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Agricultural credit demand by smallholder maize farmers in Ghana

Okyerebea Addo Koranteng and Chen Xiufeng

College of Economics and Management, Department of Agricultural Economics, China Agricultural University, 100083
Beijing, PR China.

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Maize is an important food crop in Ghana, accounting for more than 50% of the country's total cereal production. However, maize yield in Ghana still remains one of the lowest in sub-Saharan Africa. Providing agricultural credit to farmers cannot be disregarded because it has significant impact in the development of agriculture. There are two sides in accessing credit thus the demand side and supply side. A lot of studies have focused on access to credit from the supply side but that alone will not give adequate information for policy makers. This study examines the factors that influence the demand for credit from the various credit sources in Ghana using multinomial logit model. Data was sourced from the Feed the Future Initiative. A sample size of 1090 farm household was selected from Brong Ahafo, Northern, Upper East and Upper West Regions of Ghana for the study. The multinomial logit model results showed that farmers demand for credit is influenced by an individual's sex, household size, education, member of farmer-based organization, location of the farmer and land ownership. It is therefore recommended that stakeholders should formulate policies that encourage demand driven financial services from both the formal and informal sectors. Policies aimed at educating farmers by encouraging and advising them on the need to demand for credit for their agricultural activities should be implemented.

Keywords: Agriculture, Credit demand, Ghana, Multinomial logistic regression.

INTRODUCTION

Agriculture plays a dominant role in Ghana's economy. The agricultural sector employs about 44.7% of the labor force. It also contributes largely to GDP ranging from 22 to 34% (Ghana Statistical Service, 2014). In Ghana, the agricultural sector is predominantly made up of farmers who cultivate on smaller scale and these farmers produce about 80% of the sector's output. Most of these people live in the rural areas and are mostly peasant farmers who cultivate lands less than 2 hectares MoFA (2007). One of the most important food crop in Ghana is maize. It is grown in almost all parts of the country but the cultivation and production differ in ecological zones.

Reports show that, in Northern Ghana, sorghum and millet used to be their traditional staple crops but maize has almost taken over (Statistics, Research and Information Directorate (SRID) of the Ministry Of Food and Agriculture, 2011). The vast majority of maize is produced by smallholder farmers under rain fed conditions, leading to annual variations.

Major investments such as the Ghana Grains Development Project (1979 – 1997) and the Food Crops Development Project (2000-2008) were implemented to improve maize yield. But despite these efforts, the average maize yield in Ghana remains one of the lowest in the world, much lower than the average for Sub-Saharan Africa (International Food Policy Research Institute, 2014). In Sub-Saharan Africa, agricultural sector receives only a small share of total credit and peasant farmers are mostly left out. Paramount among the needs

of smallholder farmers is adequate flow of financial facilities to them. These farmers tend to rely on their inadequate savings for their activities (World Bank, 2009). Agricultural credit has been established to be of importance and also an effective tool to the progress of agriculture (Omonona, et al. 2010). Provision of credit to farmers cannot be overlooked due to its significant impact on agricultural development.

In accessing credit, there are two sides thus the demand side and supply side. A lot of studies have focused on access to credit from the supply side Kedir (2003); Barslund et al. (2008); Badiro (2015) but that alone will not give adequate information for policy makers. There is also the need to study access to credit from the demand side. Therefore, the study sought to describe the demographic and socio-economic characteristics of the farmers and also identify the factors influencing maize farmers in demanding for agricultural credit from the various sources of credit. Because if these factors are properly addressed, it will help design and implement policies for these farmers to access agricultural credit that can be used to acquire the needed inputs to increase their productivity.

Although different models have been used in examining the factors that determine the demand for credit, however, most of the findings are inconclusive, due to the contextual, geographical, socio-economic, environmental and other variations across the study areas (Mpuga, 2010). This has important implications on agricultural production in general and farm credit in particular, especially for developing economies.

LITERATURE REVIEW

“Agricultural credit encompasses all loans and advances granted to borrowers to finance and undertake service production activities relating to agriculture, forestry and also for processing, marketing, storage and distribution of products resulting from these activities,” (Ozowa, 1995). Briggeman et al. (2007) have established that, the demand for credit is a household’s desire to supplement consumption or investment with the availability of credit.

