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Determinants of household participation in non-farm enterprises in Uganda

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Abstract

Despite the increasing number of households in Uganda depending on household enterprises as an income source, non-farm household enterprises are often neglected in low-income Sub-Saharan African development strategies and receive minimal policy consideration. Non-farm household enterprises remain central to addressing the country's poverty reduction agenda and socio-economic transformation, as agricultural households increasingly transition from subsistence to commercial agriculture. The government has introduced several interventions, including the Parish Development Model (PDM) and Emyooga, that increasingly impact the non-farm household enterprise economy to achieve this. Despite these efforts, there is limited empirical evidence in Uganda on the determinants of non-farm household enterprise ownership. Against this backdrop, this study uses cross-sectional data from the UNHS 2019/2020 using the logit estimating approach to analyse the factors influencing household participation in non-farm household enterprises. Individual engagement is found to be connected with marital status, geography, education level, and financial access. Furthermore, people in the eastern and western regions are less likely to work in non-farm industries than those in the centre. Individuals with specialised training and degrees are less likely to work in non-farm enterprises than individuals with only primary schooling. Given these findings, improving access to financing is critical for household involvement. As a result, government schemes such as PDMs are even more important in increasing access to finance.

1. Introduction

Non-farm activities can significantly reduce income inequality and rural-urban migration by providing supplementary employment opportunities for small and marginal farm households. According to Kazungu and Guuroh (2014), the non-farm sector can absorb a growing labour force, boost national income growth, and promote fair income distribution. Regardless of whether the enterprise is housed on the household's property, one or more household members manage the household enterprise, non-farm enterprise, or it is jointly managed by two or more households on a partnership basis. Non-farm economy accounts for a significant and growing share of household income in Africa Haggblade et al. (2010), Rijkers and Costa. (2012). In Africa, where the lack of sufficient formal employment persists despite decades of development policies, non-farm enterprises primarily serve a risk-management and survival function Nagler and Naudé. (2014), Rijkers & Costa (2012) and Start (2001).

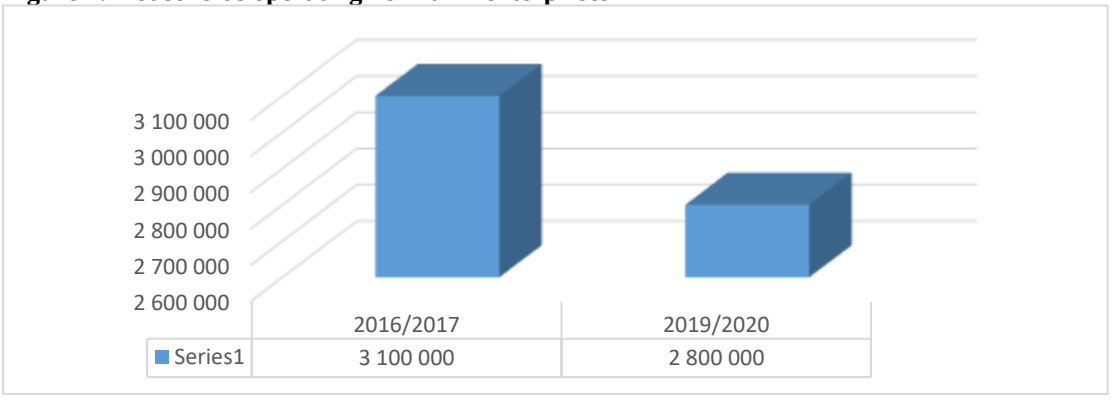
It is often argued that, to reduce poverty in Africa, its economies must become less reliant on agriculture. Small rural non-farm businesses are of vital importance during the early stages of growth beyond agriculture. It is challenging to determine how non-farm enterprises can contribute to poverty alleviation, as there is limited knowledge about their characteristics, opportunities, and limitations Lanjouw & Lanjouw, (2001). Both rural and urban areas continue to have higher rates of poverty, with rural areas having the highest rates.

According to the Uganda Bureau of Statistics, the number of people living in poverty in rural areas decreased from 7.1 million to 7 million, and the poverty rate fell from 25.2% in 2016/17 to 23.4% in 2019/20 (UBOS, 2021). Although this represents positive gains, poverty in Uganda still largely remains a rural problem, partially due to its reliance on low-yield agriculture. In 2019/2020, the percentage of the population living in poverty due to income was 27% in urban areas and 73% in rural areas, UBOS. (2021).

The Ugandan government and private sector are interested in how household enterprises can increase household incomes, create jobs, and reduce poverty. The Ugandan government sees the promotion of non-farm enterprise activity as a potential driver of development. In particular, the Uganda Vision 2040, which aims to transform the country from a peasant to a modern, prosperous country by 2030, outlines a structural transformation with the movement of the labour force from agriculture to industry and service sectors (NPA, 2010). Households have traditionally run enterprises as a combination of coping strategies against household and agricultural income shocks and as a business entity with growth potential. Such informal enterprises exist in Uganda and can be found in houses, along roads, and in other fixed and mobile sites. Such decisions by a rural household to run a non-farm firm are primarily driven by push factors, of which household shocks and seasonality in agriculture, as well as excess household labour, seem to be important (Nagler & Naudé, 2014).

According to the 2019/2020 estimates, 2.8 million households, which is 31 percent of the projected 8.9 million households in Uganda, had non-crop farming enterprises as evidenced by UBOS, 2021. This reflects a decline from the 3.1 million households that operated home enterprises in 2016/17. Urban households had a higher percentage of home enterprises (42%) than rural households (27%).

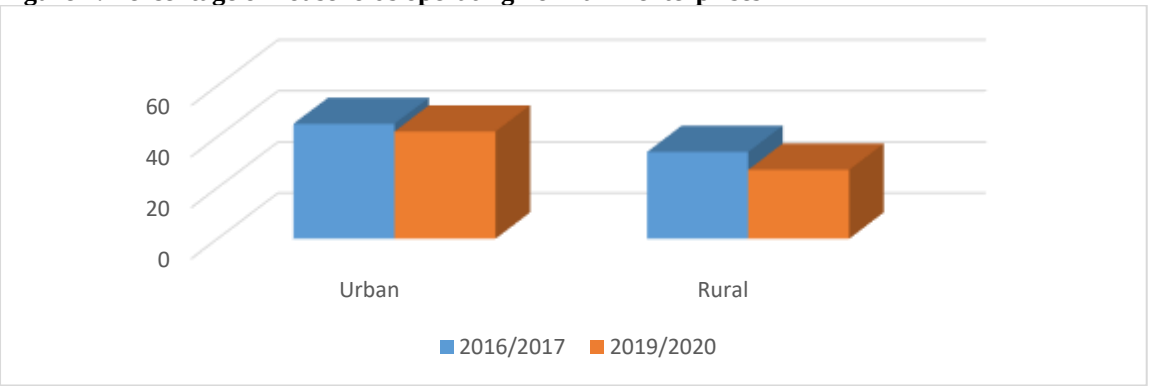
Figure 1: Households operating non-farm enterprises



Source: UBOS (2021)

There were 3.1 million household enterprises in Uganda overall, with nearly four out of five households, or 78 percent, operating at least one household enterprise, and another 19 percent operating two household enterprises. Compared with male-headed households (76%), the percentage of female-headed households operating a household enterprise was slightly higher (79%). Analysis of household enterprise distribution shows that 62% of households are rural, while 54% of household enterprise operators are female. Young people aged 18-30 years share business ownership in households, just like older people aged 60 years and above, with the former at 32% and the latter at only 7% owners, according to UBOS. (2021).

Figure 2: Percentage of households operating non-farm enterprises



Source: UBOS (2021).

The Ugandan government has, over time, reversed the bias against rural communities through structural adjustments that affected investment in services and agriculture. While household incomes rose with a recovery in agricultural productivity, food insecurity remains very severe, and marketed farm output is low. Investment in infrastructure and macroeconomic reforms seems to have benefited the urban economy more than its counterparts. The growing income disparity between rural and urban areas can partly be attributed to policy dynamics and changes. The Continuous macroeconomic and legislative reforms have made it increasingly evident that the government's approach to development relies on the private sector's increasing role in supplying manufacturing, services, and infrastructure across both rural and urban settings.

However, there are very few incentives to attract private-sector investment in the nation, especially in rural areas. Most services considered essential for growth, such as transportation, electrification, and financing, remain unaffordable for most households. There are literally no local tax revenue and the central government grants are insufficient. The poor planning procedures have also made it important to prioritise the goals of donors and the national government over those of the large population.

While evidence is building up on how household well-being is affected by NFEs, little is known about the factors influencing farm households' willingness to participate in NFE activities Lanjouw and Lanjouw, (2001) Woldenhanna and Oskam, (2001), Loening et al. (2008). Most of the previous research is focused on non-farm work, highlighting it more (Babatunde & Qaim, 2009; Reardon et al., (2007), Deininger & Olinto, (2001). However, the literature demonstrates that this pattern does not hold in Sub-Saharan Africa, especially in rural areas, where the majority of households operate their own small enterprises and non-farm employment plays only a limited role in income diversification Barret (2001). Rijkers and Costa. (2012).

