

Agricultural Credit Allocation and Constraint Analyses of Selected Maize Farmers in Ghana

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ABSTRACT

The study analyzes factors influencing agricultural credit allocation and credit constraint condition of maize farmers in the Upper-Manya Krobo District in the Eastern region of Ghana. The study uses primary solicited from the maize farmers through a structured questionnaire. Using the paired sampled t-test to test for significant differences between the amounts of credit demanded and the amount received by farmers, it is revealed that the amount of credit received was significantly lower than the amount of credit demanded by farmers. The Probit regression model was then used to estimate the parameters of the determinants of credit constraint condition of farmers. Factors found to have significant influence on credit constraint conditions of the farmers are gender, household size of farmers, annual income of farmers and farm size. The Tobit regression model was used to estimate the parameters of the determinants of the rate of agricultural credit allocated to the farm sector. Factors found to have significant influence on the rate of agricultural credit allocation to the farm sector are age, bank visits before credit acquisition and the amount (size) of credit received. These results have implications for financial institutions' lending to farmers in developing countries.

Key Words: Agricultural Credit Allocation, Agricultural Credit Constraint, Maize Farmers, Ghana, Probit Regression, Tobit Regression

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1. INTRODUCTION

The Agricultural sector in Ghana plays a crucial role in reducing poverty and achieving economic growth. In Ghana, about 60 percent of the population relies on Agriculture for their livelihood (Al-Hassan and Diao, 2007). The potential of the Agricultural sector in securing incomes, employment and food supply and thus to reduce poverty among the Ghanaian population has greatly reduced. The greatest challenge to the development in the sector is low productivity and the reasons for this are numerous. Producers have little access to financial resources and modern technologies and their organizational structures are weak. Agriculture in the pre-historic period sustained humanity over the years with little or no significant attachment to capital for production (Ezedinma *et al.*, 1995). However, in this modern period, lack of

capital is regarded as one of the major constraints in expanding production and modernizing agriculture (Richard, 2000). Credit is considered as a major aspect of financial services which is fundamental in all production units (Dicken, 2007). There has been a general awareness of the importance of credit as a tool for agricultural development (Omonona *et al.*, 2008). In view of this, the need to provide farmers with credit is inevitable due to its importance in fostering agricultural development and also ensuring efficiency in the production process. In recent years, there has been a growing interest in understanding the impact of financial structure on production as well as on the efficiency of production (Barry and Robinson, 2001).

Agriculture is highly input intensive and agricultural products are used extensively by a number of agro-based firms in Ghana and as such a reduction in credit to the sector may have the potential of affecting both upstream and downstream firms. Therefore, the importance of institutional credit as a source of finance to agriculture cannot be overemphasized (Fosu, 1998). Agricultural credit can be obtained from both formal institutions and informal sources. In most cases, smallholder farmers are seen as conservatives and unattractive to new and improved technology. However, the fact is that they are rational not to engage in uncertainty bearing in mind their resource poor circumstances. They will need external support in the form of credit to accommodate the adoption of new practices and technology.

In most developing countries, agricultural credit is considered an important factor for increased agricultural production and rural development because it enhances productivity and promotes standard of living by breaking the vicious cycle of poverty of small scale farmers (Adebayo and Adeola, 2008). Credit is regarded as more than just another resource such as land, labor and equipment, because it determines access to most of the farm resources required by farmers. The explanation is that farmer's adoption of new technologies necessarily requires the use of some improved inputs which may be purchased. Credit also acts as a catalyst for rural development by motivating latent potential or making under-used capacities functional (Oladeebo and Oladeebo, 2008).

Generally, the accessibility of a good financial service is considered as one of the engines of economic development. Governments of less developed countries have frequently practiced the policy of providing cheap credit to the agricultural sector through financial intermediaries. This cheap credit, it was hoped, would lower the dependence on the rural money lenders (Pinaki, 1998). The provision of credit has increasingly been regarded as an important tool for raising the incomes of rural populations, mainly by mobilizing resources for more productive uses. As development takes place, one question that arises is the extent to which credit can be offered to the rural poor to facilitate their taking advantage of the developing entrepreneurial activities.

The usefulness of any agricultural credit program does not only depend on its availability, accessibility and affordability but also on its proper and efficient allocation and utilization for intended uses by beneficiaries (Obboh, 2008). However, credit diversion, poor repayment rate and loan default among farmers continue to be a challenge.

The use of farm production credit for consumption purpose is still an issue of controversy. Institutional lenders usually insist that, traditionally targeted production credit should be disbursed strictly for income-generating productive assets (such as fertilizer, seed or machinery). Any other use of farm credit for non-farm activities in this context is regarded as loan diversion.

Several studies that analyzed the use of credit among resource-poor rural dwellers concluded that credit was allocated mainly for agricultural and non-agricultural productive activities as well as for consumption purposes though at varying allocative proportions (Oyatoye, 1983; Zeller 1993; Zeller *et al.*, 1996; Berger, 1989; Schreider, 1995; Heidhues, 1992).

On account of this background this study was undertaken, to fill the vacuum in the literature on the factors that affect credit allocation to the farm sector. A better understanding of the farmers' behavior in allocating credit may assist policy makers in designing sustainable financial systems that can serve resource poor farmers better.