An individual’s demand for credit refers to the variation in quantity of credit a person is likely to demand at a specified interest rate and time period assuming all other factors held constant as suggested by (Balogun and Yusuf, 2011). However, Osei-Assibey (2009) suggests that, the demand for financial services goes beyond the economic factors but also include non-economic factors. The non-economic factors consist of both an individual’s demographic and socio-economic characteristics. Even though the demographic factors usually remain the same across other studies, the socio-economic factors differ depending on the researchers’ focus and study area.

In developing countries, a lot of studies on demand and access to credit by farmers have considered a broad range of factors (Atieno 2001; Okurut et al. 2005;

Akudugu 2012; Chauke et al., 2013). They concluded that, factors that determine farmers’ access to credit differ from one geographical area to another.

Akudugu (2012) using the logit model to estimate the determinants of credit demand by farmers in the Upper East Region of Ghana, found out that age, gender and political affiliations are the main determinants of credit demand by farmers. His study was conducted in only one of the regions in Ghana which is located in the northern part of Ghana therefore a study that has a wider coverage can be conducted for more information about credit demand in Ghana. Such is this study which covers the four northern regions in Ghana. In addition, Okurut et al. (2005) using the logit model identified some factors that determine the demand for credit in the informal financial sector in Uganda. Age, education level, dependency ratio, household expenditure was significant. Atieno (2001) also did an empirical evaluation on the formal and informal institutions’ lending policies and access to credit by small-scale enterprises in Kenya. The results showed that income level, distance to credit sources, past credit participation and also assets owned were significant variables that explained participation in formal credit markets. Chauke et al. (2013) examined factors influencing access to credit among smallholder farmers in the Capricorn District of South Africa. Using the logistic regression model, they found out that factors that contributed significantly to credit access were need for credit, attitude towards risks, perception on loan repayment, total value of assets and perception on lending procedures.

Other studies have focused on factors influencing farmers’ access to credit from the supply side. Considering the different studies conducted so far, there exist limited knowledge on the factors that influence farmers in accessing agricultural credit from the demand side. Currently the financial institutions in Ghana can be categorized broadly into two and that is the formal and informal sectors. These financial markets co-exist and provide complementary and supplementary services to each other (Aryeetey, 1992). Both the formal and informal sectors provide agricultural credit to farmers but according to Institute of Statistical, Social and Economic Research (ISSER) (2010) report, there has been a decline in the allotment of credit to peasant farmers. Therefore, these farmers are compelled to rely solely on their on-farm and off-farm returns (Mohammed et al., 2013).

Even though the formal and informal sources of credit are available in Ghana, farmers are still not able to access credit (Owusu-Antwi&Antwi, 2010). This is because each credit source has its own constraints that restrict the ability of a farmer to acquire credit. However, ISSER (2010), states that credit from formal sources can hasten the development of areas such as industries and agriculture. According to Asiedu-Mante (2005), formal financial institutions are not able to satisfy credit needs of

people in rural areas so they lean on informal credits which are also often not enough or unsatisfactory. However, Togba (2009) argued that the availability of credit does not necessarily mean that, farmers will demand for it. Credit can be available to farmers but they can choose not to demand for it due to their demographic and socio-economic characteristics. Again, the choice of the source of credit is also based on their demographic and socio-economic characteristics. There, identifying factors influencing demand from the various sources for agricultural credit in Ghana becomes imperative. Therefore, this study sought to identify the factors influencing maize farmers demand for agricultural credit from the various sources. Because if these factors are properly addressed, it will help design and implement policies for these farmers to access agricultural credit that can be used to acquire the needed inputs to increase their productivity, which will also help the entire country because maize is consumed by a lot of Ghanaians.

METHODOLOGY

Theoretical Framework

The study proposes that the demand for agricultural credit by maize farmers can be influenced by both demographic and socio-economic characteristics such as age, gender, education, household size, farm size, farmer-based organization, challenge to loan, location (Mpuga 2008; Balogun and Yusuf 2011). We chose the theoretical framework for this study of identifying the factors that influence maize farmers demand for agricultural credit from the various sources which is the consumer behavior. This research employs the model as adopted by Balogun and Yusuf 2011. Therefore, the study proposes the credit demand function as:

$$DC_i = f(H_i, Q_i) \quad (1)$$

Where;

DC_i denotes demand for credit by farmer i ,
 H represents an individual's demographic characteristics (sex, age, education level, marital status and household size)

Q represents socio-economic factors or characteristics such as farm size, food shortage, land ownership, location of farmer

Multinomial Logit Model

Multinomial logistic regression is normally used to analyze mutually dependent unordered choice models Gujarati (2004); Hensher et al. (2005). It is used to predict categorical placement on a dependent variable based on multiple independent variables. It is an extension of binary logistic regression that allows for more than two categories of dependent or outcome variable.

