*Asian Journal of Agricultural Extension, Economics & Sociology*
*9(3): 1-13, 2016; Article no.AJAEES.21946*
*ISSN: 2320-7027*

**SCIENCEDOMAIN *international***
www.sciencedomain.org

# Economic and Institutional Elements of Loan Repayment Capacity of Smallholder Farmers in the Transitional Zone of Ghana

**Vincent Abankwah[1*], Dadson Awunyo-Vitor[2] and Yussif Abdul-Rahman Seini[3]**

*[1]Department of Agricultural Economics and Extension, University of Education, Winnba, Ghana.*
*[2]Department of Agricultural Economics, Agribusiness and Extension, Kwame Nkrumah University of Science and Technology, Kumasi, Ghana.*
*[3]Department of Climate Change and Food Security, University for Development Studies, Wa, Tamale, Ghana.*

***Authors' contributions***

*This work was carried out in collaboration with all authors. Author VA designed the study, conducted the literature searches, performed the statistical analysis and wrote the first draft of the manuscript. Authors DAV and YARS managed the data collection, reorganized and edited the manuscript. All authors read and approved the final manuscript for publication.*

***Article Information***

DOI: 10.9734/AJAEES/2016/21946
Editor(s):
(1) Jamal Alrusheidat, Assistant and Consultant to Director general for Extension Education, Director of Extension Education Department, National Centre for Agricultural Research and Extension (NCARE), Amman, Jordan.
Reviewers:
(1) Sanjay Kanti Das, Lumding College, Assam, India.
(2) Tsung-Yu Hsieh, MingDao University, Taiwan.
Complete Peer review History: http://sciencedomain.org/review-history/12922

***Original Research Article***

***Received 10th September 2015***
***Accepted 7th November 2015***
***Published 7th January 2016***

## ABSTRACT

Farmers in developing countries have been identified as the most defaulting group of credit beneficiaries. While credit remains the second largest source of farm capital, prospective borrowers are denied access to credit as a result of high loan delinquency among farmers. This phenomenon does not only reduce farmer productivity but contributes also to dwindling household income and food security. In order to improve agricultural credit programmes and make them sustainable, it is imperative to examine the loan repayment capacity of farmers. The objective of this study was to identify the borrower-specific characteristics as well as institutional factors that determine the loan repayment capacity of smallholder farmers. The study was conducted in the Ejura-Sekyedumasi

**Corresponding author: E-mail: vincentabankwah@yahoo.com;*

District and Mampong Municipality of Ghana. Primary data used for this study were collected from a cross section of smallholder farmers who received credit from formal and semi-formal credit institutions for farming activities between 2009 and 2011 farming seasons. A two-stage sampling technique was used to select 120 loan beneficiary farmers comprising 60 defaulters and 60 non-defaulters. The data set was analyzed using descriptive statistics and probit model. The study revealed that farmer's age, sex, household membership, income and farming systems significantly influence loan repayment capacity. More so, relatively low interest rate, post disbursement monitoring, moratorium and repayment schedule were institutional factors found to influence loan repayment by smallholder farmers.

*Keywords: Ghana; loan repayment capacity; smallholder farmers; probit model; credit.*

## 1. INTRODUCTION

Agricultural credit remains one of the major sources of acquiring inputs for agricultural production in Ghana. Kay and Edward [1] have indicated that credit is the second largest source of farm capital after equity capital. Duncan [2], however, observed that only a few small-scale farmers benefit from formal source of loans from financial institutions as a result of the difficulty in fulfilling their loan obligations. He established that the wise use of credit and honouring repayment schedule encourage more credit to be made available for further use. No matter how financially endowed, no financial institution can successfully operate a revolving loan scheme without loan beneficiaries fulfilling their financial obligations. Adejobi and Atobatele [3] identified that Loan delinquency has been the bane of agricultural financing among small-scale farmers in developing counties. Failure by farmers to repay their loans on time or to repay them at all has been a serious problem faced by both agricultural credit institutions and smallholder farmers. Poor loan repayment in developing countries has become a major problem in agricultural credit administration, especially to smallholders who have limited collateral capabilities [4]. As a result of high default rate among farmers, lending institutions are reluctant in advancing loans to farmers.

Farmers in the developing countries have been identified as the most defaulting group of credit beneficiaries. While credit remains the second largest source of farm capital, prospective borrowers are denied access to credit by financial institutions as a result of high loan delinquency among farmers [2,3]. This phenomenon does not only reduce farmer productivity but contributes also to dwindling household income and food security. In order to improve agricultural credit within financial institutions, it is imperative to examine the loan repayment capacity of farmers. The objective of the study is to identify the borrower-specific characteristics as well as institutional factors that determine the loan repayment capacity of smallholder farmers. The findings of the study may reorient lending institutions and give them insight to come out with innovative and novel strategies to boost the repayment capacity of agricultural borrowers. The findings may also facilitate a paradigm shift towards advancing loans to farmers with high repayment capacity while building the capacity of prospective client who exhibits traits of loan delinquency. This will contribute to household food security and improved farm incomes.

