, extending the analysis by examining the size or scale of non-farm enterprise households adds more insights to the study. Most studies use only binary models (Alemu & Adesina, 2017; Asfaw et al., 2017; Dary & Kuunibe, 2012; Kurniati, 2013; Nagler & Naude, 2017; Tafesse et al., 2015). This analysis gives a preliminary understanding of the factors that contribute to the growth of a non-farm enterprise. Micro- and small-sized enterprises have the potential for growth; however, only a few manage to grow and advance to the next level (Berner et al., 2008).

The size/scale of a non-farm enterprise is usually measured in terms of assets and number of employees (Mateev & Anastasov, 2010). However, these data are not available in the FIES. Expenses attributed to the entrepreneurial activities are used to proxy for the scale/size of the non-farm enterprise. Households with greater expenses are implied to be engaged more in the non-farm enterprise. It suggests that the operation is larger compared to those households that have lower expenses.

To identify the factors affecting the scale/size of the non-farm enterprise, a regression is run with the following form:

$$\ln(\text{EXP}) = \beta_0 + \beta_1 X_1 + \cdots \beta_k X_k + e \tag{2}$$

where $\ln(\text{EXP})$ is the expense attributed to the entrepreneurial activity transformed to natural logarithm, β are the coefficients to be estimated using OLS, and X are the individual and household level factors. The coefficients multiplied by 100 are interpreted as the percentage change in EXP if there is a one-unit change in the X. A potential weakness of this model is when endogeneity exists. That is when the dependent and independent variables have simultaneous causality. However, this part of the study serves only as a baseline. Interpretation focuses on how the independent variables are related to the dependent variables based on the resulting significance and signs of the coefficients. Factors affecting participation in a non-farm enterprise are proposed to be the same with the factors related to the size/scale of the non-farm enterprise.

4   Results and Discussion

4.1   Prevalence of NFEP

Table 4 presents the NFEP of households by region. The participation rate is highest in the National Capital Region (NCR) despite the low number of households identified to be agricultural. The region is a highly urbanized area, which explains why most of the households are not mainly engaged in the agricultural sector. However, being at the center of economy, culture, government, and education, opportunities to engage in non-farm business are not hard to recognize and achieve by the households.

Table 4. NFEP by region

Region	With Non-Farm Enterprise	Total Number of Agricultural Households	Participation Rate
I – Ilocos Region	76	309	24.60%
II – Cagayan Valley	156	864	18.06%
III – Central Luzon	74	360	20.56%
V – Bicol Region	133	479	27.77%
VI – Western Visayas	126	592	21.28%
VII – Central Visayas	91	312	29.17%
VIII – Eastern Visayas	128	466	27.47%
IX – Zamboanga Peninsula	113	478	23.64%
X – Northern Mindanao	105	437	24.03%
XI – Davao Region	191	728	26.24%

Region	With Non-Farm Enterprise	Total Number of Agricultural Households	Participation Rate
XII – SOCCSKSARGEN	152	699	21.75%
NCR[a]	7	18	38.89%
CAR[b]	86	387	22.22%
ARMM[c]	190	1436	13.23%
Caraga[d]	109	406	26.85%
IVA – CALABARZON	85	326	26.07%
IVB – MIMAROPA	118	404	29.21%
Total	**1,940**	**8,701**	**22.30%**

[a] National Capital Region
[b] Cordillera Administrative Region
[c] Autonomous Region in Muslim Mindanao
[d] Caraga Administrative Region

Meanwhile, the Autonomous Region in Muslim Mindanao (ARMM) has the lowest level of participation in non-farm enterprises. According to the National Economic Development Authority (NEDA) (2016), ARMM is considered to be among the poorest region in the country. While insufficient income may motivate these households to engage in non-farm enterprises, other factors may potentially hinder it. The region has been constantly plagued with armed conflicts, clan disputes, a communist insurgency, and banditry which has resulted in severe economic and social displacement (World Bank, 2013, para. 2).

Overall, the country has a participation rate of 22.3 %. One out of every five agricultural household is engaged in some form of non-farm enterprise. This figure lies somewhere in between that of African studies. Nagler and Naude (2017) report a low participation rate of 17% in Malawi to a high rate of 62% in Niger, while Alemu and Adesina (2017) report a participation rate of 29% in Ethiopia. Compared to Asian studies, this figure is close to the findings of Malek and Usami (2009) who report a 20.8% participation rate in Bangladesh. Chawanote (2012) on the other hand reports a participation rate of 40% in Thailand, which is twice as much as that in the Philippines.