Furthermore, although entry barriers might affect family diversification decisions, most studies on the subject (Deininger and Olinto. (2001), Reardon et al. (2007), Babatunde and Qaim. (2009) ignore their influence on household participation in NFE activities. The entry barriers incorporate market information, formal capital, and social capital. The existing situation makes it challenging to recommend policies that support NFEs toward enhancing household welfare in both rural and urban areas of developing countries. This paper uses data from a nationwide Ugandan household survey to examine the determinants of household participation in NFE activities. According to the literature, this study defines NFEs as attributing household productive assets to all enterprises owned or operated by self-employed workers engaged in non-farm economic activity.

2. Literature review

2.1 Theoretical literature

The theoretical framework for analysing non-farm activities draws on diverse streams of literature spanning several disciplines, Ellis. (1998). Understanding the factors that explain involvement in non-farm enterprises is aided by three theoretical strands of the literature. These comprise the agricultural household models based on Singh et al. (1986), the occupational choice models (Lucas, (1978), Evans and Jovanovic, (1989); Murphy et al., (1991), Banerjee and Newman, (1993), and finally the Entrepreneurship and Institutional theory on Manser and Brown (1980) and Chiappori (1992). The specifics of these three theoretical foundations are further discussed below.

Entrepreneurship is explained in the occupational choice models by the possibility of a person venturing into a certain business. This is based on a complete list of variables, inclusive but not limited to an individual's age, experience, and entrepreneurial skill level; relative rate of returns attributed to self-employment; barriers that cover both costs, such as start-up and entry-level costs; and variables that change the opportunity costs of choosing self-employment, such as social protections and regulations. In models of vocational choice, the individual entrepreneur is of prime importance.

Following Singh et al. (1986), households in agricultural household models play the dual roles of producers and consumers, since farmers, who seek to maximise their earnings, factor those profits into their decisions about what to buy. The production decision was initially simulated independently of the consumption decision, based on the assumption of perfect markets and information Taylor and Adelman, (2003). Therefore, in a perfectly competitive market, the household maximises profit by selecting the income-generating activities that are most profitable given prices and available resources. The household then maximises utility by selecting consumption and leisure levels in response to profits. Labour involvement in nonfarm activities is influenced by incentives and restrictions, as well as by missing, incomplete, or imperfect markets Barret and Reardon. (2000) and Reardon et al. (2006). The level and fluctuation of salaries and prices in both agricultural and non-farm operations serve as incentives. Prices at the household level vary significantly due to differences in market accessibility, human resources, and asset endowments. The restrictions concern a household's ability to diversify into various non-agricultural activities, including level of education, household size, gender composition, physical assets, age of the household head, and access to credit.

Entrepreneurship and Institutional Theory are additional important theoretical frameworks. As noted, institutional theory focuses on explaining organisational communication in relation to shared, pre-existing norms, standards, and beliefs in organisations' external environments Lammers and Garcia, (2017). Several studies have established that institutions both constrain and facilitate entrepreneurs, a finding supported by Bruton & Ahlstrom (2003), Scott (2007), and Bruton et al. (2010). The institutional hypothesis posits that various institutional factors, including cultural norms and government policies that foster a favourable climate for entrepreneurship, shape entrepreneurship. According to Brunton et al. (2010), the extent of entrepreneurship that can emerge in a society is determined by the rules and policies that regulate the distribution of rewards. It would be quite possible for governments to ensure markets function well only if they eliminate the factors that cause market imperfections, prohibit market access and enforce restrictive rules.

2.2 Empirical literature

It is widely recognised that one technique employed by developing-country farm households to increase their welfare is the formation of non-farm enterprises (Ellis). (1998) Schwarz. (2005), Owusu et al. (2011). Farmers' non-farm enterprise operations increase their agricultural revenue. Furthermore, it provides liquidity, which can be used to strengthen the agricultural industry. Nonfarm income is less uncertain than farm income; thus, households engage in nonfarm entrepreneurial activity. They are also preferred for diversification through agricultural portfolio investments or labour-market participation, as they exhibit lower correlation with agricultural operations.

The literature has identified several factors that motivate households in developing nations to participate in non-farm sector activities. (Mbalule. (2019) Owusu et al. (2011), Reardon et al. (2007); Abdulai and Crolerees, (2001); De Janvry & Sadoulet. (2001), Barrett et al. (2001). Studies consistently show that household characteristics, including gender, age, gender, education level of the household head, as well as household endowments, play a critical role in shaping household participation decisions Lanjouw et al. (2001), Crolerees & Abdulai (2001), Reardon (1997). Other analyses further emphasise that diversification in non-farm enterprises is influenced by several push and pull factors, ranging from agricultural constraints and risk mitigation to opportunities arising from developed infrastructure, market access and human capital development. Numerous potential factors that may have encouraged farm households in developing nations to participate in non-farm sector activities have been identified in the existing literature. Owusu, et al., (2011), Barrett et al., (2001), Reardon et al., (2007), Abdulai and Crolerees, (2001), Barrett et al. (2001) Woldenhanna and Oskam, (2001), Ellis. (2000) Household characteristics such as age, gender, the education level of the household head, and household endowments influence the non-farm diversification behaviour of households, Reardon. (1997), Lanjouw et al. (2001); Abdulai and Crolerees. (2001), Escobal (2001), Loening et al. (2010), Owusu et al. (2011) Ali & Peerling, (2012).

According to Reardon et al. (2006), home competence and the institutional environment have an important influence on push and pull factors that determine rural household participation. Some of these pull factors include the low risk of the activity compared to farming, the quick cash required for transactions, better labour and investment yields, the desire for a better life among the young, and the availability of economic opportunities. On the contrary, push factors include an increasing population, a lack of farmland and reduced access to it, low farm productivity, reduced profit

accrual from farming, exogenous shocks, limited rural financial markets, restricted access to markets for farm inputs, and a depleted base of natural resources.

Research has also shown that access to roads, electricity, and communication facilities was an influencing factor in farm households' decisions to engage in NFE, Lanjouw et al. (2001); De Janvry and Sadoulet. (2001); Escobal. (2001); Joshi et al. (2002); Pham et al. (2010). The reviewed literature indicates that farm households sometimes face obstacles to diversifying into non-farm enterprise activities.

Some of the constraints include limited social capital, inadequate access to formal finance, and insufficient market knowledge. Empirical evidence further shows that households without access to formal credit are less likely to participate in non-farm enterprises, further underscoring the importance of financial inclusion in household non-farm enterprise diversification decisions (Woldenhanna & Oskam (2001); Schwarz & Zeller. (2005). Similarly, Schwarz and Zeller (2005) found that families' non-farm diversification behaviour is significantly influenced by the lack of proximity to market information on non-farm activities or prices of non-farm products.

Osondu et al. (2014) employed probit estimation to investigate the factors influencing women in Abia State, Nigeria, to engage in non-farm entrepreneurship. Increasing women's access to markets and decision-making is seen as reducing poverty and increasing household and individual productivity Morrison et al., (2007). The results revealed significant positive effects of farm revenue and cooperative membership, alongside significant adverse effects of age, household size, farming experience and credit access. Subsequently, young women with smaller households, limited farming experience, limited access to credit, higher farm incomes, and members of cooperatives were more likely to engage in non-farm activities. However, the negative relationship between age and credit availability diverged from the researcher's initial expectations and hypotheses.

Shehu and Abubakar (2015) utilise a nationally representative sample of 3,257 households derived from Nigeria's General Household Panel Survey, encompassing a wider array of variables. In this study, they model farm households' decisions to engage in non-farm businesses. Indeed, they have increased entry barriers, such as market proximity, and added community features, including transportation. They estimate a probit regression and find positive coefficients for social capital, formal credit, age, education, household size, mobile phone, electricity, and the locational factor. Their results for variables of credit availability, household size, and age differ from those of a previous study by Osondu et al. (2014), which focused on a sample of women only.

Sanusi et al. (2016) add wealth-related factors, including land ownership, farm size, and assets, to the analysis conducted by Shehu and Abubakar (2015). They, however, limited the sample to 354 rural homes. Their study employs a multinomial logit model and finds a significant negative relationship between gender, land ownership, and distance to the nearest market, whereas age, its square, asset, association membership, and a communication facility index are positively related. This means that women-headed households proximal to the market have no land and a high probability of entrepreneurship.

Alemu and Adesina (2017) follow up on the binary dependent variables in their study in Ethiopia, building on the work of Sanusi et al. (2016) and Shehu & Abubakar (2015). The logit regression run on non-farm enterprises revealed that the land size, distance to a farmer's training centre, market, and town were negatively correlated with farming experience, active female membership, tropical livestock, credit availability, telephone availability, and cooperative membership. The results essentially replicate those of previous studies conducted in Nigeria. The probability of rural households participating in the non-farm industry in Ethiopia is higher when experience is high, females are highly involved, access to finance is available, and land is scarce and located closer to centres. However, the study considered only households that had received government-issued tropical livestock.

Freese (2010) examines the determinants of rural household participation in and performance in non-farm activities in Burkina Faso. He measured performance using the log of per-capita non-farm income. In this approach, he corrects for selection biases, since not all households generate off-farm income, by estimating a two-step Heckman model. He uses pooled data from the years 1994, 1998, and 2003. At the first step, the probit estimator indicates that the average last class of other working-age members, household size, having working-age women, the last class of the household head, availability of electricity, and availability of piped water all enter positively into the participation equation for non-farm activities. There is a negative relationship among land ownership, proximity to the market, the secondary school, and the health centre. The results support the findings of Osondu et al. (2014), Sanusi et al. (2016), and Shehu & Abubakar (2015).