The rural financial market in Ghana is composed of formal, semi-formal and informal financial institution [5,6]. Ghate [7] defined formal financial services providers as registered companies that are licensed to offer financial services by Central Monetary Authority. He asserted that these institutions are largely urban-based in terms of distribution of branches and the concentration of deposit and lending activities. According to Kashuliza et al. [8] informal financial service refers to all transaction, loans and deposits that take place outside the regulated monetary system including activities of intermediaries such as relatives and friends, traders, money lenders. Semi-formal institutions are described by Steel and Andah [6] as institutions which are registered to provide financial services and are not controlled by Central Monetary Authority.

The literature on factors influencing loan repayment performance among financial institutions is very sparse and limited mainly to microfinance experience in low-income countries [9]. Ledgerwoods [10] categorized factors affecting loan repayment capacity of farmers into four: borrower characteristics, business characteristics, lender characteristics and, extraneous factors.

Several studies [11-13] show that when a loan is not repaid, it may be a result of the borrowers' unwillingness and/or inability to repay. According to Derban et al. [9], factors affecting loan repayment capacity could be grouped into three main areas: The inherent characteristics of borrowers and their businesses that make it unlikely that the loan would be repaid, the characteristics of lending institution and suitability of the loan product to the borrower, which make it unlikely that the loan would be repaid and, systematic risk from the external factors such as the economic, political and business environment in which the borrower operates.

Several authorities have established institutional and borrower characteristics that influence loan repayment capacity. Arene [14] identified a positive relationship between loan repayment capacity and income, farm size, age of farmers, farming experience and level of education of farmers. Oladeebo and Oladeebo [15] established, among farmers in Ogbomoso Agricultural Zone in Nigeria, that years of farming experience and level of education, were major factors that positively and significantly influenced loan repayment. Eze and Ibekwe [16], in their study in Southeast Nigeria, revealed amount of loan received, age of beneficiary, household size, and years of formal education as predictors of loan repayment. Okorie [4] examined a number of institutional factors that could influence loan repayment ability of smallholder farmers in Ondo State, Nigeria and concluded that nature and timeliness of loan disbursement, number of supervisory visits by credit officers, profitability of the enterprise on which the loan funds were invested significantly influence loan repayment. Kohansal and Mansoori [17] identify interest rate, among farmers in Khorasan-Razavi Province of Iran, as the most important factor affecting repayment of agricultural loans. Eze and Ibekwe [16] examined the determinants of loan repayment under the indigenous financial system in Southeast Nigeria. Results from the study revealed amount of loan received, age of beneficiary, household size, and years of formal education and occupation as important predictors of loan repayment under the system.

Acquah and Addo [18] identify, among fishermen in Ghana, positive relationship between amount of loan repaid and years of education, income and years of fishing experience, whilst a negative relationship exist between the amount of loan repaid and the age and investment made.

## 2. STUDY AREA AND METHODOLOGY

### 2.1 Study Area

The study was conducted in the Ejura-Sekyedumasi District and Mampong Municipality. The two areas are located within the Forest-Savanna Transitional Zone of Ghana. The soil and climatic conditions in the area are favorable for the production of food crops. The area is endowed with the presence of formal, semi-formal and informal financial institutions which advance agricultural credit to farmers. Primary data used for this study were collected from a cross section of smallholder farmers that borrowed for farming activities between 2009-2011farming seasons.

### 2.2 Sampling Technique

A two stage sampling technique was used to select the respondents. The first stage was a purposive sampling of twelve (12) lending institutions made up of 6 formal and 6 semi-formal institutions. The institutions were selected based on their involvement in agricultural credit. The list of farmers that borrowed for farming activities between 2009 and 2011 was compiled with the help of the credit officials of the financial institutions. The borrowers who could repay their loans within the repayment schedule were classified as non-defaulters. Those whose repayment had gone beyond the schedule were classified as defaulters. The number of defaulters in each of the selected financial institutions hardly exceeded 5, hence at the second stage, ten (10) borrowers comprising the 5 defaulters and 5 randomly selected non-defaulters were enumerated from each of the lending institutions. A total of 120 borrowers comprising 60 defaulter and 60 non-defaulters were sampled for data using structured questionnaires.

### 2.3 Analytical Framework

Data analysis was pursued by making use of both qualitative and quantitative techniques. For the qualitative analysis, descriptive statistics such as percentages, frequencies and means were used. Descriptive analysis was undertaken to summarize prospective elements of loan repayment capacity. Quantitative analysis used by Okurunt et al. [19], and Mohieldin and Wright [20] was adopted and modified to evaluate the elements of loan repayment capacity.

Loan repayment capacity which is the ability of a farmer to repay a loan is assumed to be influenced by socio-economic and institutional characteristics. Loan repayment capacity of a farmer ($Y_i$) depends on a vector of explanatory variables ($X_i$) including socio-economic characteristics as well as institutional factors. The relationship between ($Y_i$) and ($X_i$) can be presented as:

$$Y_i = \alpha + \beta' X_i + \mu_i. \quad (1)$$

In reality $Y_i$, in equation 1, is a latent variable which is not observable and quantifiable. What is observable is repayment or non-repayment of loan. Thus equation 1 cannot be estimated as one can only observe whether respondent could or could not repay loan through the survey questionnaire. Hence we defined another variable $Y^*$ that leads to a binary outcome for the dependent variable such that:

$$Y^* = 1 \; if \; respondent \; is \; non - defaulter,$$
$$Y^* = 0 \; if \; respondent \; is \; defaulter$$