The objectives are fourfold: to analyze the amount of credit demanded and the amount received by farmers; to estimate the percentage of credit allocated to the farm and the non-farm sectors by farmers based on the amount of credit received; to analyze the factors that affect credit constraint condition of farmers; to estimate the factors that affect the rate of credit allocation to the farm sector.

The problems of agricultural credit in Ghana include source, availability and use. There is inadequate or complete absence of financial projections and planning, and also high level of illiteracy among farmers and lack of relevant information as to how, when and where to obtain credit. There is also lack of skilled personnel in our credit institutions to supervise and monitor loan packages as well as manage them, and diversion of credit to non-agricultural purposes by farmers. Every segment of agricultural production requires the availability of adequate capital since capital determines access to all other resources on which farmers depend (Ayoola and Oboh, 2000). However, small-holder farmers in the Upper Manya Krobo district as in other parts of Ghana are constrained by inadequate credit to carry on with meaningful agricultural activities. Accessibility to credit alone without good management by beneficiaries cannot guarantee the expected improvement in farmer's food production level, income and hence prompt loan repayment. It has been shown that farm level credit if well applied, enhances capital formation and diversified agriculture, increases resource productivity, size of farm operations, innovations in farming, marketing efficiency, value added and net farm incomes (Nwagbo *et al.*, 1989). The study, therefore, will help determine the credit situation of the farmers in the study area; help provide information that will enable financial institutions to understand credit usage by farmers and thereby formulate appropriate lending policies accordingly; help identify innovative options and institutional arrangements that would serve as an input for policy makers in formulating rural credit policy; and help policy makers in designing proper extension training programs regarding efficient credit utilization. This rest of the paper is organized as follows. Section two provides the literature review. Section three describes the research methodology that includes a brief description of the study area, data collection procedures and analytical techniques. Section four presents the results. Finally, summary of the major findings, conclusions, implications and recommendations are presented in Section five.

2. MATERIALS AND METHODS

2.1 Materials

Agricultural credit has been defined by several authors. For instance, Nwaru (2004) defined agricultural credit as the present and temporary transfer of purchasing power from a person who owns it to a person who wants it, allowing the later the opportunity to command another person's capital for agricultural purposes but with confidence in his willingness and ability to repay at a specified future date. It is the monetization of promises and exchanging of cash in the present for a promise to repay in future with or without interest. Without the willingness and ability to repay, the promise to repay at a future date would be futile.

Credit can be in cash or in kind. However, in this study we consider credit in cash. The control over the use of money, goods and services of another person termed credit is at a price usually regarded as the interest rate ((Adegeye and Dittoh, 1985; Ellis, 1992). The interest rate is required to be paid together with the amount borrowed at a specified time in the future.

Credit is an instrument whose effectiveness depends on the economic and financial policies that go with it (Nwaru, 2004). If well applied, credit should increase the size of farm operations, introduce innovations in farming, encourage capital formation, improve marketing efficiency and enhance farmers' consumption (Nwagbo, 1989; Nwaru, 2004). Udoh (2005), reported that the demand for credit tends to be a derived demand, which indicates that the borrowers will demand for credit based on the need for it and the satisfaction to be derived.

The financial institutions in Ghana can be classified into three categories: formal, semi-formal and informal. The formal finance sector is predominately made up of commercial banks, which are normally within urban areas; and for rural areas there are Rural Community Banks (RCBs) and their association the ARB Apex Bank. Ghana's semi-formal finance sector consists of credit unions, savings and loans (also known as Microfinance institutions), and non-governmental organizations

(NGOs). The informal finance sector consists of moneylenders, traders, family members, friends, neighbors, and the traditional Susu system.

Financial institutions that fall into this category are incorporated under the Companies Code 1963 (Act 179), which gives them legal identities as limited liability companies, and subsequently licensed by the Bank of Ghana under either the Banking Law 1989 or the financial Institutions (Non-Banking) Law 1993 to provide financial services under Bank of Ghana regulation (Steel and Andah, 2003). Most of these banks target urban, middle-income clients and higher net worth clients. However Rural Community Banks and the Agricultural Development Bank concentrate their focus within rural areas. Therefore, these two institutions have become the main source of financial resources for smallholder farmers.

Semi-formal institutions in Ghana consist of credit unions, savings and loans associations, and financial NGOs. Credit unions are organizations that offer savings and credit facilities exclusively to its members. However, these organizations are performing poorly because a majority of their focus is on welfare programs, and therefore cannot impose higher interest rates on their clients (Steel and Andah, 2003).

The credit union association (CUA) is similar to ARB Apex Bank, however, it does not have any control over portfolios. There are some credit unions that operate within banks whose tasks are to look for clients and to report back to the bank (Gyamfi, 2010). There are a total of 47 Savings and Loans reporting institutions in Ghana. As of 2009, services from Savings and Loans are provided to 358,717 borrowers, with an average loan balance of US\$ 290.9 per borrower (MIX Market, 2010). According to Mix Market there are 47 reported microfinance institutions in Ghana.