The use of the multinomial logit is consistent with Mpuga (2008). This model is chosen for this research because the dependent variable is categorical thus sources of credit. The various sources of credit were classified as the dependent variables. To provide evidence on the factors that influence the demand for credit from the various sources of credit, we estimate multinomial logit model of the demand for credit from different sources.

The study proposes that, the dependent variable D_i can take on one of j categories $1, 2, \dots, k$ (the different sources of credit). There are five (5) distinct categories of credit source namely; formal lender or bank, friends/ relatives, group-based microfinance, informal lenders and non-governmental organizations. Let $\Pr(D_i = M/X)$ be the probability of observing outcome M given X , the probability model for D_i can be constructed as:

$$pr(D_i = M/X) = \frac{\exp(\beta_0 + \beta_1 X_{2i} + \dots + \beta_k X_{ni})}{\sum_{j=1}^k \exp(\beta_0 + \beta_1 X_{2i} + \dots + \beta_k X_{ni})} \quad (2)$$

Where $j=1, 2, \dots, k$. All the parameters are not identified since more than one set of parameters generates the same probabilities of the observed outcomes unless we impose constraints on the model as reported by Greene (1997); Long (1997); and McFadden (1973) which is achieved by setting parameters, for example those of the first-choice category $j=1$ to be all zero: $\beta_0 = \beta_1 = \beta_{k1} = 0$. In other words, parameters of the first-choice category are used as the base against which the other choices are compared. The choice can be arbitrary and this opportunity can be used to make comparison between any groups of the alternative categories.

In this study, the choice of credit source is modelled as a function of both an individual's demographic and socio-economic characteristics. This is presented in general form equation as;

$$D_i = f(\text{age}_i + \text{sex}_i + \text{educ}_i + \text{marital status}_i + \text{hseholdsize}_i + \text{farmsize}_i + \text{FBO}_i + \text{foodshortage}_i + \text{land ownership}_i + \text{location}_i) \quad (3)$$

Age denotes age of farmer, educ denotes education level of farmer, sex denotes the sex of the farmer being a male or female, marital status of farmer, hseholdsize denotes household size, farm size denotes farm size of farmer, location is whether the is in the rural or urban area, FBO denotes whether farmer is a member of farmer-based organization, land ownership denotes whether a farmer owns a land or not and location denotes whether a farmer is located either in the rural or urban area.

The selection of variables for this study is based on the outcome from other researchers' empirical studies and also the focus of the study motivated the choice of variables. They include both demographic and socio-economic factors. The dependent variable is the source of credit which is a categorical variable. It takes the values from 1-5. Thus (1) formal lender/bank, (2) friends/ relatives, (3) group based micro finance, (4) informal

lender and (5) non-governmental organization.

The age of a farmer can have an influence on their decision to demand for credit. Younger farmers are less likely to demand for credit than older farmers as was confirmed in the findings of Akudugu et al. (2009), therefore age is a significant determinant of access to credit and a negative relationship with demand for credit. In the study conducted in Uganda, Mpuga (2010) found that age of the farmer is positively related to demand for credit and the quantity of loan applied. According to him, the young are likely to borrow, since they are very active and energetic and more aggressive to investment. While, old individuals are likely to rely more on the past earnings and accumulated capital, and therefore less inclined to need loan.

The level of education of a farmer can influence the demand for credit. Heffernan and Pollard (1983) also confirms it in their research that, an educated farmer is more likely to understand and know the importance of applying modern technology and improved varieties than an uneducated farmer. It has been found that, farmers who have at least 9 years of education are more likely to demand for credit than those who have less number of years of education as was confirmed by Ayamga et al. (2006). Again, educated farmers can read and understand the terms and conditions in credit application (Ayamga et al. 2006). While in a survey study in China, Tang et al. (2010) indicated that education is one of the significant explanatory variables that influence the demand for loan.