This leads to qualitative response with binary dependent variable model. There are several methods that can be used to analyse data involving binary dependent variable. Linear Probability Model (LPM), probit and logit models can be used to analyse household's qualitative response which give rise to binary outcomes. If the independent variables are normally distributed the discriminant analysis estimate which follows Ordinary Least Square (OLS) is the true Maximum Likelihood Estimate (MLE) and therefore asymptotically more efficient than the probit and logit models which require Maximum Likelihood method. However, if the independent variable is not normally distributed the discriminant analysis estimate is not consistent, whereas the probit and logit MLE are consistent and therefore more robust [21,22]. The LPM can be used to analyse binary models such as the one under consideration. However, Pindyck and Rubinfeld [23] and Gujarati [24] have noted that though LPM can be used to analyse binary models such as the one under consideration this model has serious defect in that, the estimated probability values can lie outside the normal 0-1 range. Hence probit and logit models are advantageous over LPM in which case the probabilities are bound between 0 and 1. Moreover, these models best fit the non-linear relationship between the probability and explanatory variables. Therefore the choice of model to estimate the above relationship lies between logit and probit models. In equation 1 $\beta' X_i$ is not $E(Y_i|X_i)$ as in linear probability model; it is rather $E(Y_i^*|X_i)$ such that:

$$\begin{aligned} Prob(Y_i^* = 1|X_i) &= Prob(Y_i > 0). \\ &= Prob(X_i'\beta + \mu_i > 0). \\ &= Prob\left(-\mu_i < X_i'\beta\right). \\ &= F(X_i'\beta). \end{aligned} \quad (2)$$

Where $F(.)$ is the cdf of $-\mu_i$, which equals the cdf of $\mu_i$ in the usual case of density symmetric about 0 assuming that the error term $\mu_i$ has standard normal distribution. The above equation $Prob(Y_i^* = 1|X_i)$ yields $Prob(-\mu < X_i'\beta)$ $= \emptyset(X_i'\beta)$ where $\Phi(.)$ is cdf of the standard normal distribution. In this case the observed value of $Y^*$ are just realizations of binomial process with probabilities which varies from trial to trail depending on the explanatory variable ($X_i$) with likelihood function as:

$$L = \prod_{y_i=0} F(-\beta' X_{1i}) \prod_{y_i=1} \left[1 - F\left(-\beta' X_{1i}\right)\right] \quad (3)$$

Assuming $\mu_i$ is $IN(0, \sigma^2)$, in this case the function $Y_i = \beta' X_{1i} + \mu_i$ result in

$$F\left(-\beta' X_{1i}\right) = \int_{-\infty}^{-\beta' X_{1i}/\sigma} \frac{1}{2\pi^{1/2}} \exp\left(-\frac{t^2}{2}\right) dt. \quad (4)$$

The estimation equation was formulated as follows:

$$Y_i = f(X_i) \quad (5)$$

Where $Y_i$ take value of 1 if a respondent is a non-defaulter and zero if the respondent is a defaulter of loan repayment. Hence, probit model is selected for the analysis of elements of the respondents' loan repayment capacity. Explanatory variables used in the probit model are described in Table 1.

## 3. RESULTS AND DISCUSION

### 3.1 Socio-Economic Background of Loan Beneficiary Farmers

According to Derban et al. [9], loan repayment capacity could be influenced by the inherent characteristics of borrowers. Tables 2a and 2b provide the characteristics of borrowers which are potential predictors of loan repayment capacity.

As depicted in Table 2a, the mean age of borrowers was 47 years which represents the economically active age with some of them having no formal education. Their household sizes were large with an average of 7 members. Their annual farm incomes were low averaging 572.42 with a minimum of 50. These may constitute a recipe for loan default. They however have good farming experience averaging 11.7 years and an average farm size of 4 acres is a characteristic of smallholder farmers. As is evident in Table 2b, Majority (62%) of the borrowers were females probably because of their inability to endure the drudgery of farming. They need credit to hire labour for most of the farming activities. Married people contract more loans probably due to their competing financial need for both household upkeep and agricultural production. The religious background of the borrowers was basically Christianity. Majority of the borrowers did not belong to farmer associations. Alternative livelihoods which are believed to financially cushion borrowers for loan repayment were not predominant. Though majority contracted loans for commercial agriculture by the use of modern farming technologies, they sold their produce at the base of the value chains attracting low price and income, a recipe for loan delinquency. Even though mono-cropping, which presumably ensures efficient use of land, predominated among the borrowers, mixed farming, which provides alternative sources of agricultural income, was not commonly practiced. The farmers mainly cultivated root and tuber crops and for that matter harvested them in bits, about twice or more in a year. Cereals and legumes, which sell well after storage, were least cultivated.