Ghana's Savings and Loans have 6 percent of portfolios at risk for more than 30 days. This is the at-risk average compared to its peer groups with East Asia and the Pacific at 4 percent, Eastern Europe and Central Asia at 4 percent, Latin America and the Caribbean at 5 percent, Middle East and North Africa at 3 percent, and South Asia at 2 percent (MIX Market, 2010).

According to Kashuliza *et al.* (1998), informal financial services refers to all transaction, loans and deposits that take place outside the regulated monetary system and these include activities of intermediaries such as relatives and friends, traders and moneylenders.

In Ghana, informal credit is defined to embrace all financial transactions that take place beyond the functional scope of banking and other financial sector regulations.

Informal credit transactions can be grouped into noncommercial transactions, such as transactions between relatives and friends or small-scale group arrangements, and commercially based ones, conducted by savings collectors, estate owners, landlords, traders, and moneylenders. Informal financial units have been formed to meet the demand of a diverse customer base (Nissanke and Aryeetey, 2006). There has been substantial increase in demand for informal credit and savings in Ghana. This is due to an increase in unsatisfied demand for formal sector credit, which has been continuously restrained as part of stabilization efforts.

Ghana has a mature informal credit system in the rural areas that satisfies the urgent demand of the people for production and consumption. The informal credit system also helps to meet the pressing social commitment, such as paying the cost of the sick and funeral expenses (Ekumah and Essel, 2001). Sources of the informal credit are relatives, friends, traders and/or private moneylenders and landlords. Relatives, that is, close family relations, and friends do not normally charge interest. But depending on their claims to the sources of the money being lent, some may do so. In any case, interest charged by relatives and friends are, however, exceptions to the rule. The interest rates charged by moneylenders are between a 50-percent and 100-percent base on the period that was contracted with the borrower (Ekumah and Essel, 2001). One of the characteristics of informal credit in Ghana is that it does not attach different risk to borrowers within their usual clientele. Borrowers are preselected by membership requirement especially in group-based arrangements. Traders on the other hand only lend to people with whom they have a business relationship. According to Nissanke and Aryeetey (2006), moneylenders are the only informal lenders that do not lend to distinct clientele. A study by Udry (1990, 1994), stated that screening in the formal sector depends extensively on the personal knowledge of borrowers. He explains that the development of personal ties and proximity is a mechanism for countering the effects of adverse selection and moral hazard.

In Ghana, moneylenders do not require a business relationship with applicants for loan approval. Given the lack of competitive pressure, moneylenders respond to possible risk variations by charging different interest rates to different borrowers. Nissanke and Aryeetey (2006) explained that moneylenders and other informal groups do not monitor loans because of free information circulation in their operating circles. Udry (1994) stated that nonpayment of loans in the informal sector is relatively low. Nissanke and Aryeetey (2006) observed in their studies that 70 to 80 percent of the sample used reported no delinquency in terms of borrowing. They also observed that the largest proportion of defaulters' borrowers was found in rural credit unions and cooperatives.

Among group-based arrangements and in rural areas, mechanisms such as peer pressure or a potential use of social stigmatization are effective. Udry (1990) stated an instance where a lender's plea with community authorities in response to a perceived default led to a prompt repayment. Ironically, when the number of defaulters in a rural cooperative arrangement is large, the sanction of stigmatizing an individual fails to be effective.

The informal financial sector consists of moneylenders, traders, susu, and other forms of credit like family, friends, and neighbors. The two most important players for rural finance within this structure are the susu (savings collections) and traders. The susu system is a traditional savings collection system, and is taught to have originated in Nigeria and came to Ghana in the early twentieth century (Asiama and Osei, 2007). Currently, there are roughly 4,032 susu collectors and clubs that operate within Ghana (UNCDF, 2008). There are at least five different types of susu institutions: collectors, associations, clubs, companies, and some licensed financial institutions that offer a Susu savings plan. There has also been growing linkages of susu with the formal sector and NGOs in Ghana to provide financing services in Ghana's rural areas. The main purpose is to succeed both in mobilizing savings from lower-income households and giving them access to financial services that are part of the formal system through the combination of licensed financial institutions and traditional methodologies. The scheme usually works primarily through susu club operators, with services that include receiving their weekly collections and making loans to the operator. These methodologies have been particularly effective in reaching lower-income brackets and women, who constitute 65 percent to 80 percent of the clients of these Susu schemes (UNDCF, 2008).

Traders have also been a major component of rural finance in Ghana, who operates between producers in rural areas and urban markets. They provide credit in the form of inputs on supplier's credit or an advance against future purchases of crops. Traders do not usually require collateral, but rather the agreement of the farmer to sell them crops over an agreed period (Steel and Andah, 2003). These growing linkages with credit unions and Susu collectors provide an important foundation for greater outreach to rural clients.