One of the cultural variables considered by Dary and Kuunibe, (2012) is religion. They investigate whether religion significantly influences rural non-farm economic activity in Ghana. Across agriculture, wealth, women, commerce, and family, religions hold varying perspectives. Logit estimation identifies the most important individual-level variables, including sex, age, marital status, education, vocational training, group membership, and location. This variable, therefore, belongingness to a group, is similar to the variable of cooperative membership studied by Alemu and Adesina (2017), hence it is sociological in nature.

Nagler and Naude (2017) conducted a more comprehensive study across six countries: Ethiopia, Malawi, Niger, Nigeria, Tanzania, and Uganda. They use an integrated survey in the agricultural dataset from the Living Standards

Measurement Survey. In addition to examining the trends, drivers, and extent of NFEP, they also assess its performance with respect to production, survival, and exit. Using probit estimation, they estimated country by country the variables that determine the probability of participating in non-farm enterprises. Age, marital status, ability to read and write, number of persons, income, lack of food, and number of rooms are significant variables in at least half of the countries. The only variables whose coefficient signs are consistent are age, level of education, and proportion of adults.

According to the literature reviewed, some of the variables used by various studies in explaining the determinants of non-farm participation include age, gender, educational attainment, location, and credit availability, Nagler & Naude., (2017; Shehu and Abubakar (2015); Reardon, (1997); Lanjouw et al., (2001); Abdulai and Crolerees, (2001); Escobal, (2001); Loening et al., (2010); Owusu et al., (2011), Ali and Peerling, (2012). However, the results for the variables are conflicting due to regional differences, varying data across studies, and different methods. For example, Sanusi et al. (2016) employed multinomial logit regression, whereas Nagler & Naude (2017), Freese (2010), Tafesse et al. (2015), and Shehu and Abubakar (2015) applied probit estimation.

Furthermore, each country has various attributes that influence participation in non-farm businesses. Age, sex, marital status, education, access to finance, utilities and communication, proximity to economic areas, and affluence, as indicated by land ownership and size, are the observed, recurrent, and significant variables, albeit with differing indications. The emphasis on rural non-farm home businesses is the main weakness in the research on Sub-Saharan Africa by Ayambila (2017), Abdulai and Delgado (1999), Abdulai and CroleRees (2001), and Barrett et al. (2001). Since the urban population increased from less than one million in 1980 to about three million in 2002—a nearly threefold increase—and further continued to increase, standing at 7.4 million in 2014 and 10.6 million in 2020, the drivers for participation/employment of households in non-farm household enterprises in both rural and urban areas need further exploration, UBOS, (2021).

According to the literature, comparable elements have been employed, albeit with varying approaches and in different years and countries, including Ethiopia, Malawi, Niger, Nigeria, Tanzania, and Uganda. Regarding the factors of nonfarm engagement, Nagler and Naude (2017) conduct a panel analysis of the Ugandan case. They utilise an integrated survey in the agricultural data set from the Living Standard Measurement Survey. This opens the potential for additional research on the factors of non-farm involvement in Uganda, focusing on a single country and using the most recent UNHS 2019/2020 dataset.

3. Methodology

3.1 Empirical model specification

In this study, the dependent variable, which indicates ownership of a non-agricultural enterprise (Yes = 1, 0 otherwise), is binary rather than continuous. Linear estimation techniques (Ordinary Least Squares or Linear Probability Model) yield biased results. Linear estimation techniques may yield a negative variance for the error term, and the probabilities may fall outside the reasonable range of 0 to 1. Therefore, the Maximum Likelihood Estimation (MLE) technique for the Logit model is more appropriate for quantifying the determinants of non-farm participation in Uganda. This study, therefore, employs the logit model to answer the first research question: to determine the factors influencing an individual's decision to participate in non-farm household enterprises in Uganda.

Using the conceptual framework, we can model households' decisions to engage in non-farm activities using index functions and the logit model. Whether the person works in the non-farm sector can be observed. The model in the equation gives the index function:

$$L_i^* = \beta^1 Z_i + \varepsilon_i \quad \text{.....3.2.1}$$

$$L_i = 1 \; if \; L_i^* > 0$$
$$L_i = 0 \; if \; L_i^* \leq 0$$

Where L_i^* is the latent (unobservable) variable, which is the wage differential between the farm and the non-farm sector, and ε_i is the random disturbance term.

The variable Z_i is a vector of explanatory variables. The variables in Z_i have been informed by the literature. The Z_i The vector contains demographic characteristics, including age, gender, residence, household status, marital status, and education level. It also contains the community characteristics (region and access to finance).
The variable β^1 is a vector of the coefficients of demographic, community and farm-level characteristic variables.

From equation (3.2.1), the household to participate (L_i= 1) in non-farm activities only if the wage differential is positive (L_i^*> 0) that is, if the market wage rate is greater than the reservation wage, otherwise the household does not participate (L_i= 0).

Cameron and Trivedi (2009), the households' participation decision is modelled as follows:

$$Prob\left(L_i = \frac{1}{Z_t}\right) = Prob\left(L_i^* > \frac{0}{Z_i}\right) \ldots\ldots\ldots\ldots\ldots\ldots\ldots\ldots\ldots\ldots\ldots\ldots\ldots\ldots\ldots\ldots\ldots\ldots\ldots\ldots\ldots\ldots..3.2.2$$

$$= Prob\left(\beta^1 Z_i + \varepsilon_i > \frac{0}{Z_i}\right)$$

$$= Prob\left(\varepsilon_i > 0 - \frac{\beta^1 Z_i}{Z_i}\right) \ldots\ldots\ldots\ldots\ldots\ldots\ldots\ldots\ldots\ldots\ldots\ldots\ldots\ldots\ldots\ldots\ldots\ldots\ldots\ldots\ldots\ldots\ldots...3.2.3$$

with $\varepsilon_i \sim f(0,1)$, which is a symmetric probability density function (pdf). This, therefore, implies that:

$$Prob\left(L_i = \frac{1}{Z_i}\right) = Prob(\varepsilon_i < \beta^1 Z_i) \ldots\ldots\ldots\ldots\ldots\ldots\ldots\ldots\ldots\ldots\ldots\ldots\ldots\ldots\ldots\ldots\ldots\ldots\ldots\ldots\ldots..3.2.4$$

$$= F(\beta^1 Z_i) \ldots\ldots\ldots\ldots\ldots\ldots\ldots\ldots\ldots\ldots\ldots\ldots\ldots\ldots\ldots\ldots\ldots\ldots\ldots\ldots\ldots\ldots\ldots\ldots\ldots..3.2.5$$

The equation (3.2.5) is the cumulative density function (cdf), which is the probability of success (having a non-farm enterprise, in this case). Since this study is using the logistic model to model the decision to have a non-farm enterprise, F is the logistic distribution function, which is usually denoted by a Greek letter Λ so that a cumulative density function (cdf) is:

$$Prob\left(L_i = \frac{1}{Z_i}\right) = \Lambda(X) = \frac{e^x}{1+e^x} \ldots\ldots\ldots\ldots\ldots\ldots\ldots\ldots\ldots\ldots\ldots\ldots\ldots\ldots\ldots\ldots\ldots\ldots\ldots\ldots..3.2.6$$

where: $X = \beta^1 Z_i$, and the probability density function (pdf) given by:

$$\lambda(X) = \frac{\partial\Lambda(Z)}{\partial Z} \ldots\ldots\ldots\ldots\ldots\ldots\ldots\ldots\ldots\ldots\ldots\ldots\ldots\ldots\ldots\ldots\ldots\ldots\ldots\ldots\ldots\ldots\ldots\ldots\ldots\ldots\ldots\ldots\ldots\ldots..3.2.7$$

In binary-dependent-variable models, interpreting the coefficients overestimates the impact. Hence, we interpret the marginal effects. To differentiate the estimated logistic model w.r.t Z_i we get the slope given by:

$$\frac{\partial E(\frac{L_i}{Z})}{\partial Z_i} = \lambda(\beta^1 Z_i)\beta_i \ldots\ldots\ldots\ldots\ldots\ldots\ldots\ldots\ldots\ldots\ldots\ldots\ldots\ldots\ldots\ldots\ldots\ldots\ldots\ldots\ldots\ldots\ldots\ldots\ldots\ldots..3.2.8$$

To calculate the marginal effects, we will use Average Marginal Effects (AME), which averages all individual slopes. The AME is calculated as presented in equation (3.2.9):

$$AME = \frac{1}{n}\sum_{i=1}^{n} \frac{\partial E(\frac{L_i}{Z})}{\partial Z_i} = \frac{1}{n}\sum_{i=1}^{n}[\lambda(\beta^1 Z_i)\beta_i] \ldots\ldots\ldots\ldots\ldots\ldots\ldots\ldots\ldots\ldots\ldots\ldots\ldots\ldots..3.2.9$$

where n is the number of households.

This logit model operationalises the theoretical framework, providing a means to empirically test the proposed relationships. The dependent variable, $\Pr(NFE_i = 1)$, represents the probability that a household participates in non-farm enterprises, with the logistic function ensuring that this probability lies between 0 and 1

$$\Pr(NFE_i = 1) = \Lambda(\beta_i + \beta_i Z_i + \epsilon_i \ldots\ldots\ldots\ldots\ldots\ldots\ldots\ldots\ldots\ldots\ldots\ldots..3.2.10$$

Each coefficient β_i In the model, a key variable from the theoretical framework—such as age, gender, and education—quantifies its impact on the likelihood of NFE participation. The signs and significance of these coefficients will reveal how strongly each factor influences the decision to engage in non-farm enterprises, as hypothesised in the theoretical section. Z_i is a vector of explanatory variables for a household's decision to participate in a non-farm enterprise.