## 3.2 Institutional Characteristics of Agricultural Loans

Table 3 depicts the loan characteristics examined in the study. Agricultural loans were found to be characterized by high lending rates as majority of the borrowers (81%) perceived the rate as high. Loan appraisal by lending

**Table 1. Description of the explanatory variables used in the Probit model**

| Variable | Description /Measurement |
|---|---|
| **Socio-economic variables** | |
| Age | Age of farmer in years |
| Sex: | 1=if male; 0=if otherwise |
| Education | Number of years spent in school |
| Household members under 18 | Farmers' household members under 18 years |
| Income | Income of farmer in Ghana Cedis |
| Farming experience | Farming experience in years |
| Farm size | Farm size in acres |
| Marital status | 1=if married; 0=if otherwise |
| Religion: | 1=if Christianity; 0=if otherwise |
| Alternative livelihood: | 1=if yes; 0=if otherwise |
| Membership of Association: | 1=if yes; 0=if otherwise |
| Sale of produce up the value chain: | 1=if yes; 0=if otherwise |
| Objective of farming: | 1=if commercial; 0=if otherwise |
| Use of modern farming technology: | 1=if yes; 0=if otherwise |
| Cropping system: | 1=if mono-cropping; 0=if otherwise |
| Farming system: | 1=mixed farming; 0=otherwise |
| Cultivating cereals & legumes as major crops: | 1= if yes 0=if otherwise |
| Cultivating root & tuber as major crop: | 1=if yes; 0=if otherwise |
| Harvesting crops more than once a year: | 1=if yes; 0=if otherwise |
| **Institutional variables** | |
| Perception of interest rate: | 1=if high; 0=if otherwise |
| Appraisal of loan before advancement: | 1=if yes; 0=if otherwise |
| Monitoring loans after disbursement: | 1=if yes; 0=if otherwise |
| Type of loan: | 1=if group loan; 0=if otherwise |
| Timeliness of loan advancement: | 1=if timely: 0=if otherwise |
| Moratorium: | 1=if adequate; 0=if otherwise |
| Loan repayment schedule: | 1=if one-time payment; 0=if otherwise |

institutions was a common practice since 73% of the borrowers received loans that were appraised. It was, however not a norm for the institutions to follow-up and monitor loans. A good loan can go bad when left unmonitored. Though group loans are believed to be less risky than individual loans, the lending institutions practiced the latter. Agriculture in Ghana is rain-fed and for that matter time-specific. Half of the borrowers did not receive their loans timely and this could make the loan more risky and bad. Due to the biological lag inherent in agricultural production, a gestation period which requires only cash-inflows needs to be crossed. There is, therefore, the need for a moratorium that covers the gestation period for all agricultural loans. Majority of the borrowers were not given that moratorium, but rather asked to repay the loan in installments. This condition may compel farmers to concentrate on impulsive loan repayment rather than providing the necessary condition for agricultural production-a fuel for loan delinquency.

Okorie [4] examined a number of institutional factors that could influence loan repayment ability of smallholder farmers in Ondo State, Nigeria and concluded that nature and timeliness of loan disbursement, number of supervisory visits by credit officers, profitability of the enterprise on which the loan funds were invested significantly influence loan repayment. Kohansal and Mansoori [17] identify interest rate, among farmers in Khorasan-Razavi Province of Iran, as the most important factor affecting repayment of agricultural loans.

## 3.3 Elements of Loan Repayment Capacity

To determine the explanatory variables that are good predictors of the loan repayment capacity of smallholder farmers, probit regression model was estimated. The results of the analysis are presented in Table 4. The log-likelihood ratio is an indication that the estimated equation is significant and a number of estimated parameters have the expected signs. A total of 26 explanatory variables were considered in the econometric model out of which 9 variables were found to significantly influence the probability of being non-defaulter at less than 5 percent level of probability. The result from probit regression model shows that age of farmer, sex of farmer, household size of farmer, income of farmer, farming system, perception of interest rate, loan monitoring, moratorium and loan repayment schedule are important factors influencing the loan repayment capacity of smallholder farmers in Ghana.

Capacity of farmers to repay agricultural loans is determined by several institutional and farmer characteristics. The results as presented in Table 4 are discussed in two broad areas: borrower-specific characteristics and institution-specific characteristics.

### 3.3.1 Socio-economic characteristics of borowers

Several financial, structural and demographic factors were established by Escalante et al. [25] to influence loan repayment ability hence nineteen borrower characteristics were examined in this study. As is evident in Table 4, five of these characteristics were identified to have significant influence on loan repayment capacity and are discussed as follows.

#### *3.3.1.1 Age of farmer*

As has likewise been established by Balogun and Adenkule [26], age of farmer was identified to have a great influence on the ability of farmers to repay loans. The results of this study, as depicted in Table 4, indicate that age of farmer has a negative marginal effect on loan repayment. As age of farmer increases, the ability to repay loans weakens. Marginal effect of 0.02 is an indication that additional increase in age of a farmer by one year results in 2% increase in the likelihood of loan default. It is established that while older farmers are more likely to default in loan repayment, younger ones have a high capacity to repay loans. This may be due to the fact that younger farmers are more energetic and active and are able to work hard on the farm to observe the cultural practices that maximize output.

#### *3.3.1.2 Gender / sex of farmer*

Sex was identified as a significant characteristic influencing famer capacity to repay loan. Table 4 shows that sex positively influences loan repayment capacity with a marginal effect of 0.45. It follows that male farmers have more capacity to repay loan than their female counterparts. Male farmers are 45% more capable to repay loans than female farmers. This observation probably is explained by the physical ability of male farmers to meet the drudgery of farming and make them more productive.