Ike (2008) in assessing credit availability, utilization and repayment among smallholder women crop farmers in Enugu state, Nigeria employed the multiple regression model in analyzing the influence of some socioeconomic variables on the rate of credit allocation to the farm sector. The socioeconomic variables included in the multiple regression models are: age of farmers, number of years spent in formal education, annual income, farming experience household size, extension contact, timeliness of loan delivery and marital status of the respondents. The study found out that factors that significantly affected the rate of credit allocation to the farm sector include age, education, farm size, household size, length of loan delay and visitation by NGO credit officers. Oboh and Ekpebu (2010) in their study on determinants of formal agricultural credit allocation to the farm sector by arable crop farmers in Benue State, Nigeria employed the multiple regression models in determining factors affecting the rate of credit allocation to the farm sector. The study revealed that age, education, farm size, loan delay, bank visit and household size were significant variables that affect the rate of credit allocation to the farm sector. According to Nwaru (2005), education was also a significant variable and had a positive effect on the rate of credit allocation to the farm sector. He explained that an educated farmer, other things being equal, allocates farm resources more efficiently.

Emerole (2004) revealed that farm size had a positive effect on the rate of credit allocation to the farm sector. He indicated that an increase in farm size necessarily requires the employment of more farm inputs which in turn require additional capital for their purchase. Nweze (1991) revealed that loan delay had an inverse relationship with the rate of credit allocation to the farm sector. He further explained that untimely release of loans tends to tempt farmers to direct the loan for unintended uses. Majeha (2005) in his study also found out that household size maintained a negative relationship with the rate of agricultural credit allocation to the farm sector. In his study he found out that, farmers with high household sizes tended to divert their loans for the sustenance and upkeep of family members. Omonona *et al.* (2008) did a study on credit constrained condition and output supply of Country Women Association of Nigeria (COWAN) farmers in Oyo state, Nigeria. In this study they found out that majority of the farmers (80 percent) were credit constrained and therefore this affected their productivity. His results showed that age, sex, farm size, level of education, marital status, contact with extension agent, land acquisition and income of household head were the determinants of credit constrained conditions of farmers. Omonona *et al.* 2010 in assessing the determinants of credit constraint conditions and production efficiency among farming households in South Western Nigeria employed the probit regression model to identify the determinants of credit constrained condition of farmers in that area. The results of the probit model showed that age, gender, education and dependency ratio of farmers are significant variables that influenced credit constraint conditions of the farmers. Oyedele *et al.* (2009) in assessing credit constrained condition of farm households and profitability of agricultural production in Nigerian agriculture employed a probit regression model in identifying the determinants of credit constrained conditions of farm households in that area. The results of the probit analysis showed that farmer's age, household size, gender, size of landholding, access to other credit, value of other assets, monthly household expenditure and choice of crop and livestock enterprises were the significant variables that determined the credit constrained condition of the credit beneficiaries. Nuryartanon *et al.* (2005) in assessing credit rationing of farm households and agricultural production in the rural areas of central Sulawesi, Indonesia employed a probit regression model in identifying the determinants of credit constrained condition of farm households in that area. The results of the probit regression analysis indicated that education, age and annual income were significant variables in determining whether a household is credit constrained. Baiyegunhi *et al.* (2010) in assessing credit constraints and household welfare in the Eastern Cape Province, South Africa employed a probit regression model in identifying the determinants of credit constrained conditions of farmers in that area. The results of the probit regression model indicated that the age of the household head, access to land, and asset value and repayment capacity are statistically significant factors determining the credit constraint condition of the sampled households.

2.2. Methods

This section presents the description of the study area. It also presents the types and sources of data used for the analysis and the sample and sampling method. The various methods used in achieving the specific objectives of the study are also outlined in this section.

The Upper Manya Krobo district is located within latitudes 6° 20" North and 6°50"North and longitudes 0° 30"West and 0° 00" West. The district covers an area of 885 sq. km, constituting 4.8% of the total land area of the Eastern Region. The district shares boundary with the Volta Lake in the North, Fantekwa District in the West, Asuogyaman District in the East, Yilo Krobo District in the South-West and Lower Manya Krobo in the South-East. The estimated population of Upper Manya Krobo District as at 2000 stood at 89,646 people.

The district falls within the semi-equatorial climate belt. It has two major seasons, namely the wet and dry seasons. The wet season is from April to early August and from September to October. August is normally dry and cold with November to March being dry and warm. The total amount of rainfall is between 900 mm and 1,150 mm. Relative humidity is high during the wet season between 70% and 80% and low in the dry season about 55% - 60%. Two major winds affect the climate of the district.

300 These are the wet South-west trade winds which blow across the district from the Atlantic Ocean
301 between March and July and the Northeast trade winds (harmattan) from the Sahara desert between
302 November and early March. The temperatures are generally high with average ranging between about
303 26° C and 32° C.

304 The topography of the district can be generally described as undulating. The highest point in the
305 district is over 660 meters above sea level located in the southern part of Sekesua. The lowest area
306 which is located in the south- eastern part of the district is about 50 meters above sea level. The
307 average height of the land is about 452 meters above sea level. Underlying these landmasses are
308 several rocks or parent rocks from which several rocks have developed.

309 The district is drained with several rivers such as the Volta, Dawado and Anyaboni. With the
310 exception of the Volta River, almost all these rivers are seasonal with most of them overflowing their
311 banks during the rainy season. The dominant vegetation cover is semi-deciduous forest and derived
312 Savannah zone. Human activities on the vegetation have resulted in scattered patches of secondary or
313 broken forest. Traditional practices such as collection of fuel wood, charcoal burning and overgrazing
314 coupled with climate change have degraded the vegetation. Because of these the semi-deciduous
315 forest is gradually turning into savannah woodland especially at areas like Akateng, Sesiamang and
316 Akotoe. These activities have resulted in low crop yields, poor soil fertility, surface run-off and
317 erosion among others.