Odds ratio:

The odds ratio represents the constant effect of a predictor x, on the likelihood that one outcome will occur. The odds ratio is given by;

$\frac{p(y=1)}{p(y=0)} = e^{\beta^1 X_i}$, the odds ratio gives the household is likely to participate in the non-farm enterprise compared to non-participation.

3.2 Definition of variables and data sources

The study used secondary data from the Uganda National Household Survey (UNHS) 2019/20 covering all 129 districts in Uganda. The field data collection spanned 12 months to account for seasonality and ensure comparability with previous surveys. The survey data were sampled from Enumeration Areas (EAs) distributed evenly across the country for each quarter of the year. The survey interviewed 10 households per EA, implying a total sample of 16,510 households. The data were used because they were easily accessible and the most recent household survey.

3.2.1 Dependent variable

The dependent variable, which measures household participation in non-farm enterprises, is dichotomous based on the UNHS dataset. In the questionnaire, households were asked whether they were engaged in non-farm enterprises, with responses of 'yes' or 'no'. This variable is coded as 1 if the household has a non-crop farm enterprise, otherwise 0 for no. This is the share of household members who engage in self-employment in the non-farm sector of the economy.

3.2.2 Independent variables

Table 3.1: Definition of independent variables

Variable	Measurement
Household characteristics	
Age	The years of the household member
Age2	The square of the years of the household member
Gender	The dummy variable takes a value 1 for males and 0 for females.
Residence	The dummy variable takes a value 1 for urban and 0 for rural.
Wealth quintile	The variable takes Quintile 1, Quintile 2, Quintile 3, Quintile 4, and Quintile 5.
Marital status	The dummy variable takes a value 1 for married, 2. Divorced/Separated, 3. Widow/Widower, and 4. Never married
Education	The dummy variable takes a value 1 for No education, 2. Primary, 3. Secondary, 4. Post-secondary plus
Welfare	Welfare is a continuous variable
Community characteristics	
Region	The dummy variable takes a value 1 for Central, 2. Eastern,3. Northern and 4. Western
Access to finance	The proportion of household members that have access to formal credit. The dummy variable takes a value 1 for access to credit and 0 for No access

4. Analysis and discussion of results

This section presents descriptive statistics, diagnostic tests, and checks, such as variance inflation factors (VIF) and a pairwise correlation matrix, to determine the extent to which two variables are linearly related. Then, the estimated results and their interpretation using UNHS 2019/20 data.

4.1.1 Descriptive statistics

The descriptive analysis describes the household and community determinants of non-farm participation in Uganda.

4.1.2 Univariate analysis

Table 4.1 indicates that the survey encompassed 14,177 household members, of whom 33.6 per cent were engaged in non-agricultural enterprises, reflecting a workforce characterised by significant agricultural independence. The sample has a higher proportion of females (mean = 0.675), with a mean age of 44.85 years and a standard deviation of 16.08, indicating a diverse age distribution. The household size variable has a mean of 1.302 and a standard deviation of 0.784, reflecting variations in the number of economically active members across households.

Welfare shows a severe income disparity, with a mean of $101,788 and a significant standard deviation of $177,232, indicating enormous wealth disparities among respondents. The data suggest that 26.2% of respondents live in cities. Marital status has a mean of 1.519, indicating that most respondents are in the lower marital status groups. The average educational attainment among respondents is 2.212, indicating moderate levels of education. Finally, finances, with a mean of 0.306, indicate that approximately 30.6% of respondents have access to financial services, while the region variable shows a diverse geographical spread across four regions.

Table 4.1: Univariate descriptive statistics

variable	mean	sd	min	Max	N
nonagric	0.336	0.472	0	1	14177
age	44.85	16.08	15	108	14177
agesq2	22.70	16.46	2.250	116.6	14177
Household size	1.302	0.784	0	2	14177
Quintiles: Quintile 1: (ref)	3.081	1.430	1	5	14177
Welfare	101788	177232	156.2	1.150e+07	14177
Gender: Female (ref)	0.675	0.469	0	1	14177
Residence: Rural(ref)	0.262	0.440	0	1	14177
Marital status: Married: (ref)	1.519	0.888	1	4	14177
Education: No formal education: (ref)	2.212	0.843	1	4	14091
Finances: No access to credit: (ref)	0.306	0.461	0	1	8853
Region: Central: (ref)	2.494	1.064	1	4	14177

4.1.3 Bivariate analysis

The bivariate analysis was performed to ascertain the relationship between participation in nonagricultural enterprises and household and community characteristics as indicated in table 4.2. Household size shows a clear positive relationship with enterprise ownership. Among households with small sizes (1-2 members), 25.5% have an enterprise, whereas in larger households (5+ members), 37.5% do. This indicates that larger households may have more labour resources or financial capacity to engage in entrepreneurial activities. The trend suggests that as the number of household members increases, the likelihood of starting and maintaining a business also rises.

There is a clear pattern across income quintiles: enterprise ownership increases as households become wealthier. In the lowest income quintile (Quintile 1), only 26.3% of households own an enterprise, while in the highest quintile (Quintile 5), this figure rises to 42.2%. Higher-income households are likely better equipped to invest in businesses due to greater access to financial resources, better networks, and a higher tolerance for financial risk, making them more likely to establish and sustain enterprises.

The relationship between the sex of the household head and enterprise ownership shows minimal difference. Female-headed households have an enterprise ownership rate of 33.3%, while male-headed households have a slightly higher rate at 33.8%. This suggests that gender does not play a significant role in determining whether a household is likely to have an enterprise, indicating relative gender parity in entrepreneurship within this dataset.

Enterprise ownership is significantly more common in urban areas (40%) than in rural areas (31.3%). This discrepancy may reflect the greater availability of business opportunities, infrastructure, and market access in urban settings, as well as better access to capital and networks needed to start and run enterprises. Urban households may also benefit from a higher concentration of consumers and service providers, further enhancing entrepreneurial prospects.

Marital status appears to influence enterprise ownership, with married household heads being the most likely to own an enterprise (36.5%). In contrast, widowed heads are the least likely to have an enterprise, with only 22% reporting ownership. Divorced or separated heads (30.8%) and those who have never married (29.4%) fall in between these extremes. Married households may benefit from dual incomes or more stable household structures, which could support enterprise development.

Education is positively associated with enterprise ownership. Households with a head who has a secondary education have the highest likelihood of owning an enterprise (38.4%), followed by households with a head who has post-secondary education (36.8%). In contrast, those with no formal education are least likely to have an enterprise (27.5%). This suggests that higher education levels may equip individuals with the skills, knowledge, and networks needed to start and grow a business, as well as to improve access to capital and markets.

Access to financing is a critical factor in firm ownership. Households that have access to financing are substantially more likely to own a business (44.1%) than those without (31.8%). This research emphasises the importance of financial inclusion in promoting entrepreneurship, as access to credit provides the cash needed to start and expand firms, helping households overcome financial hurdles.

There are notable regional differences in enterprise ownership. Households in the Northern (41.1%) and Central (39.2%) regions have higher rates of enterprise ownership than those in the Western region, where only 23.3% of households report owning an enterprise. These regional disparities could reflect differences in economic opportunities, infrastructure, market access, and government policies, making some regions more conducive to entrepreneurial activity than others.

The average age of household heads with enterprises is younger (41.9 years) compared to those without enterprises (46.3 years). This suggests that younger household heads may be more likely to engage in entrepreneurial

ventures, potentially because they are more willing to take risks or have a greater need for income diversification in earlier life stages. It may also reflect the dynamic nature of younger individuals in seeking out business opportunities. Enterprise ownership is associated with higher levels of welfare. Households with enterprises report an average welfare of 111,189.3, which is higher than the welfare of households without enterprises (97,030.0). This suggests that owning an enterprise contributes to improved living standards, likely through higher income and better economic security, providing a clear link between entrepreneurship and enhanced household welfare.

Table 4.2: Bivariate descriptive analysis

Variables	Don't have enterprise	Have enterprise
household size		
Small (1-2)	74.5	25.5
Medium (3-4)	67.4	32.6
Large (5+)	62.5	37.5
Quintiles		
Quintile 1	73.7	26.3
Quintile 2	72.0	28.0
Quintile 3	67.9	32.1
Quintile 4	62.3	37.7
Quintile 5	57.8	42.2
Sex of household		
Female	66.7	33.3
Male	66.2	33.8
Residence		
Rural	68.7	31.3
Urban	60.0	40.0
Total	66.4	33.6
Marital status of the head		
Married	63.5	36.5
Divorced/Separated	69.2	30.8
Widow/ Widower	78.0	22.0
Never married	70.6	29.4
Highest level of education of the head		
No formal education	72.5	27.5
Primary	66.8	33.2
Secondary	61.6	38.4
Post-secondary plus	63.2	36.8
Access to credit		
No	68.2	31.8
Yes	55.9	44.1
Region		
Central	60.8	39.2
Eastern	68.6	31.4
Northern	58.9	41.1
Western	76.7	23.3
Overall	66.4	33.6

(mean) Hh Head Age In Completed Years	46.3	41.9
(mean) Welfare Based On Usual Members Present	97,030.0	111,189.3

4.1.4 Diagnostic tests

The diagnostic tests were conducted to build confidence in the estimates and to check for any abnormalities in the data, the model, or the variables used in this study. High multicollinearity tends to make the t-statistics too small and to produce wide confidence intervals for the coefficients. Variables were dropped to address multicollinearity. Following that, the variance inflation factor (VIF) and the pairwise correlation matrix were used to identify multicollinearity, as described in Appendices C and D as well as normality test in Appendix E.