Sex of a farmer is a dummy variable and a significant determinant of access to credit. Females are more likely to access credit than their male counterparts. Awunyo-Vitoret al. (2014) and Akudugu (2012) posit that, females are considered the most disadvantaged, vulnerable and also credit worthy. However, Awunyo-Vitor and Abankwah (2012) also argued that females usually control fewer assets and also cultivate smaller acreages and so they do not have assets to be used as collateral for demanding for credit. Therefore, the effect of gender on access to credit cannot be predicted a priori.

The size of a household has been established to have negative relation to agricultural credit demand. Smaller households are more likely to demand for credit than larger households. Credit is used for the purchase of inputs and hiring labor and therefore it is needed in smaller households to supplement farmers who are labor and input constrained. It has also been found that size of a farm is positively related to the probability of farmers' demanding for credit. The size of a farm can be used to estimate the expected income of the farmer. Large farm sizes are expected to lead to increase in credit access (Kosgey, 2013; Baffoe and Matsuda, 2015; Awunyo-Vitor et al. 2014).

Being a member of farm-based organization has been found to be positively related to the probability of household demand for agricultural credit (Akudugu 2012).

He (Akudugu, 2012) established that formation of social associations helps improve access to credit since there is joint guarantee by association members.

Land plays an important role when it comes to agricultural issues. Land can serve as collateral for a farmer to be able to access agricultural credit (Saqib et al., 2017; Baffoe and Matsuda, 2015). This is because lenders are likely to give credit to farmers who own land. A farmer who owns a land can therefore use it as collateral to demand for credit.

The location of a farmer may also influence his/her demand for credit (Kedir, 2003). This variable is employed to see how the location of an individual can influence their demand for credit. This is because, farmers who are located in the rural areas may not have access to most of credit sources unlike their counterparts in the urban areas.

Marital status may have an influence on the demand for credit. Being married is also considered as part of socioeconomic factors that determine a respondent's responsibility level. In Ghana, married persons are perceived to be responsible people. Therefore, a farmer who is married may have the confidence of being granted credit and hence will demand for it (Kedir, 2003; Kosgey, 2013)

From intuition, another factor that may influence farmers to demand for agricultural credit is food shortage. This is a variable of interest for this research. Farmers usually face some difficulties in managing their households especially when it comes to food losses and food expenditure. Nimoh et al. (2012) studied the causes and effect of seasonal food shortages and coping strategies adopted by households to increase food availability in Ghana. They suggested that, efforts aimed at reducing food shortages among rural households should focus on off-farm income generating activities and also provision of credit. Food and Agriculture Organization of the United Nations (2011), report suggest that long term investment to the agricultural sector and improving flexibility among farmers is one of the key components of providing sustained access to food for them. Again, these investments can also prevent food waste (post-harvest losses) through acquiring storage facilities and techniques. Robert (2014) posits that, household food security can be improved through accessing credit by rural folks. This variable is employed to know whether farmers demand for credit when there is food shortage in their households.

Study Area

Ghana is located in the tropics, specifically in West Africa. It lies between latitudes 4°45'N and 11°N and longitudes 1°15'E and 3°15'E. It covers a land area of approximately 238,000 km². It is bordered by Togo on the east, Ivory Coast on the west, Burkina Faso in the north and the Gulf of Guinea in the south.

The country is divided into 10 administrative regions and sub-divided into 216 districts. Agriculture is the largest source of employment for the people of Ghana. It employs about 60% of the labor force. This study focused on the zone of influence or the target regions of the Feed the Future Initiative by the United States' Government. It covers the Northern, Upper East, Upper West and The Brong Ahafo Regions. This is because the northern part of Ghana is deeply entrenched in poverty and mostly made up of smallholder maize farmers.

Data

Secondary data was used for this study and was collected from dataset from the United States Government's Feed the Future (FTF) initiative obtained from the USAID website (USAID/GHANA, 2012). The FTF program started in Ghana in mid-2011 and is being implemented in the four northernmost regions namely: Upper West, Upper East, and Northern Region, as well as some selected areas in the Brong Ahafo Region.

Sampling and Data Analysis

Multistage sampling procedures were applied and carried out in the three northern regions of Ghana as well as areas above the 8th parallel in the Brong Ahafo Region of Ghana. In the first stage, a probability sampling methodology was employed to select two hundred and thirty (230) Enumerated Areas (EAs) from all the EAs within the Zone of Influence (ZOI) were then divided into 2 strata (agriculture-nutrition intervention area as strata I and agriculture only intervention area as strata II in the second stage to ensure an adequate number of respondents for the 2 strata.