318 Quantitative data was collected from primary data sources. Structured questionnaire was
319 prepared and administered to the sampled respondents to collect the necessary data
320 needed for the study. Primary data source was the sampled farm households including both
321 male and female headed maize farmers receiving agricultural credit from the Asesewa Rural
322 Bank in the Upper Manya-Krobo district. Secondary data source was the district office of
323 Ministry of Food and Agriculture (MoFA) located in Asesewa. The questionnaire was pre-
324 tested to evaluate for consistency, clarity, ambiguity and to avoid duplication, and to estimate
325 the time requirement during data collection.

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327 The data collection process required a preliminary survey in order to construct the sampling
328 frame and draw a sample. A pilot study was conducted for this purpose. A multi-stage
329 sampling procedure was employed for selecting individual respondents in the study. A
330 population of smallholder maize farmers who receive agricultural credit from the Asesewa
331 Rural Bank was identified in the study area with the help of the district office of the Ministry
332 of Food and Agriculture (MoFA). A list of maize farmers who received agricultural credit for
333 the 2011 cropping season was provided by the district office of MoFA. With the aid of the list
334 provided three zonal areas namely: Asesewa, Sekesua and Anyaboni were purposively
335 selected. A random sampling technique was then used to select 50 farmers each within the
336 three zones to get a total of 150 maize farmers. In the end 130 properly filled questionnaires
337 were returned and utilized for analysis.

338 The paired-sample t-test was used to test for significant differences between the amount of
339 credit applied by farmers and the amount of credit received by the farmers.

340 Descriptive statistics (means, frequency distribution, percentages) was used to analyze the
341 percentage of credit allocated to the farm and the non-farm sectors based on the amount of
342 credit received.

343 The Probit regression model was employed to analyze the factors that influence credit
344 constraint conditions of farmers.

345

346 According to Nagler (2002), the Probit model constraints the estimated probabilities to be
347 between 0 and 1 and relaxes the constraint that the independent variable is constant across

different predicted values of the dependent variable. This is normally experienced with the Linear Probability Model (LPM). The Probit model assumes that while we only observe the values of 0 and 1 for the variable Y, there is a latent, unobserved continuous variable Y^* that determines the value of Y. The other advantages of the Probit model include believable error term distribution as well as realistic probabilities (Nagler, 1994). Therefore, for this analysis the Probit model is preferred and used. We assume that Y^* can be specified as follows:

$$Y_i^* = \beta_0 + \sum_{j=1}^8 \beta_j X_j + \varepsilon_i \quad (1)$$

$$Y_i = 1 \text{ if } Y^* > 0$$

$$Y_i > 0 \text{ Otherwise}$$

Where $X_1, X_2, X_3, \dots, X_K$ represent vector of random variables, β_i represent a vector of unknown parameters and ε_i represent a random disturbance term (Nagler, 2002).

The empirical probit model specified to analyze the credit constraint condition of the maize farmers can be expressed as follows:

$$Y_i = \beta_0 + \beta_1 X_1 + \beta_2 X_2 + \beta_3 X_3 + \beta_4 X_4 + \beta_5 X_5 + \beta_6 X_6 + \beta_7 X_7 + \beta_8 X_8 \quad (2)$$

where X_1 denotes age of the farmers; X_2 denotes the square of the age of the farmers; X_3 denotes gender of the farmers; X_4 denotes the household size of the farmers; X_5 denotes the number of years of formal education of the farmers; X_6 denotes the annual income of the farmers; X_7 denotes farming experience; X_8 denotes farm size.

Table 1: Description, Measurement and a priori expectations of the variables used in the probit model

Variables	Description	Measurement	A priori expectation
age	Age of farmers	Years	+
agesquared	Age squared	Years	+
gend	Gender of farmers	Dummy:1 if male, 0 otherwise	-/+
hhsiz	Household size of farmers	Number of people	+
edu	Number of years of formal education	Years	-
ann	Annual income	Ghana cedis	-
farmexp	Farming experience	Years	-
famsiz	Farm size	Acres	+

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374

375 **Analysis of the factors that affect the rate of credit allocation to the farm sector**

376 The objective which sought to analyze the rate of credit allocation to the farm sector was
377 achieved with the use of the Tobit model. Following Maddala (1992), Amemiya (1985) and
378 Johnston and Dinardo (1997), the Tobit model can be defined as:

379
$$Y_i^* = \beta_0 + \sum_{j=1}^{13} \beta_j X_j + \varepsilon_i \quad (3)$$

380
$$Y_i = Y_i^* \text{ if } Y_i^* > 0$$

381
$$Y_i = 0 \text{ if } Y_i^* \leq 0$$

382 Where, Y_i denotes the observed dependent variable; Y_i^* denotes the latent which is not
383 observable; X_j denotes vector of factors affecting the rate of credit allocation to the farm
384 sector; β_j denotes vector of unknown parameters; ε_i denotes residuals that are
385 independently and normally distributed with mean zero and a common variance σ^2 . The
386 Tobit model shown above is also called a censored regression model because it is possible
387 to view the problem as one where observations of Y^* at or below zero are censored
388 (Johnston and Dinardo, 1997). The empirical Tobit model specified to analyze the factors
389 that affect the rate of credit allocation to the farm sector can be expressed as follows:

390
$$Y_i = \beta_0 + \beta_1 X_1 + \beta_2 X_2 + \beta_3 X_3 + \beta_4 X_4 + \beta_5 X_5 + \beta_6 X_6 + \beta_7 X_7 + \beta_8 X_8 + \beta_9 X_9 + \beta_{10} X_{10} +$$

391
$$\beta_{11} X_{11} + \beta_{12} X_{12} + \beta_{13} X_{13} \quad (4)$$

392 Where, $X_1, \dots, X_8$ are as defined above, and $X_9, X_{10}, X_{11}, X_{12}, X_{13}$ denote Extension visits,
393 Loan delay, Bank visit before loan acquisition, Bank visit after loan acquisition, and Amount of credit
394 received, respectively.
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411 **Table 2: Farmer Household Characteristics Affecting the Rate of Credit Allocation**
 412 **to the Farm Sector**

Variables	Description	Measurement	A priori expectation
perafsec	Percentage of credit allocated to the farm sector	Percentage	
age	Age of farmers	Years	+
agesquared	agesquared	Years	-
gen	Gender of farmers	1 if male, 0 otherwise	-/+
hhsiz	Household size	Numbers	-
edu	Number of years of formal education	Years	+
ann	Annual income	Ghana cedis	+
farmexp	Farming experience	Years	+
famsiz	Farm size	Acres	+
extvist	Extension visits	1 if visited, 0 otherwise	+
londel	Loan delay	Days	-
banvbf	Bank visit before loan acquisition	1 if visited, 0 otherwise	+
banvaf	Bank visit after loan acquisition	1 if visited, 0 otherwise	+
amtrecvd	Amount of credit received	Ghana cedis	+

413 4. Empirical Application

414

415 4.1 Demographic Characteristics of Respondents

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417 From the descriptive analysis majority (40%) of the farmers were between 41-50 years with a mean
 418 age of 46 years. Male headed households constitute 86.9 per cent and female headed households
 419 constitute only 13.1 per cent. The mean household size is 7 members per household. Majority of the
 420 farmers (62.3%) spent 10 years in formal education.

421

422 4.2 Credit Status of Respondents

423

424 The credit status of the farmers in the study area is shown in Table 1. The table shows that out of the
 425 130 maize farmers interviewed, one hundred and twenty four (124) of them were credit constrained
 426 representing 95.38 % while the remaining six were credit unconstrained representing only 4.62%.
 427 This result shows that most of the maize farmers in the study area are credit constrained and this is a
 428 big challenge in the study area as it is likely to affect farm productivity and in effect also affect the
 429 profitability of the farm business. This result is consistent with the earlier findings of Hussien, 2008.

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434 **Table 1: Credit Status of Respondents**

Credit Status	Constrained	Unconstrained	Total
Frequency	124	6	130
Percentage	95.38	4.62	100

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436 **4.3 Amount of credit applied for and amount received by farmers**

437 The results of the t-test analysis used to determine whether significant differences exist between
 438 amount of credit applied for and amount received by farmers indicated that the mean value of credit
 439 received (GH¢ 2,114.60) was significantly lower than the mean value of credit applied (GH¢
 440 2,746.90) at 1% significance level (see Table 2). The inadequate amount of credit granted to
 441 applicants might limit their capacity to finance their farm investment plans thereby affecting farm
 442 output and productivity negatively. This result confirms earlier findings of Oboh and Ekpebu (2011)
 443 and Ike (2008). For example, Oboh and Ekpebu (2011) found out that the mean value of credit
 444 received by arable crop farmers in Benue State, Nigeria was significantly lower than the mean value
 445 of credit demanded at one percent (1%) level of significance.

446

447 **Table 2: The results of the paired t-test showing significant difference between**
 448 **amount of credit applied and amount received by farmers**

Variables	Individual Mean	t-value	Degree of freedom	Significance (2-tailed)
Loan applied	2,746.90	17.29	129	.000***
Loan received	2,114.60			

449 ***Significance at 1% level

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451 **4.3 Percentage of credit allocated to the farm and non-farm sector based on the total amount of**
 452 **credit received**

453 Table 3 below presents the amount and the respective percentage of credit allocated to the farm and
 454 the non-farm sectors across the various categories of loan amount. On a comparative basis,
 455 beneficiaries belonging to low loan amount category ($\leq$ GH¢ 1000) allocated less of their loans to the
 456 farm sector and by implication, more to the non-farm sector. On the other hand, beneficiaries in the
 457 high loan amount category (GH¢ 5100-GH¢ 6000) allocated more of their loans to the farm sector.
 458 These results suggest that there is high propensity for low loan amount (which seems inadequate for
 459 meaningful farm work) to be easily diverted for non-farm activities. The results indicate that as
 460 farmers credit portfolio increases, the percentage of credit allocated to the farm sector increases
 461 while the percentage of the credit allocated to the non-farm sector decreases.