All pairwise coefficients were below 80%, indicating no perfect multicollinearity among the explanatory variables (Gujarati, 2003). All variables passed the test except for Age and Age squared, whose VIFs exceeded the threshold of 10. However, this is expected, since Age squared is included in the model to investigate the possibility of a quadratic relationship between Age and non-farm participation, rather than simply assuming a linear one. The average VIF for the overall model is 4.743. The diagnostic tests proved non-problematic; therefore, the various logit regressions were performed to generate coefficients, marginal effects, and odds ratios for interpretation and discussion.

4.1.5 Post Estimation tests

4.1.5.1 Percentage of correct prediction

The percentage of correct predictions can be used to assess model quality or as a goodness-of-fit metric. A prediction is classified as positive if $nonagric_i \geq c$ and otherwise is classified as negative. The classification is correct if it is positive and $nonagric_i = 1$ or if it is negative and $nonagric_i = 0$. Sensitivity is the fraction $nonagric_i = 1$ observation that is correctly classified, whereas specificity is the percentage of $nonagric_i = 1$ Observations that are correctly classified (STATA, 2014). The overall classification was estimated at 47.17 percent as indicated in Table 4.3.

Table 4.3: Goodness of fit test results

Sensitivity		Pr(+ D)	94.67%
Specificity		Pr(-~D)	20.89%
Positive predictive value		Pr(D +)	39.83%
Negative predictive value		Pr(~D -)	87.64%
False + rate for true ~D		Pr(+~D)	79.11%
False - rate for true D		Pr(- D)	5.33%
False + rate for classified	+	Pr(~D +)	60.17%
False - rate for classified	-	Pr(D -)	12.36%
Correctly classified			47.17%

4.1.6 Estimation results

4.1.6.1 Marginal effects for determinants of non-farm participation in Uganda

Table 4.4: Logit estimates (dy/dx) of determinants of non-farm participation in Uganda

Variables	(1) Nonagric
Age	0.0327***
	(0.00948)
agesq2	-0.0501***
	(0.00965)
Household size: small (Ref 1-2)	
Medium (3-4)	0.355***
	(0.0799)
Large (5+)	0.637***
	(0.0811)
Quintile 1: (ref)	
Quintile 2	0.199**

	(0.0820)
Quintile 3	0.487***
	(0.0818)
Quintile 4	0.881***
	(0.0828)
Quintile 5	1.129***
	(0.0923)
Welfare	7.14e-08
	(1.40e-07)
Gender: Female (ref)	
Male	-0.272***
	(0.0647)
Residence: Rural(ref)	
Urban	0.250***
	(0.0583)
Married: (ref)	
Divorced/separated	-0.357***
	(0.0894)
Widow/Widower	-0.544***
	(0.0992)
Never married	-0.357***
	(0.134)
No formal education: (ref)	
Primary	-0.101
	(0.0709)
Secondary	-0.117
	(0.0836)
Post-secondary plus	-0.488***
	(0.110)
No access to credit: (ref)	
Have access to credit	0.396***
	(0.0511)
Central: (ref)	
Eastern	-0.235***
	(0.0684)
Northern	0.293***
	(0.0734)
Western	-0.673***
	(0.0757)
Constant	-1.605***
	(0.243)
Observations	8,802

Standard errors in parentheses, *** p<0.01, ** p<0.05, * p<0.1
***, **, * indicate significance levels at 1%, 5% and 10% respectively.
Source: Author

Marital status of the individual (Mstatus)

Marital status significantly influences household non-farm participation. From Table 4.4, individuals who are divorced/separated, widowed, and never married are 35.7, 54.4, and 35.7 percentage points, respectively, less likely to participate in non-farm enterprises than married individuals. This suggests that being married provides a stable environment that may facilitate participation in non-farm enterprises, possibly due to shared economic responsibilities or the need for diversified household income. In contrast, however, those without a partner may face greater financial or social constraints, limiting their participation in non-agricultural employment. The results align with those of Nagler and

Naude (2017), who reported that married individuals are more likely to participate in non-farm enterprises. Married couples are more likely to mobilise resources together and may choose to engage in non-farm industries. Marriage is viewed as social capital, which may increase an individual's ability to engage in nonfarm activities.

Gender

Gender has a significant adverse effect on male non-agricultural employment. Males are 27.2 percentage points less likely than females to work outside of agriculture. This shows that women may be more active in non-agricultural sectors, such as small businesses, retail, or other activities more common outside agriculture. It could also imply that men are more inclined to engage in agricultural activities than women.

This result aligns with findings from studies such as those by Ellis (2000) and Dolan (2002), which show that women in rural areas often turn to non-farm employment to diversify their incomes, particularly in trade, handicrafts, and informal services. Conversely, men tend to dominate in agricultural labour, particularly in subsistence farming. This pattern is also observed in research by Deininger and Olinto (2001), who found that women's participation in non-agricultural sectors is higher in contexts with limited agricultural opportunities, leading them to seek alternatives in non-farm sectors. The significant gender difference may reflect structural barriers or preferences that drive men and women into different types of employment.

Income quintiles

Income levels significantly affect the probability of household participation in non-agricultural enterprises. Compared to the lowest income group (Quintile 1), households in higher income quintiles have a progressively higher likelihood of being employed in non-agricultural sectors. The probability increases by 19.9 percentage points for Quintile 2, 48.7 percentage points for Quintile 3, 88.1 percentage points for Quintile 4, and 112.9 percentage points for Quintile 5. This substantial positive association suggests that wealthier households are more likely to work in non-agricultural fields, possibly due to greater access to opportunities, knowledge, and resources that support such work.

These findings are consistent with those of Lanjouw and Lanjouw (2001), who found that wealthier households are more likely to diversify into non-farm industries due to greater financial and social capital, which enables them to participate in non-agricultural activities. Similarly, Reardon et al. (2000) observed that higher-income households tend to dominate non-farm sectors, especially in rural areas, where they can leverage their resources to establish and grow small enterprises. Wealthier households also have better access to credit and markets, which promotes non-agricultural employment and supports the substantial positive relationship between income and engagement in non-farm activities shown in the study.

Education level of the individual

The study results indicate that individuals with specialised training or higher education are significantly less likely to engage in non-farm enterprises than those with no formal education. Specifically, post-secondary graduates are 48.8 percentage points less likely to participate in non-farm enterprises compared to individuals without formal education. These results suggest that education in Uganda tends to channel individuals towards formal wage employment or professional careers rather than into the informal non-farm sector. In Uganda, most non-farm enterprises are informal and owned by uneducated individuals. The educated prefer seeking jobs rather than starting off-farm enterprises. The findings, therefore, are contrary to those of Dary and Kuunibe (2012), who found a positive relationship between education, training, and participation in non-farm enterprises.

Age and squared age (agesq2)

As people get older, they are more likely to work in non-agricultural industries. The positive and substantial marginal effect of age (0.0327) suggests that older people are more likely to work in non-agricultural settings. However, the negative, significant coefficient for the squared age variable (-0.0501) indicates that the relationship is not linear. As individuals age, the probability of participating in non-agricultural enterprises decreases after a certain point. This reflects an inverted U-shaped relationship, in which the probability of non-agricultural employment peaks in middle age and then declines among older individuals.

These findings align with studies such as Davis et al. (2007), who found that middle-aged individuals are more likely to diversify into non-farm businesses due to their acquired experience, capital, and social networks. Similarly, Barrett et al. (2001) found a decline in non-agricultural activity among older adults, attributing it to declining physical capacity and a trend toward retirement. The inverted U-shaped relationship is consistent with the notion that younger individuals may lack the resources or networks to participate. In comparison, older individuals may prefer less demanding or local agricultural activities.

Access to finance (Finances)

Access to credit is a substantial predictor of non-agricultural enterprise participation, with credit-exposed households 39.6 percentage points more likely to engage in non-agricultural operations. This highlights the critical role that financial resources play in facilitating such employment. Access to credit can help individuals and households invest in non-agricultural ventures, such as small businesses or trade, thereby diversifying their income and reducing their dependence on agriculture. Access to credit is expected to increase the individual's participation in non-farm business because of the availability of capital; therefore, many individuals are constrained with capital to start-up businesses without credit. The findings agree with Woldenhanna and Oskam (2001), Schwarz and Zeller (2005), and Osondu et al. (2014), who found that access to finance affects non-farm participation.

Household size

Household size has a substantial impact on non-farm participation. Medium-sized households (3-4 persons) are 35.5 percentage points more likely to work in non-agricultural jobs than small households (1-2 members). The chance is even higher for large households (5 or more individuals), with a 63.7 percentage point rise. These findings imply that larger households may have more resources — such as labour or capital — to participate in non-agricultural activities, or that there is a greater need to diversify income sources beyond agriculture due to the larger household burden. This finding aligns with research in other developing countries, including studies by Ayalew et al. (2017) and Ghosh et al. (2021), which show that larger households often have greater resources and support networks, enabling them to engage in non-farm activities. Larger households may benefit from economies of scale and shared resources, enabling them to participate in a broader range of industries.