The final database includes information on demographic characteristics, access and sources of credit, marketing, nutrition and production information of smallholder farmers (maize, rice and soya beans) in the northern part of Ghana. But the study used a total sample size of 1138 from the 4 northmost regions of the country. The entire dataset contains information on maize, rice and soya bean farmers as these crops are the interests of the FtF project. However, the interest of this research is in maize farmers therefore, the decision to use only such for the analysis. Also, the final sample size is arrived at as missing and incomplete responses for some variables of interest prevented them to be included in the estimations. STATA (version 14) was the software used for analysis of the data.

RESULTS AND DISCUSSION

Summary Statistics Analysis

Summary statistics of the variables is as follows; (Table 1)

From the sample, 21.44% are females and 78.56% are males. Table 1 also shows that, 74.96% from sample are married, 5.01% are divorced, 1.49% are separated, 4.39% are living in consensual union and 6.41% are single. It was also evident that majority of the farmers 78.21% have never been to school and 21.79% have acquired some formal education. Age distribution of the sampled farmers shows an average age of 45 years and ranges from a minimum of 18 years to a maximum of 100 years (Table 2). The average household size is 5.4 and it ranges from a minimum of 1 to maximum of 28. The average farm size of the sampled farmers is 2.9 acres with a minimum of 0.2 and maximum of 16 acres (Table 2). Close to about 70.12% of the farmers do not belong to farmer-based organizations with only 29.88% belonging to a farmer group.

Empirical Analysis

The estimation was done to determine the factors that influence the decisions of respondents on credit sources in the Brong Ahafo, Northern, Upper East and Upper West regions of Ghana. The number of respondents for this study was 1138 but 1090 were used in the final estimation because of incomplete responses for some farmers. The probability $> \chi^2$ value of 0.0000 indicates that the independent variables jointly contribute to explaining variations in sources of credit and the pseudo R^2 is 0.0278. The likelihood ratio (LR) χ^2 value is 93.86 which is significant at 1%. Five categories were considered in the multinomial logit regression for the sources of loans with the informal lender credit source set as the base category to which all outcomes would be compared to. The categories are as contained in the table 3 below;

Any category of the dependent variable can be chosen to be the baseline category and the model will fit equally well by achieving the same likelihood and producing the same fitted values but only the interpretation of the parameters will change (Schafer, 2006). In this study, the baseline category chosen was the category with the highest frequency (informal lender). This means comparison will be made with reference to the informal lender. The informal lender source has the highest frequency among all the sources of credit. This may be due to its easy accessibility by the farmers and also, it does not have any formal application processes when borrowing from this source.

Interpretation of Results

The variable sex of household head is significant at 5% level. The sex of household head or farmers can influence the decision to demand credit from the formal sector/banks source. It has a relative risk ratio of 0.624 for the formal source. Education level is only significant in the friends or relative source of credit with a 5% significance

Table 1. Summary of Demographic Characteristics of Maize Farmers.

Sex	Frequency	Percent
Female	244	21.44
Male	894	78.65
Total	1138	100
Marital status		
Divorced	57	5.01
Informal/consensual union	50	4.39
Married	853	74.96
Never married/Single	73	6.41
Separated	17	1.49
Widowed	88	7.73
Total	1138	100
Age category		
up to 20	20	1.76
21 -30	234	20.56
31 – 40	273	23.99
41 – 50	233	20.47
51 – 60	182	15.99
61 – 70	103	9.05
Above 70	93	8.17
Total	1138	100
Education level		
Basic Education	64	5.62
Bachelor	40	3.51
Senior High School	144	12.65
None	890	78.21
Total	1138	100

Source: Authors' Computation (2018).

Table 2. Summary Statistics of Continuous Variables.

Variable	Observations	Mean	Std. Dev.	Minimum	Maximum
Age	1138	45.09	16.34	18	100
Household size	1138	5.43	3.09	1	28
Farm size (acres)	1138	2.97	4.27	0.2	16

Source: Authors' Computation(2018).

level. It is insignificant at all the other sources and has a relative risk ratio of 0.587. Household size is a significant determinant of demand for credit in the friends or relative credit source. At 10% level of significance, the associated relative risk ratio of the variable is 1.056. Farmer-based organization is significant at 5% for group-based microfinance and non-governmental organizations. The relative risk ratios associated with farmer-based organization variable for the two categories of credit sources are 0.664 and 0.630 respectively. Land ownership is significant at all levels at 1% and 5%. The

associated relative risk ratios are 2.611, 1.634, 1.918 and 2.444 for formal lender, friends and relatives, group-based microfinance and non-governmental organization respectively. Location which was found to be a significant determinant for credit demand in all categories at 1% and 10% significant levels. The relative risk ratios associated with the variable for the four categories are 0.399 for the formal sector, 0.336 for friends or relatives, 0.593 for group based/microfinance and 0.346 for non-governmental organizations.