**Table 2a. Descriptive statistics of socio-economic characteristics**

| Statistic | Parameter (N=120) | | | | | |
|---|---|---|---|---|---|---|
| | Age | Years in education | Household members under 18 | Annual income | Farming experience | Farm size |
| Mean | 47.74 | 7.87 | 7.48 | 572.42 | 11.70 | 4.00 |
| Std. dev. | 11.06 | 3.68 | 3.41 | 547.88 | 7.45 | 2.41 |
| Min. | 20.00 | 0.00 | 1.00 | 50.00 | 2.00 | 0.50 |
| Max. | 78.00 | 18.00 | 20.00 | 3000.00 | 40.00 | 9.00 |

*Source: Survey data, 2011*

**Table 2b. Summary of socio-economic characteristics of borrowers**

| Socio- economic characteristics | Frequency (N=120) | Percentage |
|---|---|---|
| **Sex** | | |
| Male | 45 | 38 |
| Female | 75 | 62 |
| **Marital status** | | |
| Married | 79 | 66 |
| Otherwise | 41 | 34 |
| **Religion** | | |
| Christianity | 95 | 79 |
| Otherwise | 25 | 21 |
| **Alternative livelihood** | | |
| Available | 60 | 50 |
| Not available | 60 | 50 |
| **Membership to farmers association** | | |
| Member | 57 | 48 |
| Not member | 63 | 52 |
| **Selling of produce** | | |
| Up the value chain | 59 | 49 |
| At the base of value chain | 61 | 51 |
| **Objective of farming** | | |
| Commercial | 104 | 87 |
| Subsistence | 16 | 13 |
| **Farming technology** | | |
| Use of modern technologies | 101 | 84 |
| Otherwise | 19 | 16 |
| **Cropping system** | | |
| Mono-cropping | 83 | 69 |
| Inter-cropping | 37 | 31 |
| **Farming system** | | |
| Mixed farming | 51 | 43 |
| Otherwise | 69 | 57 |
| **Cultivation of cereals and legumes** | | |
| As major crops | 43 | 36 |
| As minor crops | 77 | 64 |
| **Cultivation of roots and tubers** | | |
| As major crops | 37 | 31 |
| As minor crops | 83 | 69 |
| **Harvesting of crops** | | |
| Twice or more in a year | 92 | 77 |
| Once in a year | 28 | 23 |

*Source: Survey data, 2011*

*3.3.1.3 Household membership*

As shown in Table 4, the study established a negative influence between loan repayment capacity and farmers' household members who were under 18 years. A marginal effect of 0.14 indicates that an additional increase in the number of household members under 18 results in 14% increase in the likelihood of loan default. It is established that farmers with small number of household dependants have higher capacity of loan repayment than their counterparts whose households have large household dependent membership. This may be due to the fact that when a household dependent membership is large, household spending is higher and may affect the savings of farmer leading to weak capacity of loan repayment. Household size of farmer was established by Akinwumi and Ajayi [27] as a major factor having a positive influence on loan repayment capacity of farmers. Large household size is assumed to have higher labour endowment and so higher capacity to effectively carry out various required agricultural activities for increased output and income hence higher loan repayment capacity. However, if a household is large with larger number of dependants, it is likely to have lower loan repayment capacity and hence higher likelihood to default in loan repayment.

*3.3.1.4 Income of farmer*

In this study income of farmers was found to positively influence loan repayment ability of farmers as is depicted in Table 4. As income of a farmer increases, his or her ability to repay loan increases. Increasing a farmer's income by one unit, would increase his or her likelihood to pay off loans by 0.1%. Farmers who can broaden their income base through alternative livelihood would be financially robust and have a higher capacity for paying off loans. This observation confirms that made by Sileshi et al. [28] in similar study conducted in Ethiopia. Income of farmers was indicated by Afolabi [29] as a factor influencing loan repayment ability of farmers.

*3.3.1.5 Faming system*

As shown in Table 4, the study established a positive relationship between loan repayment capacity and farming system practiced by farmers. Farmers who practice mixed farming are more likely to repay loans than their counterparts who do not practice mixed farming. Mixed farming improves repayment capacity of farmers by 51% by making them more financially sound. This may be due to the fact that farmers who practice mixed farming have alternative sources of income to broaden household income base

**Table 3. Summary of institutional characteristics of agricultural loans**

| Loan characteristics | Frequency (N=120) | Percentage |
|---|---|---|
| **Perception of lending rate** | | |
| High | 97 | 81 |
| Otherwise | 23 | 19 |
| **Loan appraisal by financial Institution** | | |
| Appraisal | 88 | 73 |
| No appraisal | 32 | 27 |
| **Monitoring of loans by financial institutions** | | |
| Monitoring | 49 | 41 |
| No monitoring | 71 | 59 |
| **Type of loan** | | |
| Group Loan | 48 | 40 |
| Individual loan | 72 | 60 |
| **Timeliness of loan advancement** | | |
| Timely | 60 | 50 |
| Untimely | 60 | 50 |
| **Moratorium** | | |
| Covering gestation period | 44 | 37 |
| Less than gestation period | 76 | 63 |
| **Mode of repayment** | | |
| Payment at end of production period | 23 | 19 |
| Payment by installments | 97 | 81 |

*Source: Survey data, 2011*

and make it more financially robust to meet loan obligations. Kutin [30] identified farming system practiced as a discriminating factor between defaulters and non-defaulters of loan.