Residence

Living in urban areas increases the likelihood of working in the non-agricultural sector by 25 percentage points relative to living in rural areas. This strong positive effect is consistent with the findings of Reardon et al. (2001), who discovered that households closer to urban areas are more likely to engage in non-farm enterprises due to improved access to infrastructure, markets, and financial services. Similarly, Bezu and Barrett (2012) found that urban households are more likely to engage in non-agricultural enterprises because these areas have better access to transportation and markets, thereby promoting the establishment of small businesses.

In contrast, the results differ partially from those of Lanjouw and Lanjouw (2001), who noted that while non-farm activities are important in urban settings, they also play a critical role in rural areas. Their study emphasised that even in rural regions, non-farm income contributes to poverty alleviation, although urban areas remain more favourable for non-agricultural employment. This study, however, suggests a more substantial disparity in participation between rural and urban areas in non-agricultural sectors, highlighting the concentration of such opportunities in urban regions.

Region of the individual (Region)

Non-agricultural employment differs significantly by region. Individuals in the Eastern region are 23.5 percentage points less likely to engage in non-agricultural employment than those in the Central region, whilst those in the Northern region are 29.3 percentage points more likely. In the Western region, individuals are 67.3 percentage points less likely to be employed in non-agricultural sectors. These significant effects point to regional disparities in economic structure and opportunities, with the Central and Northern regions likely offering more non-agricultural employment options, while the Western and Eastern regions may be more agriculture dependent. Different regions have different resources and capacities that encourage or discourage their participation in non-farm enterprises. Therefore, this is also emphasised by the findings of Awudu and Crolees (2001); Pham et al. (2010); Ali and Peerling (2012).

The corresponding odds ratios, which quantify the relative likelihood of household participation in non-farm enterprises for each unit change in the determinants, are presented in Appendix A. These odds ratios provide insights into the direction and magnitude of the effects of various household characteristics and socioeconomic factors on the probability of engaging in non-farm activities. Furthermore, an examination of these ratios can help one better understand how specific determinants increase or decrease the odds of participation, thereby offering a clearer perspective on the influences shaping household economic decisions.

4.1.6.2 Rural-urban interaction on the determinants of household participation in non-farm participation in Uganda

Table 4.5: Marginal effects for the rural-urban interaction estimates(dydx) of determinants of non-farm participation in Uganda

Variables	(1) Rural	(2) Urban
Age	0.00604***	0.0140***
	(0.00233)	(0.00485)
agesq2	-0.0101***	-0.0165***
	(0.00237)	(0.00494)
Household size: small (ref 1-2)		
Medium (3-4)	0.0726***	0.0850**
	(0.0210)	(0.0346)
Large (5+)	0.128***	0.172***
Quintile 1: ref		
Quintile 2	0.0361*	0.108**
	(0.0192)	(0.0529)
Quintile 3	0.0983***	0.184***
	(0.0195)	(0.0501)
Quintile 4	0.181***	0.288***
	(0.0199)	(0.0496)
Quintile 5	0.252***	0.306***
	(0.0232)	(0.0502)
Gender: Female (ref)		
Male	-0.0795***	0.00581
	(0.0163)	(0.0312)
Central: (ref)		
Eastern	-0.0214	-0.106***
	(0.0184)	(0.0297)
Northern	0.0983***	-0.0372
	(0.0191)	(0.0350)
Western	-0.121***	-0.204***
	(0.0196)	(0.0365)
Married: (Ref)		
Divorced/separated	-0.129***	0.0489
	(0.0238)	(0.0394)
Widow/Widower	-0.144***	-0.0309
	(0.0248)	(0.0485)
Never married	-0.0664*	-0.0498
	(0.0384)	(0.0508)
No formal education: (ref)		
Primary	-0.0243	0.00991
	(0.0171)	(0.0404)
Secondary	-0.0196	-0.0199
	(0.0208)	(0.0434)
Post-secondary plus	-0.0999***	-0.109**
	(0.0306)	(0.0488)
No access to credit: (ref)		
Have access to credit	0.0805***	0.112***
	(0.0126)	(0.0261)
Observations	6,772	2,030

Standard errors in parentheses
*** p<0.01, ** p<0.05, * p<0.1
Source: Author

Age of household head

The age of the household head is positively associated with nonfarm enterprise participation, with the effect larger in metropolitan regions. Specifically, for every additional year, the likelihood of owning a non-farm enterprise rises by 1.4% in cities and 0.6% in rural areas (See Table 4.5). This distinction might be due to the diverse opportunities and demands present in various environments. In metropolitan settings, elder household heads may have more expertise, savings, and social networks, which can help with business investment. In contrast, in rural areas, elder heads may continue to work in agriculture as their principal source of income, limiting their ability to transition to non-farm firms. This finding is consistent with Bezu and Barrett's (2012) observation that older Ethiopians engage in more non-farm occupations as they amass capital and experience. Similarly, Reardon et al. (2006) found a positive association between age and non-farm firm ownership, suggesting that older leaders seek to diversify to reduce risk. Davis et al. (2010) discovered that younger people, due to their risk-taking mentality, are more entrepreneurial, which could be an alternate explanation in rapidly changing metropolitan environments.

Household size

Household size is strongly positively associated with the ownership of a nonagricultural enterprise. The higher the household size, the lower the likelihood of a household owning a non-agricultural enterprise, both in rural and urban areas. Specifically, households with larger sizes (5+ persons) increase the likelihood of non-farm enterprise ownership by 17.2% in urban regions and 12.8% in rural regions. This phenomenon could be explained by resource competition: larger households would likely prioritise allocating household resources to meet basic needs rather than starting a business.

This tendency is consistent with Ellis (2000), who proposed that larger households diversify into non-farm industries to better utilise their labour. de Janvry and Sadoulet (2001) agree that family labour availability is a significant driver of nonfarm involvement. However, Winters et al. (2009) expressed concern that large rural households may prioritise subsistence needs over launching a business due to limited financial resources, which may explain the lesser impact in rural settings.

Wealth quintiles

The household's wealth status is also positively associated with the presence of a nonagricultural enterprise. Households in higher-income brackets are more likely to have a nonagricultural enterprise than those in lower-income brackets. For instance, rural households in the fifth quintile have a 25.2% chance of having a non-agricultural enterprise, whereas urban households have a 30.6% chance. The wealth enterprise relationship can be explained by wealthy households' ability to access capital to start businesses, whereas poor households face a lack of startup capital.

This finding is corroborated by Barrett et al. (2001), who discovered that wealthier households are more likely to engage in non-farm activities due to reduced budgetary constraints. Dercon and Krishnan (1996) discovered that wealthier households have greater access to financing, making it easier for them to invest in firms. On the contrary, Canagarajah and van der Walle (2001) found that poorer households in Ghana and Kenya struggle to participate in NFEs due to a lack of capital. This problem is equally prevalent among rural households in Uganda based on the results discussed.

Gender of household head

The sex of the household head significantly influences the presence of a non-agricultural enterprise in rural areas. Rural households with male heads have a 7.9% lower chance of having a non-agricultural enterprise than female-headed households. There is, however, a positive association between having a non-agricultural enterprise and urban male-headed households, though the relationship is not significant.

These results are similar to those of Ellis (1999) and Haggblade et al. (2010), who found that rural women frequently dominate informal and small-scale nonfarm enterprises. Blackden and Wodon (2006) discuss how women in rural Africa use non-farm enterprises to supplement their incomes. In comparison, Bryceson (1996) discovered that men in some places dominate larger non-farm operations, which may explain the reduced gender discrepancy in urban environments where businesses are larger and more formal.

Access to credit

There is a strong positive relationship between access to credit and the presence of a non-agricultural enterprise. Access to credit increases the likelihood of having a non-agricultural enterprise by 8.1% among rural households and 11.2% among urban households. The coefficient for urban households is higher than that for rural households, reflecting that most formal financial institutions are located in urban areas. Thus, urban households have better access to credit

than rural households.

This result is consistent with Reardon et al. (2006), who found that access to credit is a significant driver of non-farm enterprise development in rural Africa. Haggblade et al. (2010) and Ayyagari et al. (2010) found that access to formal financing significantly increases the likelihood of enterprise success, particularly in metropolitan areas. However, Zeller et al. (1997) noted that formal financial institutions are frequently absent in rural areas, which may explain the weaker effect in Uganda's rural districts, where informal credit networks may be insufficient for company investments.

Education level

The proportion of non-agricultural enterprises increases with the household head's education level among rural households. The same pattern is observed for urban households, except for those with a primary education level. Specifically, higher levels of education reduce the likelihood of nonfarm participation by 10.9% in urban households and 9.9% in rural households with postsecondary education. This could be because educated people in both urban and rural areas tend to prefer formal employment over non-farm activities, which are often viewed as less stable and respectable. This pattern aligns with the findings of Winters et al. (2009), who observed that highly educated individuals in rural areas are more likely to seek formal-sector jobs. Barrett et al. (2001) also argued that educated individuals are less likely to engage in non-farm enterprises since they have more formal employment opportunities. Matsumoto et al. (2006) found that educated individuals in metropolitan areas are more likely to be employed in the formal sector, resulting in lower participation in non-farm activities.