Most agricultural households participate only in one non-farm enterprise (Table 5). Nagler and Naude (2017) also report a comparable number of participation among households in Africa. The average number of non-farm enterprises per household in six African countries is 1.36. One possible reason for this observation is that these households earn just enough to meet their needs but not enough to invest in more business. Ellis (1999) observes that in most developing countries, households in the opposite extreme of the income level tend to have more livelihood sources than those of the middle range income earners.

**Table 5. NFEP by number of activities participated**

Number of Non-Farm Enterprise Participated	Number of Households	Percentage
1	1,731	89.23
2	191	9.85
3	15	0.77
4	3	0.15
Total	**1,940**	**100.00**

4.2   Patterns of NFEP

The type of non-farm enterprise participated by the agricultural households is presented in Figure 1. Wholesale and retail trade activities are the most participated non-farm enterprise. This result is similar to Nagler and Naude (2017) who find trade and sales to be the top non-farm enterprise in Ethiopia, Malawi, and Niger. Tafesse et al. (2015) report a participation rate of 82% in trading activities in Ethiopia. Households seem to engage in easy-to-enter business, such as trade and retail than those that require higher capital or higher educational background (Nagler & Naude, 2017, p. 177). Little

capital is sufficient to open a retail business, such as a "sari-sari" (sundry) store, which is very common in the country. The least participated enterprise is the construction services. This venture requires highly technical skills aside from the tools needed in the delivery of the services.

Figure 1. Distribution of household by type of non-farm enterprise
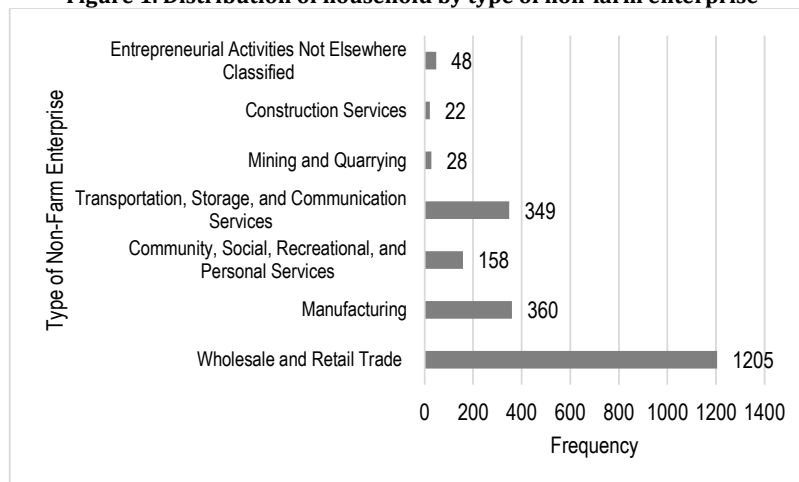
The gross income and expense of agricultural households from non-farm enterprises are presented in Table 6. Expenses attributed to non-farm entrepreneurial activities can proxy for the size or scale of the operation[1]. On average, wholesale and retail trade activities have the highest gross income and expense among non-farm enterprises. This indicates that agricultural households have relatively large operations of wholesaling and retailing activities than other non-farm enterprises. However, household trading activities are very diverse as they can be very small or large. This is evident by the high standard deviation of expense. Trading activities have low entry barriers and can grow rapidly given the suitable strategies and favorable marketing conditions. Meanwhile, mining and quarrying activities have the lowest gross income and expense. Mining activities of agricultural households are at a subsistence level conducted by family members themselves. The most significant input in small-scale mining and quarrying is labor which is not significantly expensive (Bugnosen, 2001). They have limited capital for investment in more advanced technology of extraction (Bugnosen, 2001). The informality in the sector is so pervasive that key players in the industry are not given proper consideration by the government (Pascual, Domingo, & Manejar, 2019).

Table 6. Gross income and expense by non-farm enterprise activity

Non-farm entrepreneurial activity	Obs.	Gross Income				Expense			
		Mean	Std.Dev.	Min	Max	Mean	Std.Dev.	Min	Max
Wholesale and Retail Trade	1,205	88,080	132,435	480	2,559,000	61,748	106,702	0	2,020,437
Manufacturing	360	23,921	64,480	0	905,520	10,491	47,576	0	716,744
Community, Social, Recreational, and Personal Services	158	39,589	63,907	300	430,200	17,359	38,481	0	251,220
Transportation, Storage, and Communication Services	349	42,949	39,400	1,800	294,000	17,883	23,259	0	215,010
Mining and Quarrying	28	18,149	23,780	1,100	120,000	5,725	19,031	0	100,000
Construction Services	22	35,600	44,671	800	200,000	18,576	39,130	0	170,000
Entrepreneurial Activities Not Elsewhere Classified	48	60,687	167,177	2,275	1,170,000	18,483	54,276	0	372,605

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[1] Size and scale of operation are usually measured in terms of assets or number of employees. However, this information is not available in the FIES. Expense attributed to the enterprise can represent the scale or size of operation. These expenses can represent investment spending in the operations of the enterprise. Higher expense implies higher use of inputs for operations.