462 The average amount of credit allocated to the farm sector by all the farmers in our sample was 72.43%
 463 leaving the balance of 27.57% to the non-farm sector. This is called the average budget share (ABS)
 464 and it is a measure of the percentage of total credit spent on each sector. Even though, the ABS value
 465 of 72.43 for the farm sector is relatively high, the value of 27.57% for the non-farm sector suggests
 466 that there is a reasonable level of loan diversion. This finding is consistent with the findings of Rabo
 467 *et al.* (2001) in which about 36.7% of small scale farmers institutional credit intended for farm
 468 activities in Bauchi State in Northern Nigeria was diverted. This finding is also consistent with earlier
 469 findings by Ike (2008). The study of Ike (2008) showed that averagely 56.1% of the loan received by
 470 farmers was directly allocated to the farm sector for farm activities while the remaining 43.9% was
 471 diverted to the nonfarm sector. This finding is also consistent with earlier finding by Oboh and
 472 Ekpebu (2011). The study by Oboh and Ekpebu (2011) showed that 43.9% of the loan received by

473 arable crop farmers in Benue State, Nigeria meant for farm activities was diverted and spent on
474 nonfarm activities.

475 **Table 3: Allocation of Credit by Respondents between the Farm and the Non-farm**
476 **Sectors**

Credit Allocation (%)			
Amount of credit (GH¢)	Farm sector	Non-farm sector	Total
≤1000	49.00	51.00	100
1100-2000	69.89	30.11	100
2100-3000	72.25	27.75	100
3100-4000	78.21	21.79	100
4100-5000	81.89	18.11	100
5100-6000	83.33	16.67	100

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478 **4.4 Analysis of Factors that Influence Credit Constraint Conditions of Farmers**

479 Probit regression model was used to identify factors influencing credit constraint condition of farmers.
480 The socioeconomic variables included in the Probit regression model are age, age-squared, gender,
481 household size, education, annual income, farming experience, farm size and extension visits. Table 4
482 below shows the maximum likelihood estimates of the Probit model. In the model, coefficient of four
483 out of eight explanatory variables was found to be significant. The results reveal that the gender of
484 farmers, household size of farmers, annual income of farmers, farm size of farmers and extension
485 visits are significant variables that influence credit constraint condition of the farmers.

486 **Table 4: Probit Regression Results of the Factors Influencing Credit Constrained**
487 **Condition of Farmers**

Variable	Coefficient	Robust Std. Err.	P-value
Age	.1497627	.2179647	0.492
Age squared	-.0008952	.0023692	0.706
Gender	1.908175	1.098749	0.082*
Household size	.4529769	.1505312	0.003***
Education	.0019988	.0725811	0.978
Annual income	.001015	.0003353	0.002***
Farming experience	-.0549166	.0666358	0.410
Farm size	-.1636943	.0478471	0.001***
cons	-9.599127	5.792543	0.097
Number of observations (130)	Wald chi ² (8) (18.11)	Prob>chi ² (0.0204)	Pseudo R ² (0.5528)

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*** significant at 1% * significant at 10%

Gender was found to be significant at 10% and has a positive coefficient. This result means that males are associated with high levels of credit constraints compared to the females. This result is contrary to expectation. For example, the study of Lawal *et al*, 2009 and Omonona *et al*, 2008 observed that male

farmers were associated with reduced levels of credit constraints as compared to their female counterparts.

Household size has a positive coefficient, which significantly influences credit constrained status of the farmers. The positive sign and significance of the coefficient imply that farm households with more household members have high probability of being credit constrained. This may be attributed to the high credit demands by larger families to cultivate large farm sizes, for the sustenance of these families. This result is consistent with that of Nuryatono *et al.* (2005). This finding is also consistent with the findings of Oyedele *et al.* (2009) who observed that credit beneficiaries with more household members were more credit constrained.

Annual income was found to be a significant variable which influences credit constraint conditions of farmers positively. The positive sign for the coefficient of this variable suggests that farmers with high annual income are more credit constrained than farmers with low annual income. This finding is contrary to expectation. For example, the study of Akram *et al.* (2008) observed a negative relationship between annual income and credit constrained condition of farmers.

Farm size was expected to impact positively on credit constrained condition of the farmers. The study however observed a negative relationship between farm size and credit constrained condition of the farmers. This finding is contrary to expectation. For example, the study of Omonona *et al.* (2008) observed a positive relationship between farm size and credit constrained condition of farmers.

4.5 Analysis of factors that affect the rate of credit allocation to the farm sector

The Tobit regression model was used to analyze the factors influencing credit allocation to the farm sector. Socioeconomic variables included in the Tobit model are age, age-squared, gender, household size, education, annual income, farming experience, farm size, extension visits, loan delay, bank visit before credit acquisition, bank visit after credit acquisition and size of loan received. The result of the Tobit model shows that four out of the thirteen variables were found to have significant influence on credit allocation to the farm sector (see Table 5). These variables were age of the farmers, age squared, bank visit before credit acquisition and size of loan received.