Marital status

Heads of households who are widowed, separated/divorced, or never married are less likely to engage in NFEs compared to married heads, particularly in rural areas. Furthermore, widowed or divorced family heads in rural Uganda are 14.4% less likely to participate in nonfarm activities than their married counterparts, likely due to budget constraints and limited household labour. In urban areas, the influence of marital status is less pronounced. However, divorced or separated individuals may still engage in NFEs on a smaller scale; this is likely due to necessity. This aligns with Beegle et al. (2006), who found that single-parent households face greater financial constraints, which limit their ability to participate in non-farm activities. Horrell and Krishnan (2007) found that widowed or divorced women usually lack the financial and social capital needed to start a business. Doss (2006) argued that divorced women in urban areas may be more likely to engage in non-farm activities to survive, even though these businesses are often small and less profitable.

Regional differences

Across regions, households in the western, northern, and eastern regions are less likely to have a non-agricultural enterprise than households in the central region, except for northern rural households, which show a strong positive association. The rapid proliferation of non-agricultural enterprises in the central region may be attributable to the availability of markets for their products and a higher standard of living, which enables them to afford startup capital and obtain credit.

This finding aligns with Appleton (2001) and Kiggundu (2002), who highlighted the impact of infrastructure and market access on non-farm participation. The central region’s advantage may also be attributed to its proximity to Kampala, Uganda’s economic hub. Bigsten and Kayizzi-Mugerwa (1992) found that conflict-affected regions, such as northern Uganda, were originally less engaged in non-farm activities, but post-conflict rehabilitation efforts may now be driving increased engagement, particularly in rural areas. Appendix B presents further analysis of nonfarm enterprise determinants based on regional difference interactions while Appendix A presents Logistic Regression/ Odds Ratios for Determinants of Non-farm Participation in Uganda.

5. Conclusion and policy recommendations

The study sought to investigate the determinants of non-farm participation in Uganda, including household and community determinants. The logit estimation technique was employed to identify these determinants. The empirical model was estimated using cross-sectional UNHS 2019/2020 data. The percentage of correct predictions indicates that the model achieved an overall accuracy of 47.17%, with sensitivity and specificity analyses providing insight into its classification performance.

The study revealed both positively and negatively linked factors impacting household nonfarm involvement characteristics. Individual engagement was found to be connected with marital status, geography, education level, and financial access. Divorced and separated people, as well as widows and widowers, are less likely than married people to work in non-farm enterprises. Individuals in the Eastern and Western regions are less likely to engage in nonfarm enterprises than those in the Central region. Moreover, individuals with specialised training and degrees are less likely to work in non-farm enterprises, reflecting a preference for formal employment. Furthermore, access to finance is a critical enabler, as households with credit access are more likely to engage in the non-farm sector than those without it.

Based on these findings, the following policy recommendations are suggested. ***Firstly***, deliberate policies that enhance access to credit should be prioritised, particularly by providing capital at low interest rates to encourage participation in non-farm enterprises. Such access would support the accumulation of productive assets, potentially raise household income and reduce poverty. The provision of low-interest capital will promote participation in non-farm enterprises, thereby increasing the acquisition of productive assets that could increase household income and reduce poverty. ***Secondly***, the government should establish a sustainable framework enabling individuals and enterprises to access credit at reduced interest rates. ***Thirdly***, households without formal education are highly engaged in the non-farm sector; therefore, government and non-governmental organisations should provide skill-enhancing training to improve the quality of commodities they provide and attract positive returns. ***Fourthly***, the government should establish policies to address barriers to entry into non-farm enterprises, while considering regional differences. Incentives for enterprises willing to relocate to deprived regions could help achieve that non-farm participation. Lastly, any policy intervention must consider the unique demographic, regional, and socioeconomic characteristics that shape household non-farm participation in Uganda, as highlighted.

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APPENDICES

Appendix A: Logistic regression/ odds ratios for determinants of non-farm participation in Uganda

Variables	(1) Nonagric
Age	0.0327***
	(0.01000)
agesq2	-0.0501***
	(0.0103)
Household size: small (ref 1-2)	
Medium (3-4)	0.355***
	(0.0802)
Large (5+)	0.637***
	(0.0823)
Quintile 1: ref	
Quintile 2	0.199**
	(0.0809)
Quintile 3	0.487***
	(0.0798)
Quintile 4	0.881***
	(0.0808)
Quintile 5	1.129***
	(0.0899)
welfare	7.14e-08
	(1.06e-07)
Gender: Female (ref)	
Male	-0.272***
	(0.0645)
Residence: Rural(ref)	
Urban	0.250***
	(0.0590)
Married: (ref)	
Divorced/separated	-0.357***
	(0.0886)
Widow/Widower	-0.544***
	(0.0997)
Never married	-0.357***
	(0.132)
No formal education: (ref)	
Primary	-0.101
	(0.0692)
Secondary	-0.117
	(0.0828)
Post-secondary plus	-0.488***
	(0.112)
No access to credit: (ref)	
Have access to credit	0.396***
	(0.0513)
Central: (ref)	
Eastern	-0.235***
	(0.0676)
Northern	0.293***
	(0.0726)
Western	-0.673***

	(0.0749)
Constant	-1.605***
	(0.247)
Observations	8,802
Pseudo R-squared	0.0768

Robust standard errors in parentheses
*** p<0.01, ** p<0.05, * p<0.1
Source: Author

Appendix B: Regional interaction estimates (dydx) of determinants of non-farm participation in Uganda

Variables	(1) Central	(2) Eastern	(3) Northern	(4) Western
Age	-0.00184	0.0212***	0.000385	0.00575
	(0.00496)	(0.00389)	(0.00405)	(0.00411)
agesq2	-0.00159	-0.0246***	-0.00401	-0.00984**
	(0.00506)	(0.00398)	(0.00410)	(0.00417)
Household size: small (ref 1-2)				
Medium (3-4)	0.128***	0.0702**	0.122***	0.00945
	(0.0374)	(0.0335)	(0.0367)	(0.0350)
Large (5+)	0.205***	0.133***	0.185***	0.0571
	(0.0399)	(0.0328)	(0.0376)	(0.0351)
Quintile 1: ref				
Quintile 2	0.196**	0.0645**	0.00783	0.185***
	(0.0789)	(0.0290)	(0.0331)	(0.0502)
Quintile 3	0.243***	0.122***	0.0817**	0.268***
	(0.0757)	(0.0297)	(0.0360)	(0.0473)
Quintile 4	0.374***	0.157***	0.233***	0.334***
	(0.0739)	(0.0309)	(0.0420)	(0.0461)
Quintile 5	0.418***	0.184***	0.102	0.449***
	(0.0766)	(0.0370)	(0.0640)	(0.0473)
welfare	3.24e-08	8.31e-08	4.85e-07	-3.43e-08
	(1.16e-07)	(8.78e-08)	(2.95e-07)	(5.01e-08)
Gender: Female (ref)				
Male	-0.0630*	0.0400	-0.146***	-0.0127
	(0.0374)	(0.0255)	(0.0282)	(0.0295)
Residence: Rural(ref)				
Urban	0.113***	0.0602***	0.00702	0.0318
	(0.0274)	(0.0221)	(0.0309)	(0.0248)
Married (Ref)				
Divorced/separated	-0.0795*	-0.0322	-0.126***	0.00826
	(0.0436)	(0.0365)	(0.0448)	(0.0376)
Widow/Widower	-0.113**	-0.0832**	-0.162***	-0.0338
	(0.0569)	(0.0411)	(0.0409)	(0.0429)
Never married	-0.0889*	-0.0595	-0.0298	-0.124*
	(0.0522)	(0.0607)	(0.0754)	(0.0654)
No formal education: (ref)				
Primary	0.213***	0.0171	-0.166***	0.0740**
	(0.0458)	(0.0299)	(0.0304)	(0.0314)
Secondary	0.185***	0.0475	-0.218***	0.0728**
	(0.0493)	(0.0332)	(0.0401)	(0.0364)
Post-secondary plus	0.146**	-0.0818*	-0.318***	-0.0150

	(0.0570)	(0.0446)	(0.0605)	(0.0461)
No access to credit: (ref)				
Have access to credit	0.122***	0.0929***	0.0739***	0.0614***
	(0.0279)	(0.0182)	(0.0262)	(0.0202)
Observations	1,780	2,864	2,180	1,978

Standard errors in parentheses, *** p<0.01, ** p<0.05, * p<0.1
***, **, * indicate significance levels at 1%, 5% and 10% respectively.
Source: Author

Appendix C: Pairwise correlation tests

Nonagric	age	hsize	welfare	quints	gender	urbanr~l	
Age	-0.1305*	1					
Hsize	0.0970*	-0.00540	1				
Welfare	0.0377*	-0.00570	-0.1604*	1			
Quints	0.1260*	-0.0462*	-0.2916*	0.3812*	1		
Gender	0.00490	-0.1503*	0.1531*	0.0146	0.0361*	1	
urbanrural	0.0811*	-0.0822*	-0.1126*	0.1432*	0.2654*	-0.0347*	1
Mstat	-0.0961*	0.1733*	-0.4043*	0.0806*	0.1282*	-0.4712*	0.0901*
Education	0.0694*	-0.2389*	0.0248*	0.1920*	0.3698*	0.2865*	0.2457*
Finances	0.1181*	-0.0638*	0.1356*	0.00990	0.1051*	0.0589*	-0.0504*
Region	-0.0809*	0.0392*	0.0661*	-0.0836*	-0.1674*	-0.0174*	-0.1798*