The distribution of agricultural households by scale of operation is presented in Figure 2. Scale is based on the expenses attributed to non-farm entrepreneurial activities. The expense brackets are based on the PSA expenditure class. The figure reveals that most households have operating expenses below Php40,000 and only very few have an operating expense of Php500,000 and above. This suggests that most non-farm enterprise operations of agricultural households are small-scale. This is expected since the primary activities of these households are agriculture. Non-farm enterprises are only an alternative source of income. In addition, agricultural households are limited by their wealth and resources which can be used as capital to expand the non-farm enterprise (Chawanote, 2012).

Figure 2. Distribution of participating households by size/scale of non-farm enterprise
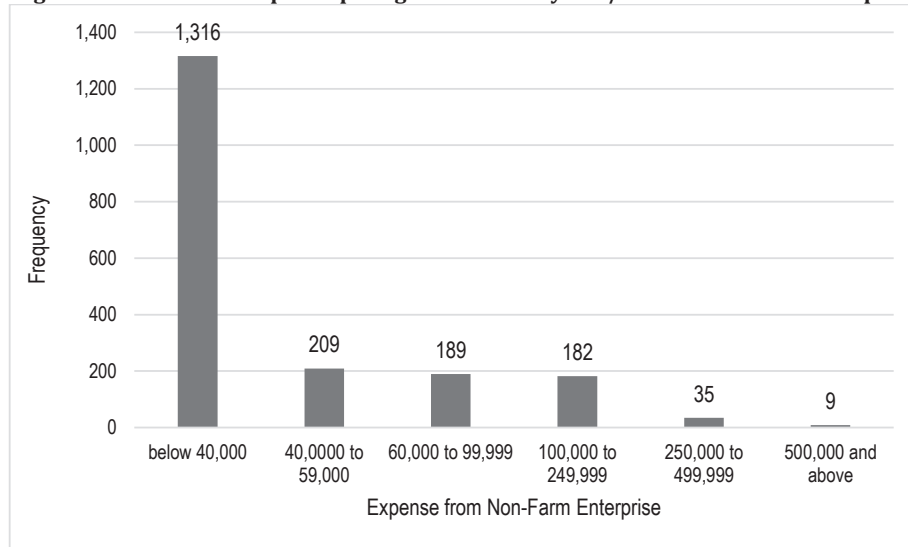
The significance of non-farm enterprises among agricultural households can be assessed by examining its total contribution to total household receipt. Figure 3 reveals that income from non-farm enterprises is the third-largest contributor to household income following only other receipts. But the difference between the two sources is not that significant. The observed 15% contribution of non-farm enterprise is on the low side compared to other recent studies. The contribution of non-farm enterprise in Africa ranges from a low of 8.5% in Malawi to a high of 35.8% in Niger (Nagler & Naude, 2017). Contribution in Ecuador ranges from 20 to 33% (Vasco & Tamayo, 2017).

Figure 3. Contribution of a non-farm enterprise to total household receipt
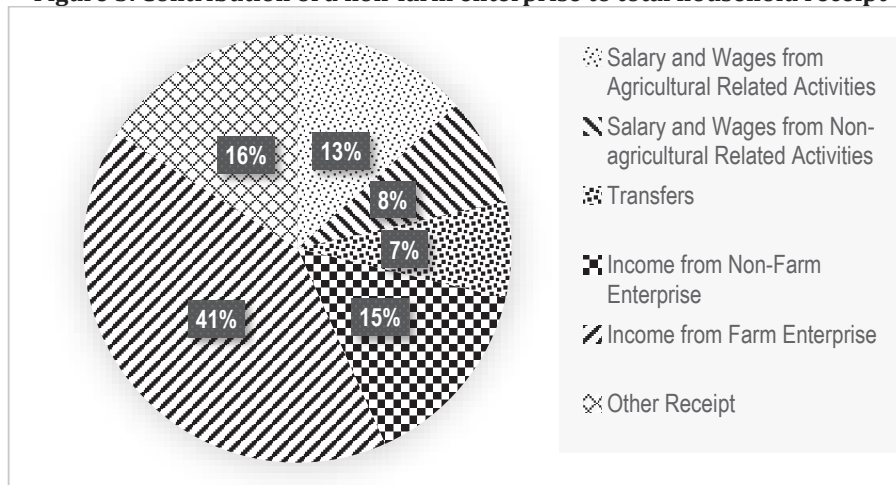
4.3   Determinants of Participation to Non-Farm Enterprise
4.3.1   Sub-Sample Averages

Table 7 presents the sub-sample average of all the variables used in the study. It shows the mean and standard deviation for all variables grouped according to NFEP as well as overall. Indicator and dummy variables can be converted and interpreted in percentage terms since the sum is also the total number of occurrences. This provides an overview of how the data support this study's expectations.