Table 3. Maximum Likelihood Estimates of the Multinomial Regression Logit Model.

Variable	Formal/ banks	Friends and relatives	Group-based microfinance	NGOs
Age	1.002 (0.006)	1.004 (0.006)	0.998 (0.005)	1.002 (0.005)
Sex	0.624** (0.136)	1.043 (0.278)	1.212 (0.305)	0.796 (0.188)
Marital Status	0.869 (0.082)	1.045 (0.109)	1.055 (0.104)	0.888 (0.088)
Education	0.928 (0.202)	0.587** (0.159)	0.730 (0.171)	1.196 (0.262)
Household Size	1.036 (0.032)	1.056* (0.035)	1.036 (0.033)	1.050 (0.033)
Farm size	0.984 (0.024)	0.983 (0.028)	0.998 (0.022)	1.009 (0.019)
FBO	0.822 (0.158)	0.774 (0.168)	0.664** (0.136)	0.630** (0.131)
Food Shortage	1.029 (0.187)	1.198 (0.240)	1.168 (0.218)	1.347 (0.253)
Land ownership	2.611*** (0.511)	1.634** (0.369)	1.918*** (0.397)	2.444*** (0.500)
Location	0.399*** (0.109)	0.336*** (0.116)	0.593* (0.159)	0.346*** (0.105)
Number of observations = 1,090	LR Chi ² (40) = 93.86	Prob>chi ² = 0.0000	Log-likelihood = -1642.3847	

***, ** and * are significance levels at 1%, 5% and 10% respectively. Comparison group: informal lender. Note: standard errors are in parenthesis.

Source: Authors' Computation (2018).

DISCUSSION

The estimation was done to determine the factors that influence the decisions of respondents to demand for agricultural credit from the various sources in the Brong Ahafo, Northern, Upper East and Upper West regions of Ghana. The number of respondents for this study was 1138 but 1090 were used in the final estimation because of incomplete responses for some farmers. The probability > chi² value of 0.0000 indicates that the independent variables jointly contribute to explaining variations in sources of credit and the pseudo R² is 0.0278. The likelihood ratio (LR) chi² value is 93.86 which is significant at 1%. Five categories were considered in the multinomial logit regression for the sources of loans with the informal lender credit source set as the base category to which all outcomes would be compared to.

Age, farm size, marital status and food shortage were the variables that were insignificant at all levels in all credit sources of the estimation. All other variables were significant at either 1%, 5% or 10%.

Sex of household head can influence the source from which credit is demanded. Akudugu (2012) who studied factors that determine credit demand by farmers and supply by rural banks in Upper East region of Ghana is also consistent with this result. This variable (sex of household head) is significant at 5% level. The sex of household head or farmers can influence the decision to demand credit from the formal sector/banks source. The

relative risk ratio of 0.624 for the formal source indicate that female farmers are about 0.624 times more likely to choose credit from the formal sector as compared to males, holding all other factors constant. This is the source the female farmers would choose over the informal sector compared to males. This may be attributed to the facts that women are perceived to be better financial managers than men and the default rates for women are relatively lower than for men therefore are a trusted group of people by the formal sector category.

Education level is only significant in the friends or relative source of credit with a 5% significance level. It is insignificant at all the other sources. With a relative risk ratio of 0.587 less than 1, this means that uneducated farmers who have not had any form of formal education are more likely and more comfortable borrowing from friends or relatives than borrowing from the informal sector than farmers who have had some level of education. This may be due to the fact that some paperwork and commitments that must be done at other sectors make those sectors unattractive but these processes are usually not a requirement in accessing credit from either a friend or a relative. This is plausible because requesting credits in the other sectors require some level of literacy and understanding of the systems. This is often found very tedious and sometimes embarrassing for an uneducated farmer who would rather prefer to have credit from some other sector that does not require all the tedious paper-works and processes. This

result is also consistent with Ayamga (2006) on factors affecting the distribution of micro-credit program: an illustration for northern Ghana.