**Table 4. Probit estimates for loan repayment capacity**

| Explanatory variables | Coefficient | Standard error | Z | P>\|z\| | Marginal effect $dy/dx$ |
|---|---|---|---|---|---|
| Age of farmer | -0.057 | 0.023 | -2.42 | 0.015** | -0.022 |
| Sex: 1=if male; 0=if otherwise | 1.186 | 0.600 | 1.97 | 0.048* | 0.445 |
| Number of years spent in school | 0.058 | 0.073 | 0.80 | 0.426 | 0.023 |
| Household members under 18 years | -0.366 | 0.088 | -4.16 | 0.000** | -0.142 |
| Income of farmer | 0.002 | 0.001 | 2.86 | 0.004* | 0.001 |
| Farming experience | 0.015 | 0.038 | 0.41 | 0.683 | 0.006 |
| Farm size | -0.107 | 0.092 | -1.16 | 0.245 | -0.041 |
| Marital status: 1=if married; 0=if otherwise | -0.110 | 0.497 | -0.22 | 0.825 | -0.042 |
| Religion: 1=if Christianity; 0=if otherwise | -0.529 | 0.578 | -0.92 | 0.360 | -0.193 |
| Alternative livelihood: 1=if yes; 0=if otherwise | 0.277 | 0.483 | 0.57 | 0.566 | 0.107 |
| Membership of Association: 1=if yes; 0=if otherwise | -0.697 | 0.528 | -1.32 | 0.187 | -0.266 |
| Sale of produce up the value chain: 1=if yes; 0=if otherwise | 0.091 | 0.474 | 0.19 | 0.848 | 0.035 |
| Objective of farming: 1=if commercial; 0=if otherwise | -0.569 | 0.804 | -0.71 | 0.479 | -0.203 |
| Use of modern farming technology: 1=if yes; 0=if otherwise | 0.456 | 0.804 | 0.57 | 0.571 | 0.180 |
| Cropping system: 1=if mono-cropping; 0=if otherwise | -0.989 | 0.617 | -1.60 | 0.109 | -0.340 |
| Farming system: 1=mixed farming; 0=otherwise | 1.497 | 0.541 | 2.76 | 0.006** | 0.519 |
| Cultivating cereals & legumes as major crops: 1= if yes 0=if otherwise | -0.089 | 0.522 | -0.17 | 0.864 | -0.035 |
| Cultivating root & tuber as major crop: 1=if yes; 0=if otherwise | 0.455 | 0.628 | 0.72 | 0.469 | 0.171 |
| Harvesting crops more than once a year: 1=if yes; 0=if otherwise | 0.257 | 0.544 | 0.47 | 0.637 | 0.101 |
| Perception of interest rate: 1=if high; 0=if otherwise | -1.616 | 0.696 | -2.32 | 0.020* | -0.467 |
| Appraisal of loan before advancement: 1=if yes; 0=if otherwise | -0.386 | 0.578 | -0.67 | 0.504 | -0.145 |
| Monitoring loans after disbursement: 1=if yes; 0=if otherwise | 1.270 | 0.568 | 2.24 | 0.025* | 0.450 |
| Type of loan: 1=if group loan; 0=if otherwise | 0.630 | 0.535 | 1.18 | 0.240 | 0.236 |
| Timeliness of loan advancement: 1=if timely: 0=if otherwise | -0.289 | 0.486 | -0.59 | 0.553 | -0.112 |
| Moratorium: 1=if adequate; 0=if otherwise | 2.139 | 0.687 | -3.11 | 0.002** | 0.715 |
| Loan repayment schedule: 1=if one-time payment; 0=if otherwise | 1.308 | 0.609 | 2.15 | 0.032* | 0.407 |
| _cons | 5.475 | 2.210 | 2.48 | 0.013 | 0.000 |
| Probit regression | | | | | |
| Number of obs = 119 | | | | LR $chi^2(26)$ = | 100.42 |
| Prob > chi2 = 0.0000 | Log likelihood | = -32.268593 | | Pseudo R2 = | 0.6088 |

*Source: Survey data; 2011 **=Significant at 1% Level; *=Significant at 5% Level*

### 3.3.2 Institutional characteristics of loans

A few researchers found that loan characteristics play an important role in determining repayment performance [31-33]. Copisarow [34] found that defaults generally arise from poor program design or implementation by the lending institution, not from any essential problems with the borrowers. Sterns [35] argues that, "it is the lender not the borrower, who causes or prevents high levels of delinquency in credit programs". Out of the seven characteristics of lending institutions examined in Table 4, four were found to significantly influence loan repayment capacity.

*3.3.2.1 Perception of interest rate*

How farmers' perception of interest rate affects their loan repayment capacity was examined by the study and the result shown in Table 4. As has similarly been established by Olomba [36], this study has identified a negative effect of perception of interest rate on loan repayment performance. As the table shows, farmers who perceive interest rate as high are more likely to default loan repayment than those who perceive it as low. Farmers who perceive interest rate as high have 47% likelihood of defaulting loan repayment. Interest rate is comparable to rate of financial returns or profitability of an enterprise. Rational farmers compare the two and if the former is higher than the later, they perceive it as high. When such farmers contract loan when it is the only option, they are 47% likely to default.