Age was found to be a significant variable which influences the rate of credit allocation to the farm sector by the farmers, negatively. The negative sign and significance of the coefficient of this variable imply that as the farmer increases in age, there is a decrease in credit allocation to the farm sector. However, age squared has a positive relationship with credit allocation to the farm sector. This result is consistent with the study of Oboh and Ekpebu (2011) and Ike (2008) who revealed that credit allocation to the farm sector increases with the age of the farmers.

Bank visits before loan acquisition specified as a dummy variable was found to be a significant variable which affects the rate of credit allocation to the farm sector. The coefficient for this variable also had a positive sign implying that respondents visited by bank officials tend to allocate more funds to the farm sector. This result is consistent with earlier findings of Ike (2008) who revealed that farmers visited by credit officers providing loans tended to allocate more funds to the farm sector. This result is also in line with earlier findings by Oboh and Ekpebu (2011) who reveal that arable crop farmers in Benue State Nigeria, who were visited by bank officials, allocated more of their credit to the farm sector and in effect less to the nonfarm sector.

The size (amount) of loan received was also found to be a significant variable which affects the rate of credit allocation to the farm sector positively, implying that credit allocation to the farm sector increases with an increase in the amount of credit received. This means that as farmer's amount of credit received increase, the percentage of the credit allocated to the farm sector also increase. Thus, that there is a direct positive relationship between the amount of credit received by farmers and the rate of allocation to the farm sector. If the amount is large then credit allocation to the farm sector increases and vice versa. This result is somewhat consistent with earlier findings of Noshiru (2010) who reveal that micro credit enabled farmers to buy the inputs they needed to increase their agricultural productivity.

547 **Table 5: Tobit Regression Results of the Factors Influencing Credit Allocation to the**
 548 **Farm Sector**

Variable	Coefficient	Robust Std. Err.	P-value
Age	-1.678647	.8129167	0.041**
Age squared	.0197057	.008404	0.021**
Gender	1.616665	5.265839	0.759
Household size	.7892378	.522362	0.134
Education	.3413959	.2940639	0.248
Annual income	.0000407	.0006706	0.952
Farming experience	-.1742334	.2908091	0.550
Farm size	.0890857	.2552068	0.728
Extension visit	-5.115038	3.750744	0.175
Loan delay	-.0217141	.0950807	0.820
Bank visit before credit acquisition	13.28136	3.414263	0.000***
Bank visit after credit acquisition	-.8985074	3.115754	0.774
Amount of credit received	.005823	.0013291	0.000***
cons	77.26323	20.40017	0.000
Number of observations (130)	Pseudo R ² (0.0488)	Prob>chi ² (0.0000)	LR chi ² (52.66)

549 Source: Survey Data *** significant at 1% ** significant at 5%

550 5. CONCLUSIONS

551 The study seek to analyze the effect of socio-economic factors on credit constraint of farmers and the
 552 rate of credit allocation to the farm sector in the Upper Manya Krobo District of Ghana. Primary and
 553 quantitative data was solicited from the sampled farm households receiving agricultural credit from
 554 the Asesewa Rural Bank in the Upper Manya Krobo District. All predictor variables were obtained
 555 from the primary data gathered. In order to determine the amount of credit demanded and the amount
 556 received by farmers, descriptive statistics and the paired-sample t-test were used. Descriptive statistics
 557 was also used to analyze the amount of credit allocated to the farm and non-farm sectors respectively.
 558 The probit regression model was used to identify the determinants of credit constrained condition of
 559 the maize farmers, while the Tobit regression model was then used to identify factors that affect credit
 560 allocation to the farm sector.

561 The results of the paired sample t-test analysis to determine whether significant differences exist
 562 between amount of credit applied and amount received by farmers revealed that the mean value of
 563 credit received was significantly lower than the mean value of credit applied at one per cent
 564 significance level. The study also revealed that farmers who received low loan amount allocated less
 565 of their loans to the farm sector and by implication more to the non- farm sector. Farmers who

received high amount of loan allocated more of their loans to the farm sector and less to the non-farm sector. Averagely farmers allocated 72.43 per cent of their loans directly to the farm sector while the remaining 27.57 per cent was diverted for non-farm activities.

The Probit regression model reveal that out of the eight explanatory variables considered, four were found to have significant influence on credit constrained conditions of the farmers: gender, household size, annual income and farm size. Also out of the thirteen explanatory variables considered in the Tobit regression model, four were found to have significant influence on credit allocation to the farm sector: age; age squared, bank visits before loan acquisition and the amount (size) of loan received.

The study provides the following recommendations. Bank visits before credit acquisition and the amount of credit received has a positive influence on the rate of agricultural credit allocation to the farm sector. Therefore, it is imperative that bank officials visit farmers on their farms before granting them loans, and also farmers must be granted the required amounts of loan to enhance the rate of agricultural credit allocation to the farm sector to ensure increased productivity of crops grown for increased welfare and livelihood of these farmers and the citizens of the country as a whole.

The study provides the some contributions to the existing literature by assessing the credit constraint conditions of maize farmers and the factors influencing this condition, as well as analyzing the factors influencing the rate of credit allocations by these farmers to the farm sector vis-à-vis the non-farm sector. Therefore, the results of this study would enhance our understanding of credit constraint conditions and credit allocation decisions by farmers in developing countries, as well as provide a guide to lending institutions to the farm sector.

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