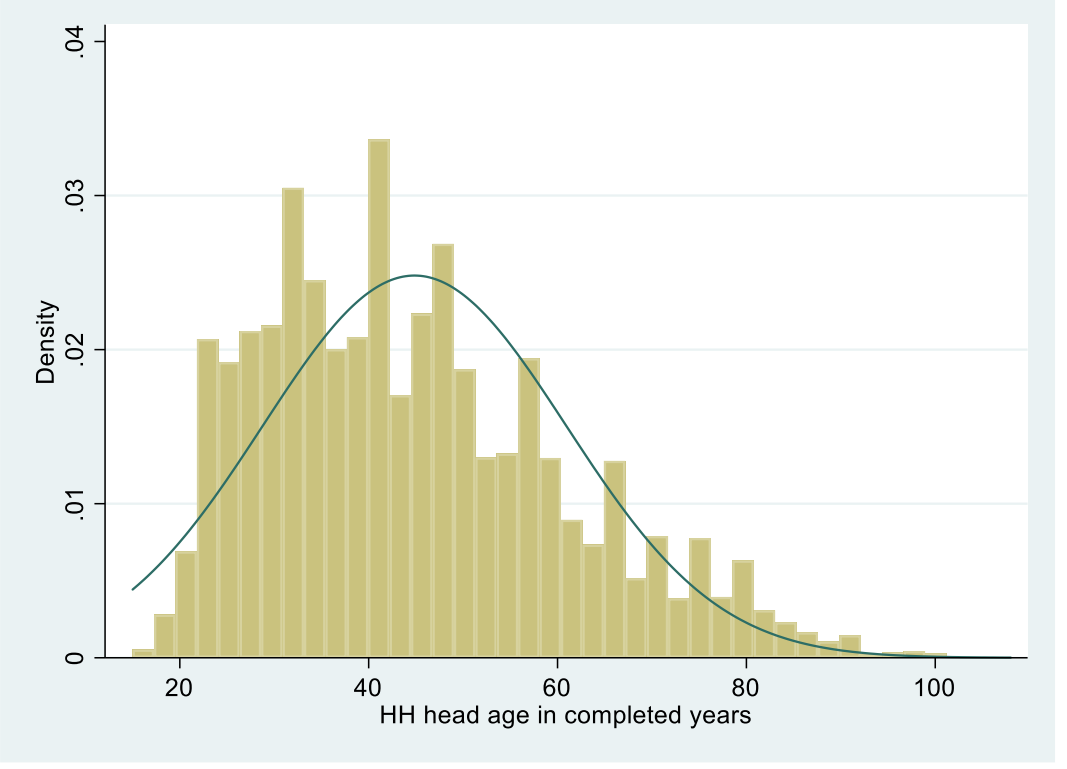
Mstat	Educat~n	Finacc~s	region	
Mstat	1			
Education	-0.1427*	1		
Finances	-0.0669*	0.0771*	1	
Region	-0.0617*	-0.1589*	-0.0147	1

Appendix D: Multicollinearity test

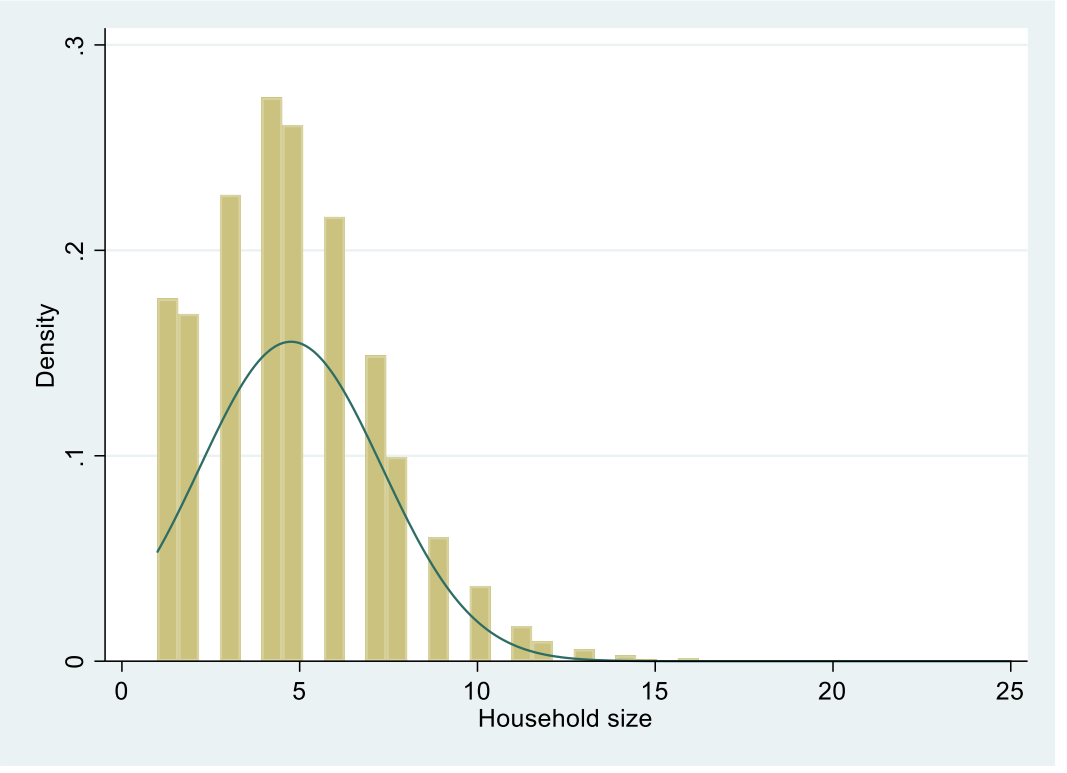
	VIF	1/VIF
Age	32.95	.03
Agesq2	32.403	.031
Medium household	2.193	.456
Large household	2.713	.369
Quintile 2	1.701	.588
Quintile 3	1.813	.552
Quintile 4	1.936	.517
Quintile 5	2.546	.393
welfare	1.17	.855
Male	1.713	.584
Eastern	1.953	.512
Northern	1.943	.515
Western	1.761	.568
Divorced/separated	1.426	.701
Widow/ Widower	1.862	.537
Not married	1.265	.791
Primary	2.17	.461
Secondary	2.206	.453
Post-secondary and above	1.654	.604
Have access to finance	1.076	.929
urban	1.151	.869
Mean VIF	4.743	.

Appendix E: Normality test results

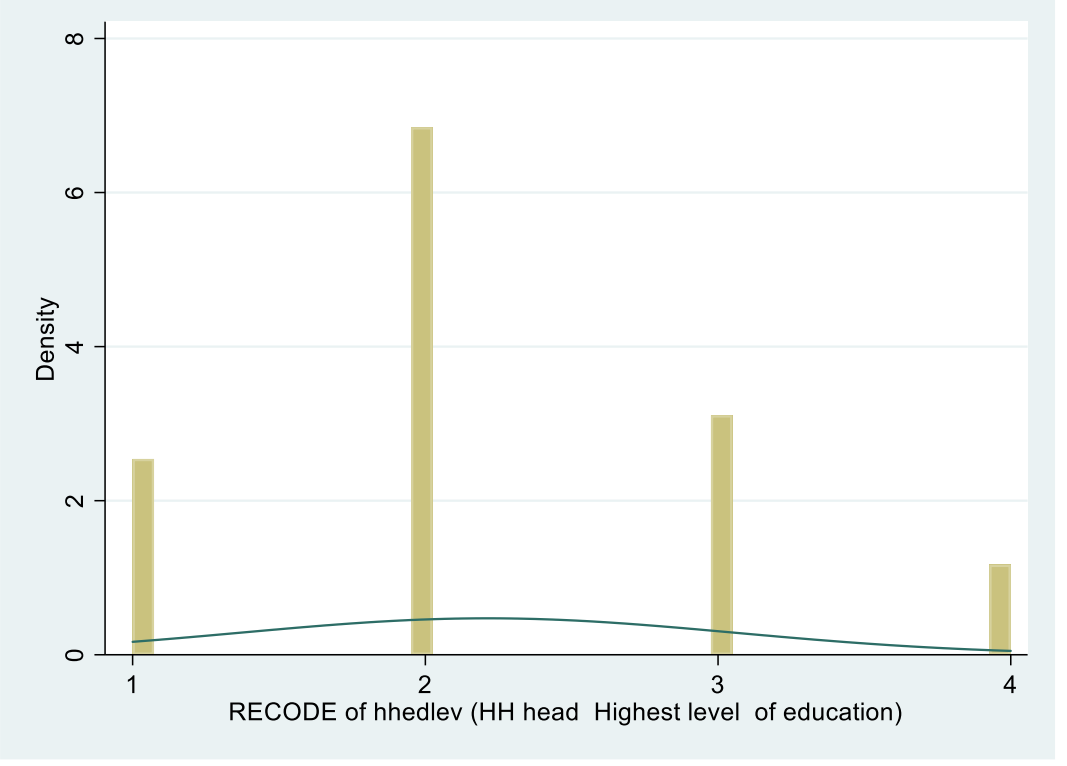
Distribution of age of household head



Distribution of household size



Distribution of highest education level of household head



Distribution of place of region of the household