Household size is a significant determinant of credit access in the friends or relative credit source. At 10% level of significance, the associated relative risk ratio of the variable is 1.056. This value is larger than 1 which means that as household size increases by 1 person, farmers consider friends or relatives as a more comfortable source of accessing credit. Larger households usually have higher expenditure than smaller households. Households with larger numbers tend to source credit from friends and relatives compared to the informal lender source. This may be due to the fact that friends or relatives are easily accessible and they do not need any formalities before granting loans. This result is consistent with Shah (2008) who also studied determinants of credit program participation and socio-economic characteristics of beneficiaries: evidence from Sargodha.

FBO status of a farmer significantly affected the decisions of respondents to source credit from group-based microfinance institution and non-governmental organizations than sourcing credits from the informal source. This is consistent with the study by Akudugu et al. (2012) on the estimation of the determinants of credit demand by farmers and supply by rural banks in Upper East region in Ghana. The relative risk ratios associated with this variable for the two categories of credit sources are 0.664 and 0.630 respectively. These values are less than one which means that farmers who do not belong to FBOs have about 0.66 times and 0.63 times more likelihood of accessing credit from group based/microfinance and NGOs respectively compared to the informal sector than farmers who are members of FBOs, *ceteris paribus*. However, this variable had no significant effect on the decisions of the respondents to demand for credit from the formal/lender bank and friends or relatives.

Farmers who own lands have higher likelihoods of demanding credit from all the four categories compared to their counterparts do not own lands. This is significant at all levels at 1% and 5%. For instance, a farmer who owns a land is about 2.611 times more likely to access credit from the formal sector or bank compared to a farmer who does not own a land. This is significant at 1% level of significance. Similarly, a farmer who owns a land is about 1.634 times more likely to access loans from friends or relative compared to their counterparts who don't own lands. Again, with relative risk ratios of 1.918 and 2.444, land owners are 1.91 and 2.44 times more likely to demand credit from group-based microfinance and non-governmental organizations respectively and are significant at 1% level. In all of these, the choices are made over the informal credit sector. This is because the lands can be used as collateral to secure credit from the various sources. Also, this result is in accordance with the

findings of previous studies that reported that land ownership significantly influenced farmers' access to agricultural credit (Nguyen & Le, 2015; Saqib et al., 2017).

Location which was found to be a significant determinant for credit demand in all categories at 1% and 10% significant levels. This result is consistent with Kedir (2003) who studied determinants of access to credit and loan amount at household level: evidence from urban Ethiopia. The ratios associated with the variable for the four categories are 0.399 for the formal sector, 0.336 for friends or relatives, 0.593 for group based/microfinance and 0.346 for non-governmental organizations. These relative ratios which are less than 1 which means that, rural farmers have higher likelihoods of accessing credit from all four sources compared to their urban counterparts. This means urban farmers are more likely to access credit from the informal sector. This is counterintuitive considering that an urban farmer is better placed to access credit from at least the formal sector/bank. It is however, possible because the urban farmer would want to exploit cheaper credit sources compared to the rural farmer which could push them to the informal lender sector to demand for credit.

CONCLUSION AND RECOMMENDATIONS

This paper focused on smallholder maize farmers demand for credit in the northern part of Ghana. Using the multinomial logit model, we estimated the factors that influence smallholder farmers demand for credit in Ghana. The results showed that farmers demand for credit is influenced by an individual's sex, household size, education, member of farmer-based organization, location and land ownership. Informal lender credit source dominates the rural areas but these sources are usually not able to satisfy the credit needs of rural households because credit granted are often in smaller amounts. There is also the need to formulate policy measures to increase access of smallholder farmers to formal credit.

We therefore call on stakeholders to formulate policies that encourage demand driven financial services from both the formal and informal sectors and also make them available to people in rural areas. Again, policies aimed at educating farmers by encouraging and advising them on the need to demand for credit for their agricultural activities to enhance productivity. Credit insurance schemes can be formed to protect financial institutions against default risks and also protect borrowers from losing their assets that may be used as collateral to secure credit since this is a challenge as to why farmers refuse to demand for credit. Again, application process and requirements by financial institutions should be made flexible so that uneducated farmers will not be intimidated not to demand for credit.

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