The table reveals that the mean for male is equal for both households with and without a non-farm enterprise. This indicates that both groups are equally headed by a male. Means for age and education is higher for households with non-farm enterprise. This pattern suggests a positive relationship between NFEP and the two individual-level variables (age and education) which is consistent with expectation. On the other hand, the mean for single is lower in households with non-farm enterprises. This implies that somehow more single household head chooses not to engage in a non-farm enterprise. Overall, the average agricultural household is headed by a male, in their late 40s, with elementary education, and married.

Table 7. Sub-sample averages

Variables	With Non-Farm Enterprise		Without Non-Farm Enterprise		Overall	
	Mean	SD	Mean	SD	Mean	SD
Individual level						
MALE	0.91	0.29	0.91	0.28	0.91	0.28
AGE	49.28	12.15	48.46	13.35	48.64	13.09
EDUCATION						
NO SCHOOL	0.05	0.21	0.09	0.28	0.08	0.27
PRE-SCHOOL	0.00	0.00	0.00	0.03	0.00	0.02
ELEMENTARY	0.57	0.49	0.62	0.49	0.61	0.49
HIGH SCHOOL	0.29	0.45	0.25	0.43	0.26	0.44
POST HIGH SCHOOL	0.01	0.08	0.00	0.05	0.00	0.05
COLLEGE	0.08	0.28	0.04	0.20	0.05	0.22
POST BACCALAUREATE	0.00	0.02	0.00	0.02	0.00	0.02
SINGLE	0.01	0.10	0.04	0.19	0.03	0.18
Household level						
FAMILY SIZE	5.17	2.14	4.82	2.15	4.90	2.15
AGRICULTURAL INCOME [a]	99922.89	98423.69	93687.53	91625.23	95077.78	93214.35
HOUSE OWNERSHIP	0.72	0.45	0.71	0.45	0.71	0.45
ACCESS TO CREDIT	0.26	0.44	0.17	0.37	0.19	0.39
CASH SUPPORT [a]	13364.14	21637.55	10394.61	15073.34	11056.70	16805.21
ACCESS TO ELECTRICITY	0.83	0.38	0.69	0.46	0.72	0.45
ACCESS TO WATER	0.33	0.47	0.24	0.43	0.26	0.44
ACCESS TO COMMUNICATION	0.89	0.31	0.77	0.42	0.80	0.40
AGRI. SALARY AND WAGES	0.30	0.46	0.40	0.49	0.38	0.48

[a] *Reported figure covers six months from July to December*

In terms of household-level variables, households with non-farm enterprises have generally higher means in all variables except for agriculture and salary and wages. Higher means for family size, house ownership, access to credit, cash support, access to electricity, and access to communication among households with non-farm enterprises generally indicate a positive relationship which is consistent with expectations. Agricultural income is higher for households with non-farm enterprises, which may indicate that non-farm entrepreneurship is a result of pull factors, such as the sufficiency of capital and recognition of business opportunities. Interestingly, households relying on agriculture and salary and wages are higher among households without non-farm enterprises. This pattern indicates a negative relationship that is contrary to expectations. The average agricultural household has a family size of five, earns Php95,077.78 in six months in agricultural activities, has limited access to credit, receives a total cash support of Php11,056.70 from abroad and domestically, has access to electricity, limited access to piped water, access to communication, and mainly relies on agricultural production.

4.3.2   Regression Analysis
4.3.2.1 Logit Regression

Table 8 summarizes the logit estimates and the marginal effects of the two models examined in this study. Model 1 uses all the variables as defined by this study except for agricultural income and cash support which are converted to natural log. Model 2 examines Ellis' (1999) observation that income is more diversified among households in the opposite extreme of the income bracket than in the middle bracket. This implies that the relationship between participation in a non-farm enterprise and income is U-shaped. Therefore, the squares of the natural logarithm of agricultural income and cash support are added in the second model. All variables retained their significance and signs across the two models except for age. Changes in the estimates are also minimal implying that the models are fairly stable and have a low risk for omitted variable bias.

All variables are found to be significant except for male and house ownership. Positive coefficients are observed in the variables age, education, family size, access to credit, access to electricity, access to water, and access to communication. Meanwhile, significant negative coefficients are observed for single, lnagri income, lncashsupport and agri salary/wage. The signs and significance of these variables are examined for robustness and non-linearity in the next three models.