*3.3.2.2 Post-disbursement monitoring*

As is evident in Table 4, loan monitoring was identified by the study to positively influence loan repayment capacity with a marginal effect of 0.45. Farmers whose loans and projects were monitored had higher likelihood of paying off loans. Both on-farm and on-dusk monitoring of loans provides 45% propensity to recover them. Woller et al. [37], Roslan et al. [38] in their study conclude that close and informal relationship between lending institutions and borrowers may help in monitoring and early detection of problems that may arise in non-repayment of loans. This observation may be owing to the fact that if the activities of the defaulters were not monitored, they veered off productive practices and did not realize earlier that they were failing in their activities. They were left to decide when to visit lenders for repayment. Awoke [39] reports that, most of the default arose from poor management procedures, loan diversion and unwillingness to repay loans which may result from lack of loan monitoring. Therefore, the lenders must devise various institutional mechanisms that aim to reduce the risk of loan default. This agrees with Escalante et al. [25], who found that poor follow-up systems, irregular monitoring visits to borrowers to provide advice and collection of loan repayments, allows some borrowers to skip repayment schedules and others to completely default.

*3.3.2.3 Moratorium*

In agricultural credit, a moratorium which is equal to the gestation period of an enterprise is usually needed for effective management of credits. If this condition is not met there is the likelihood for agricultural credit to suffer delinquency. Table 4 gives evidence that moratorium, when more or equal to the gestation period of enterprises, positively influences loan repayment capacity of farmers. It is evident in the table that farmers who were given adequate moratorium which covered gestation periods of their agricultural enterprises were more likely to repaying their loans. Lending institutions have 71% more likelihood of retrieving loans from farmers who are given adequate moratorium than their counterparts whose moratorium was less than the gestation period of enterprises.

*3.3.2.4 Repayment schedule*

Loan repayment plan should be project specific. Repayment of loan can only start when the project begins to yield returns. In agricultural production this occurs after the gestation period. The repayment plan adopted by financial institutions for agricultural production affects the loan repayment capacity of farmers. Table 4 indicates that farmers who are made to repay loans one-time after gestation period are more likely to repay loans as scheduled. They are 41% more likely to repay loans than their counterparts who are made to repay loans in installments. This observation stems from the fact that in food crop production, harvesting is mainly done ones or several times within a month or two. It is technically prudent to restrict loan repayment to when produce is harvested and sold. Installment-repayment schedule may fall outside the harvesting and marketing period and constitute a recipe for loan delinquency.

## 4. CONCLUSION AND RECOMMENDATION

Loan repayment capacity was found to be influenced by several socio-economic factors. As

age of farmer increases, the ability to repay loans weakens. Male farmers were found to have more capacity to repay agricultural loan than their female counterparts. It is established that farmers with small dependent household size have higher capacity of loan repayment than their counterparts whose households have large dependent household size. Higher farm incomes were found to increase loan repayment capacity of farmers. Farmers who practice mixed farming are more likely to repay loans than their counterparts who do not practice mixed farming. Several loan characteristics were also identified as predictors of farmer loan repayment capacity. Loans whose interest rates are perceived by borrowers as high are more likely to be delinquent. Loans that were monitored after disbursement have high propensity to be fully recovered. Loans that are characterized by moratorium covering the gestation period of agricultural enterprises enhance farmer loan repayment capacity. Type of repayment schedule was found to influence loan repayment capacity of farmers. Farmers who are made to repay loans one-time after gestation period are more likely to repay loans.

The following policy recommendations are worth noting for agricultural credit:

> Lending institutions should consider smallholder farmers who exhibit the physical ability to overcome the drudgery of farming so that loans will only complement their efforts. Smallholder farmers with large dependent household sizes should be made to prove alternative sources of income that can provide for the upkeep of their households. Farmers who practice mixed farming have more than one source of income and for that matter should be considered for agricultural loans. Lending institutions should negotiate interest rates with borrowers. This will make both of them better off and erase farmer perception of high interest rate. Lending institutions should continually monitor loans both on-site and off-site. Agricultural loans should be given adequate moratoria to cover gestation periods. Repayment schedule for agricultural loans should be based on the cash-flow pattern of the enterprise for which the loan was advanced.

## COMPETING INTERESTS

Authors have declared that no competing interests exist.

## REFERENCES


1. Kay RD, Edward EM. Farm management. Fourth edition. Longman Publication, Singapore; 1999.
2. Duncan BA. Women of agriculture in Ghana. Gold Type Ltd. Malaysia; 1994.
3. Adejobi O, Atobatele JT. An analysis of loan delinquency among small scale farmers in Southwestern Nigeria: Application of logit and loan performance indices. East African Agricultural and Forestry Journal. 2008;74(3):105-114.
4. Okorie A. Major determinant of agricultural smallholder loan repayment in developing economy: Empirical evidence from Ondo state Nigeria. The Journal of Socio-Economics. 2004;21(4):223-234.
5. Hussain I, Demaine H. How informal credit offers greater benefit to farmers: An inquiry into credit market in Parkistan. Asian Institute of Technology, Division of Human Settlement Development Bangkok, Thailand; 1992.
6. Steel FW, Andah OD. Rural and micro finance regulation in Ghana: Implications for development of the industry. Publication for proceedings of conference on Ghana at Half Century; 2005.
7. Ghate PB. Interaction between the formal and informal financial sectors: The Asian experience. World Development. 1992;1:XIV.
8. Kashuliza AK, Hella P, Magayane FF, Mvena ZSK. The role of informal and semi-formal finance in poverty alleviation in Tanzania: Results of a field study in two regions of REPOA. Research Report No 98.1; 1998.
9. Derban WK, Binner JM, Mullineux A. Loan repayment performance in community development finance institutions in the UK. Small Business Economics. 2005; 25(1):319-332.
10. Ledgerwood J. Microfinance handbook: An institutional and financial perspective. The World Bank. Washington; 1999.
11. Greenbaum SI, Thakor AV. Contemporary financial intermediation. Forth Worth, Texas: Dryden Press; 1995.
12. Coyle B. Framework for credit risk management. CIB Publishing, UK; 2000.
13. Ozdemir O, Boran L. An empirical investigation on consumer credit default risk. `Discussion Paper, 2004/20. Turkish Economic Association; 2004.