Among individual-level variables, only male is found not to be significant, and its sign is opposite to expectations. The relationship implies that a female household head is more likely to engage in a non-farm enterprise but without statistical evidence. This relationship is, however, supported by Dary and Kuunibe (2012), Escobal (2001), and Vasco and Tamayo (2017). This is rather intuitive since households without an active male household head are vulnerable to inadequate income and may be forced to engage in other businesses to support themselves.

The result for age implies that older people have a higher chance of engaging in a non-farm enterprise. This supports the notion that experience is enhanced with age and increases the confidence of the individual to take the business risk. This finding coincides with Chawanote (2012) but contradicts the African studies of Asfaw, et al. (2017), Dary and Kuunibe (2012), and Nagler and Naude (2017). The non-farm economy is dominated by younger people in those selected African contexts.

Meanwhile, the result for education aligns with most of the empirical studies (Alemu & Adesina, 2017; Escobal, 2001; Nagler & Naude, 2017). Higher marginal effects (column 2) are observed for higher levels of education. This implies that as education increases the average probability of the household to engage in a non-farm enterprise increases. Education indeed is a critical determinant of NFEP. It improves skills and knowledge necessary to start and operate a business. Better educated individuals have more access to non-farm employment, and also are more likely to establish their own non-farm enterprise (Gordon & Craig, 2001, p. 16).

As to marital status, results reveal that household heads who are single are less likely to have a non-farm enterprise. This factor has the highest marginal effects among the individual-level factors. Being married increases the chances of the households engaging in a non-farm enterprise by 17%. This confirms the importance of the alliances and sharing of resources in marriage (Dutta, 2007). The spouse of the household head is also an additional worker who can contribute to the overall earnings of the household through a non-farm enterprise. Marriage is seen as a motivation to provide for the spouse and an opportunity to diversify income (Dutta, 2007).

The logit result for most of the explanatory household-level variables is supportive of the hypothesized relationship with NFEP except for agri salary/wage and lncashsupport. The positive coefficient for family size means that larger households have a higher chance of having a non-farm enterprise. Active members are considered household human resource who can actively contribute to households earning to support their growing needs (Khatun & Roy, 2012). But this could also mean that the household is pressured to diversify income to meet the needs of the growing number of household members. This result confirms Freese (2010) and Nagler and Naude (2017) in selected African countries. However, some empirical studies find non-significance, and interestingly a negative relationship (Escobal, 2001; Malek & Usami, 2009; Osondu et al., 2014).

No sign was hypothesized for agricultural income, but the linear term lnagri_income and the quadratic term lnagri_income[2] are significant in Model 2. The test of the joint hypothesis of these two factors is highly significant (chi (2) = 81.01; Prob > chi2 = 0.000). This implies that households belonging in the extreme income bracket have higher chances of participating in non-farm enterprises.

Thus, validating Ellis' (1999) observation that households in the two extreme income brackets have a more diversified source of income.

The household's likelihood of engaging in a non-farm enterprise is associated with the source of funds. Access to credit encourages participation in a non-farm enterprise as indicated by a positive coefficient. Credit is a critical source of business venture funds through loans (Khatun & Roy, 2012). This result conforms with the studies of Alemu and Adesina (2017) and Escobal (2001). But it contradicts the studies of Osondu et. Al. (2014) and Malek and Usami (2009) who find that access to credit is negatively related to participation in a non-farm enterprise. Interest payments somehow discourage households to venture into risky activities. Some households do not have enough collateral to support their payments.

Lncashsupport does not support the priori expectation as indicated by a negative coefficient. Households with lower cash support have higher chances of participating in a non-farm enterprise. However, the quadratic term lncashsupport^2 is significant in Model 2. The test of the joint hypothesis of these two variables is significant (chi(2) = 12.45; Prob>chi2 = 0.002). Households whose cash supports belong to the extreme end have higher chances of engaging in a non-farm enterprise. This relationship is similar to agricultural income and further validates Ellis' (1999) results.

Access to electricity and water also increases the likelihood of NFEP among households as shown by their positive coefficients. Electricity and water are an important part of the community infrastructure. These are important inputs in small-scale non-farm enterprises (Freese, 2010). Similar results have been shown by Escobal (2001), Shehu and Abubakar (2015), and Vasco and Tamayo (2017).

Moreover, access to communication positively stimulates NFEP. Its contribution to the average change in probability of participating in a non-farm enterprise is the highest among all the household factors as indicated by its high marginal effects. Access to communication increases the chances of households to participate in a non-farm enterprise by almost 12%. Households find communication to be really important in business. Transactions, exchange of information, and expansion of network are facilitated through communication (Alemu & Adesina, 2017). This variable is only included in a limited number of empirical studies, such as those of Shehu and Abubakar (2015) and Vasco and Tamayo (2017), but all reveal positive results.

Lastly, the negative coefficient for agri_salary/wage implies that the households' likelihood of participation in a non-farm enterprise decreases when households are only relying mainly on agricultural salary and wage. The marginal effect reveals that this factor is also highly significant. The average probability of participating in a non-farm enterprise decreases by almost 10% if the household's main source of income is agricultural salary and wages. This result is logical because agricultural salary and wage are very low, and farm work is seasonal which does not allow them to accumulate funds. On the other hand, the result also implies that households engaged in agriculture as producers or tenants themselves have a higher likelihood of engaging in a non-farm enterprise. The possible motivations for the households are to protect themselves from risk and shocks, and at the same time to further diversify and increase their income (Holden, Shiferaw, & Pender, 2004; Ruben & Pender, 2004).

Table 8. Logit regression results

Independent Variables	Dependent Variable: NFEP_dum			
	Model 1		Model 2	
	Logit	Marginal Effects	Logit	Marginal Effects
Individual level				
MALE	-0.131	-0.021	-0.113	-0.018
	(-0.102)	(-0.016)	(-0.103)	(-0.016)
AGE	0.004*	0.001*	0.003	0.001
	(-0.002)	(0.000)	(-0.002)	(0.00)
EDUCATION				
PRESCHOOL[1]	----	----	----	----
ELEMENTARY	0.265**	0.038**	0.268**	0.039**
	(-0.123)	(-0.017)	(-0.124)	(-0.017)
HIGH SCHOOL	0.441***	0.067***	0.438***	0.066***
	(-0.133)	(-0.019)	(-0.133)	(-0.019)

Independent Variables	Dependent Variable: NFEP_dum			
	Model 1		Model 2	
	Logit	Marginal Effects	Logit	Marginal Effects
POST HIGH SCHOOL	1.424***	0.262***	1.369***	0.249**
	(-0.461)	(-0.1)	(-0.46)	(-0.099)
COLLEGE	1.086***	0.189***	1.025***	0.176***
	(-0.161)	(-0.028)	(-0.162)	(-0.028)
POST BACCALAUREATE	0.631	0.1	0.366	0.054
	(-1.253)	(-0.227)	(-1.259)	(-0.203)
SINGLE	-1.080***	-0.172***	-1.119***	-0.178***
	(-0.248)	(-0.04)	(-0.249)	(-0.04)
Household level				
FAMILY_SIZE	0.116***	0.018***	0.118***	0.019***
	(-0.014)	(-0.002)	(-0.014)	(-0.002)
LNAGRI_INCOME	-0.423***	-0.068***	-4.888***	-0.777***
	(-0.06)	(-0.009)	(-1.086)	(-0.172)
HOUSEOWNERSHIP	-0.009	-0.001	-0.008	-0.001
	(-0.064)	(-0.01)	(-0.064)	(-0.01)
ACCESS TO CREDIT	0.413***	0.066***	0.417***	0.066***
	(-0.065)	(-0.01)	(-0.065)	(-0.01)
LNCASHSUPPORT	-0.020***	-0.003***	-0.103***	-0.016***
	(-0.007)	(-0.001)	(-0.038)	(-0.006)
ACCESS TO ELECTRICITY	0.469***	0.075***	0.472***	0.075***
	(-0.074)	(-0.012)	(-0.074)	(-0.012)
ACCESS TO WATER	0.245***	0.039***	0.246***	0.039***
	(-0.063)	(-0.01)	(-0.063)	(-0.01)
ACCESS TO COMMUNICATION	0.747***	0.119***	0.779***	0.124***
	(-0.087)	(-0.014)	(-0.088)	(-0.014)
AGRI_SALARY/WAGE	-0.683***	-0.109***	-0.668***	-0.106***
	(-0.063)	(-0.01)	(-0.063)	(-0.01)
LNAGRI_INCOME^2			0.193***	0.031***
			(-0.047)	(-0.008)
LNCASHSUPPORT^2			0.009**	0.001**
			(-0.004)	(-0.001)
constant	1.830***		27.497***	
	(-0.678)		(-6.215)	
Pseudo R-square	0.08	0.08	0.08	0.08
No. of observations	8,696	8,696	8,696	8,696
Education (df)	67.54(5)		57.5(5)	
	0.000		0.000	
Region (df)	115.4(13)		99.16(13)	
	0.000		0.000	
Percent Correctly Classified	78%		78.01%	

* p<0.1; ** p<0.05; *** p<0.01; [1]Pre-school is dropped because it predicts failure perfectly.