14. Arene CJ. An analysis of loan repayment potentials of smallholder soyabean group farmers in Nigeria. Quarterly J. Int. Agric. 1993;32:160-169.
15. Oladeebo JO, Oladeebo OE. Determinant of loan repayment among smallholder farmers in Ogbomoso Agricultural Zone of Oyo State, Nigeria. Journal of Social Science. 2008;17(1):59-62.
16. Eze CC, Ibekwe UC. Determinants of loan repayment under the Indigenous financial system in Southeast, Nigeria. The Social Sciences. 2007;2:116-120.
17. Kohansal MR, Mansoori H. Factors affecting loan repayment performance of farmers in Kharasan-Razavi province of Iran. A paper presented in a conference on International Research on Food Security. Natural Resource Management and Rural Development, University of Hamburg; 2009.
18. Acquah HD, Addo J. Determinants of loan repayment performance of fishermen: Empirical evidence from Ghana. Cercetari Agronomice in Moldova. 2011;4(148):89-97.
19. Okurunt N, Schoombee A, Van der Berg S. Credit demand and credit rationing in the informal financial sector in Uganda. African development and poverty reduction: The macro-micro linkage. Forum paper, Lord Charles Hotel, Somerset West, South Africa; 2004.
20. Mohieldin SM, Wright WP. Formal and informal credit market in Egypt: Economic Developemnt and Cultural Change. 2000;48(3):657-670.
21. Maddala GS. Limited dependent and qualitative variables in economics. Cambridge University Press. 1999;223-228.
22. Cameron CA, Trivedi PK. Microeconometrics: Methods and applications. Cambridge University Press. 2005;463–569.
23. Pindyck RS, Rubinfeld DL. Econometric models and economic forecasts. (2nd ed). McGraw- Hill Book Co. New York; 1981.
24. Gujarati DN. Basic econometrics. 2nd edition. McGraw-Hill Book Company. New York; 1988.
25. Escalante CL, Brooks JE, Epperson RL, Stegelin FE. Credit risk assessment and racial minority lending at the farm service agency. Journal of Agricultural and Applied Economics. 2006;38:61-75.
26. Balogun ED, Adekunle E. Loan delinquency among small scale farmers in developing countries: A case study of the small-farmer credit programme in Lagos State. Economic and Financial Review. 1998;26(3):36-44.
27. Akinwumi JA, Ajayi AO. The role of loan repayment capacity in small scale farmers credit administration. The Nigerian Journal of Agricultural and Rural Management. 1990;15(2):23-31.
28. Sileshi M, Nyikal R, Wangia S. Factors affecting loan repayment performance of smallholder farmers in East Hararghe, Ethiopia. Developing Country Studies. 2012;2(11):205-213.
29. Afolabi JA. Economic analysis of loan repayment among small–scale farmers in Oyo State, Nigeria. Unpublished PhD Thesis, Department of Agricultural Economics and Extension, Federal University of Technology, Akure, Naigeria; 2002.
30. Kutin AS. Examining determinants of group loan repayment in the Dominican Republic. Unpublished Master's Thesis. The Ohio State University, USA; 1995.
31. Roslan AH, Mohd AK. Determinants of microcredit repayment in Malaysia: the case of Agrobank. Humanity and Social Sciences Journal. 2009;4(1):45-52.
32. Njoku JE. Determinants of loan repayment under the special emergency loan scheme (SEALS) in Niger: A case study of Imo state. African Review of Money Finance and Banking. 1997;1:39-51.
33. Ugbomeh GMM, Achoja FO, Ideh V, Ofuoku AU. Determinants of loan repayment performance among women self-help groups in Bayelsa State, Nigeria. Agriculture Conspectus Scientificus. 2008;73(3):189-195.
34. Copisarrow R. The application of micro credit technology to the UK: Key commercial and policy issues. Journal of Micro Credit. 2000;1(1):42-51.
35. Sterns K. The hidden beast: Delinquency in micro enterprise credit programme. ACCION Discussion. Thesis Document No.6; 1995.
36. Olomba OE. Determinant of loan repayment among smallholder farmers in Ogbomoso Agricultural Zone of Oyo State. Nigeria. Journal of Social Science. 1999;17(1):59-62.
37. Woller G, Parsons R. Assessing the community economic impact of

microfinance institutions. Journal of Developmental Entrepreneurship. 2002; 7(2):133-150.

38. Roslan AH, Faudziah ZA, Mohd Saifoul ZN, Rahimah M. Microfinance service for microenterprise: Good practices and performance of selected microfinance institutions in Malaysia. Journal of Yala Rajabhat University. 2007;2(1):31-45.

39. Awoke MU. Factors affecting loan acquisition and repayment patterns of Smallholder farmers in Oyo states. Journal of Sustainable Tropical Agricultural Research. 2004;9(1):61-69.



*Peer-review history:*
*The peer review history for this paper can be accessed here:*
*http://sciencedomain.org/review-history/12922*