4.3.2.1 OLS Regression

This study explores the factors affecting the size or scale of non-farm enterprises of agricultural households. The analysis only includes households engaged in non-farm enterprises. An OLS regression is performed using the natural logarithm of expense attributed to the non-farm enterprise (ln(exp)) as the dependent variable. Table 9 shows the result of the OLS regression. The result should be interpreted cautiously. A potential error exists because of the endogeneity problem[2]. However, this section of the study serves only as a baseline. The practical implications of the signs of the coefficients are interpreted, nevertheless. There are two models examined. The first model is the baseline model while the second model includes the use of the quadratic term of the natural logarithm of income and cash support.

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[2] Simultaneous causality potentially exists between the scale/size of enterprise and some independent variables. For instance, access to credit is dependent on the size of the operation. Financial institution usually evaluates the scale of the operation of the business and decides if the loan is approved or not.

The table shows that among the individual-level variables, only education is found to be significant for both models. Having a college level education has the highest positive significant relationship with the size of enterprise operations. This result conforms to most empirical studies (Alemu & Adesina, 2017; Escobal, 2001; Nagler & Naude, 2017). Individuals with higher education are more skilled and knowledgeable in the operations of as enterprise. There is a high potential for enterprise growth for those household heads with higher education.

For household-level variables, factors with a consistent positive significant relationship with the dependent variable are house ownership, access to credit, access to electricity, and access to communication. The signs support the expectation of this study. Households who own their houses or have some ownership-like arrangements have no monthly expenses allowing them to commit more resources to non-farm enterprises (Cardak & Wilkins, 2009). Meanwhile, access to credit allows agricultural households to finance the expansion of their non-farm enterprises. Raw materials and important input can be procured without constraints when households have credit sources. The importance of community infrastructure, such as electricity, is highlighted once again with the results (Freese, 2010). Electricity allows the households to use equipment and machineries needed in production, and to produce effectively and efficiently contributing to growth. Enterprises are also growing because of networks established through communication.

The relationship of cash support and size is non-linear as indicated by the significant positive quadratic term. In particular, the shape is U implying that those households at the extreme bracket of cash support have larger non-farm enterprises. This result again validates the claims of Ellis (1999) where households at both ends of the income bracket have higher levels of participation in non-farm enterprises. Cash support serves as an additional source of funds which can be used in buying more inputs. On the other hand, those at the lower cash support bracket are pushed to participate more and commit more resources to the non-farm enterprise consequently letting them earn more.

Similar to participation in a non-farm enterprise, the scale of a non-farm enterprise is negatively related to whether the household relies mainly on agricultural salary/wages or not. This is indicated by the negative sign of agri_salary/wage. Households who are employees of agricultural activities are exposed to labor income risk due to low salary and seasonality of farm production. This source of income is not enough to support expansion or growth of a non-farm enterprise.

Table 9. OLS regression results

	Dependent Variable: ln(exp)	
Independent Variables	Model 1	Model 2
Individual level		
MALE	0.355	0.355
	(0.231)	(0.231)
AGE	0.006	0.004
	(0.006)	(0.006)
EDUCATION		
PRESCHOOL[1]	------	------
	------	------
ELEMENTARY	0.725*	0.682*
	(0.305)	(0.305)
HIGH SCHOOL	1.027**	0.979**
	(0.322)	(0.322)
POST HIGH SCHOOL	1.321	1.231
	(0.882)	(0.881)
COLLEGE	1.461***	1.409***
	(0.370)	(0.370)
POST BACCALAUREATE	2.397	1.690
	(2.755)	(2.758)
SINGLE	-0.110	-0.133
	(0.640)	(0.639)
Household level		
FAMILY_SIZE	-0.020	-0.030
	(0.032)	(0.032)

Independent Variables	Dependent Variable: ln(exp)	
	Model 1	Model 2
LNAGRI_INCOME	0.779***	0.030
	(0.120)	(2.268)
HOUSEOWNERSHIP	0.317*	0.320*
	(0.145)	(0.144)
ACCESS TO CREDIT	0.341*	0.344*
	(0.145)	(0.145)
LNCASHSUPPORT	-0.035*	-0.309***
	(0.016)	(0.087)
ACCESS TO ELECTRICITY	0.486**	0.460*
	(0.182)	(0.182)
ACCESS TO WATER	0.005	-0.006
	(0.140)	(0.139)
ACCESS TO COMMUNICATION	0.719***	0.717***
	(0.216)	(0.217)
AGRI_SALARY/WAGE	-0.335*	-0.300*
	(0.145)	(0.145)
LNAGRI_INCOME²		0.029
		(0.098)
LNCASHSUPPORT²		0.028**
		(0.009)
constant	-1.850	3.058
	(1.412)	(13.034)
r-square	0.138	0.143
Adj. r-square	0.123	0.127
F	9.269	9.075
N	1940.000	1940.000
Education F(df)	3.97 (5, 1906)	3.64 (5, 1904)
(Prob > F)	0.0014	0.0026
Region F(df)	4.13 (16,1906)	4.11(16, 1904)
(Prob > F)	0.000	0.000

5   Summary and Conclusion

This study sought to determine the prevalence and patterns of NFEP, and to identify the factors affecting the likelihood of agricultural households to engage in non-farm enterprises. This study was motivated by the limited empirical studies conducted in the Southeast Asian context, particularly in the Philippines. This paper primarily made a contextual contribution, but differed from other studies by extending the samples to households mainly involved in other agricultural activities aside from crop farming and gardening. The level and main source of agricultural income were included as determinants in the analysis.

This study reveals that one out of every five agricultural households is engaged in some form of non-farm enterprise. But this participation is only limited to one non-farm activity in most of the sample households. Most of them prefer to engage in retailing and trading. Non-farm enterprise contributes around 15% of their total household receipts.

Participation in a non-farm enterprise is stimulated by individual-level factors, such as age, education, and marriage. Older, better-educated, and married household heads have higher chances of participating in a non-farm enterprise. Meanwhile, household-level factors that affect participation in non-farm enterprises are family size, agricultural income, access to credit, cash support, access to electricity and water, access to communication, and the main source of income. Chances of participating in non-farm enterprises are higher for those households with larger family size, access to credit, with access to utilities and communication, the main source of income is the profit from agricultural production, those belonging in the two extremes of agricultural income, and cash support levels.

This study also explores the factors affecting the scale or the size of the non-farm enterprise among households that are already engaged in non-farm enterprise. The size of the enterprise is proxied by expenses attributed to entrepreneurial activity. Results reveal that the scale of operation of non-farm enterprises is larger for those household heads with higher education and those households with access to credit, own their house, access to electricity, and access to communication. Also, households receiving lower or higher cash support have larger non-farm enterprises. Meanwhile, a non-farm enterprise is smaller for those households who are relying mainly on their salary and wages in the agricultural sector.

In conclusion, the study shows that the non-farm enterprise participation in the Philippines is prevalent among agricultural households. But such participation is considered limited and minimal per household. They recognize the limitations of their resources, and therefore choose non-farm activities with low entry barriers. While agricultural activity is significantly the main source of income, the contribution of non-farm enterprises cannot be considered marginal in comparison to other sources. Households participate in a non-farm enterprise because of the opportunities brought by education, marriage, access to utilities, and access to funds. Others are pushed to diversify and participate in a non-farm enterprise because of necessity due to insufficient agricultural income. Moreover, non-farm enterprises grow in size because of education, ownership of houses, access to credit, cash support, and basic community utilities. Education allows agricultural households to accumulate skills and knowledge needed for the larger operation of the non-farm enterprise. Reduce financial constraint due to access to credit, ownership of a house, and cash support allows the household to finance the expansion of the non-farm enterprise. Basic community utilities, such as communication and electricity, stimulate entrepreneurship through expansion of networks and utilization of production equipment and machineries.

Important policy implications include the provision or improvement of development infrastructure in rural areas. Existence of basic utilities stimulates household investment in a non-farm enterprise, such as in small- and medium-sized manufacturing of goods. Significant agricultural training must be in place to ensure the increase in agricultural productivity and income of the households. This allows them to accumulate enough funds to engage in high barrier but high return enterprises. The farmers must be updated with market information for possible opportunities. This can be done by improving communication facilities and basic utilities in the rural areas. Financial inclusion is also a problem in rural areas along with the non-repayment of microloans. Cooperatives and institutions must not focus only on the agricultural activities, but must also provide support and assistance to non-farm activities of the households. Cooperatives and financial institutions can greatly benefit from these programs because incomes from non-farm enterprises can serve as insurance if agricultural productions fail. This can allow household borrowers to repay their microloans.

This study is limited by the available data in the 2015 FIES. Behavioral variables, such as risk tolerance and innovativeness, are critical in entrepreneurship. These variables can be examined in future studies given a richer data set even on a smaller scale. The study can also be extended by examining whether these household enterprises survive in time through the use of panel data. The interpretation of OLS coefficients is weak because of the endogeneity problem. Future studies could use models to establish a stronger causal interpretation. Quasi-experimental models and instrumental variables regression are suggested.

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