



The nexus between attributes of agricultural credit sources and smallholders' credit acquisition: evidence from Nigeria

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ABSTRACT: The study examined the link between institutional attributes of formal agricultural credit sources (FACS) and credit demand by small-scale farmers in Southwest, Nigeria. Cross-sectional data on farms, farmers' socio-economic characteristics and institutional attributes of FACS were collected and analyzed with 2-Limit Tobit regression model. The results showed that transaction costs, time of disbursement, loan amount and availability of complimentary inputs were significant factors influencing farmers' decision to acquire credit. Cash crop farmers showed both higher credit acquisition propensities and credit use intensities than food crop farmers implying cash crop farmers' need for a special credit window. It is strongly recommended that bringing formal credit sources close to farmers, synchronizing credit disbursement with production season, increasing credit volume to make it adequate and providing improved complimentary inputs, should form important considerations in an agricultural credit policy that is geared at sustainable development of Nigeria's agriculture.

Keywords: Institutional attributes, credit sources, agricultural development, credit demand, smallholders, Nigeria.

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INTRODUCTION

The introduction of improved production technologies in agriculture often leads to increased requirement of capital input for investment in the farm firm (Mafimisebi, 2010). This is the case because farmers' adoption of new innovations is necessarily preceded by effective demand for credit to execute the relevant new practices (Oladele and Adesope, 2004, Mafimisebi *et al.*, 2010). For instance, cash crop farmers have to invest considerable funds on cocoa, rubber and oil palm plantations in the process of expending funds recurrently on agrochemicals while food crop farmers need to jack up their expenditure on fertilizers, improved seeds and propagules for increased productivity and farm income. The main crux with capital in traditional agriculture is that most peasant farmers in Africa do not have sufficient equity

capital nor are they able to raise substantial funds to finance their farm operations (Mafimisebi, *et al.*, 2006, Mafimisebi *et al.*, 2010). The cost of procuring capital for farm investment in Nigeria increased tremendously in recent times and agricultural lending that normally enjoyed preferential treatment in the past, now has to operate under a fully deregulated credit market. What this implies is high cost of capital as reflected in increasing bank lending rates and increased riskiness of lending to agricultural enterprises since it compounds the low repayment rate often regarded as a hydra-headed problem of state-sponsored agricultural banks and credit agencies in many developing countries (Manohar and Manfred, 1997; Mafimisebi *et al.*, 2006, Mafimisebi *et al.*, 2010). There was a decline in agricultural lending rate

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to 19% from 26% between 2001 and 2006 as a result of the reduction of minimum rediscount rate to 13% (Central Bank of Nigeria, 2007). In recognition of the inefficiency in the operation of the Nigerian agricultural financial market in both the formal and informal sectors and its implications for credit acquisition by small-scale farmers, a recent Federal Government reform agenda in agricultural lending gave birth to the Nigerian Agricultural Cooperative and Rural Development Bank (NACRDB) from an erstwhile government-owned credit bank called Nigerian Agriculture Credit Bank (NACB). The NACRDB has the statutory mandate to grant credit facilities to small, medium and large-scale farmers for the attainment of agricultural and overall economic development of the country. The reform was necessitated by findings from previous research that perennial under-funding is the major factor responsible for making Nigerian agriculture to remain largely traditional, subsistent and very low in the uptake of productivity-boosting technologies (Mafimisebi *et al.*, 2006, Mafimisebi *et al.*, 2010).

In Southwestern Nigeria, there are six zonal branches of the NACRDB to meet the credit needs of some three million farming families (Idachaba, 2000). The institutional arrangement of the bank makes access to credit by small-scale farmers very traumatic and cumbersome owing to high transaction costs associated with several unfruitful calls (which sometimes span over six months) made on the bank's zonal offices to negotiate loan terms and conditions and obtain/return loan application forms (Imoudu and Akinbami, 1997). Where credit is eventually granted, the volume is relatively small compared to the volume of capital required for financing farm operations. More importantly, disbursements of such credit are wrongly timed, a condition which encourages diversification of agricultural credit to non-agricultural and non-self liquidating activities (Akinrinola, 1989, Mafimisebi *et al.*, 2005).

Implicit in the fore-going is the fact that in designing a credit policy, adequate consideration should be accorded farmers' socio-economic characteristics and credit

sources' institutional arrangement that brings credit agencies close to farmers. Another important consideration is that the policy framework should synchronize loan disbursement with the agro-climatic conditions or farm calendar of the agro-ecological zone of the credit-seeking farmer, apart from relaxing conditions for collaterals. According to Manohar and Manfred (1997), interest rate subsidies on formal credit in an economic environment that is characterized by a weak financial market does not seem to be a rational, desirable and sustainable economic policy, as its overall effect is reduction in access to agricultural credit. In Nigeria, several attempts at credit price discrimination have led to policy distortions and shift of policy focus from intended to unintended beneficiaries (Idachaba, 2000; Rahji 2000). It is against this backdrop that this study tried to examine the socio-economic characteristics of farmers and institutional arrangement affecting farmers' decision to acquire credit in Southwest Nigeria. This is with a view to unraveling the key determinants of farmers' decision to acquire credit and the intensity of credit acquisition. An attempt was also made in the study to obtain the effect of changes in the institutional attributes of formal credit sources on farmers' demand for credit and intensity of credit acquisition. Credit demand assessment models have been developed to evaluate the credit acquisition potentials of prospective borrowers (farmers) and these models have been applied to the agricultural sectors of developed countries. Contrariwise, there is a dearth of such studies in the agricultural sector of a developing country like Nigeria. Thus, the ultimate goal of this study is to bridge this gap in knowledge.

Conceptual Model

This paper follows a Rahm and Huffman (1984) application of Tobit model to adoption decision of farmers in loan acquisition based on output maximization. Defining the variational loan sources by α_{ij} where $i=1$ for formal loan sources and $j=2$ for informal loan sources, the non-observable underlying output maximization function which

ranks the preference of the i th farmers is given by $Q(X_{ij}, Y_{ij})$. Thus, the output derivable from the acquisition of certain loan size is a function of X_{ij} , which is a vector of farm and farmer-specific characteristics, and Y_{ij} which is a vector of credit institution's characteristics and availability of complimentary inputs/services. Output maximization function is however unobservable, the correlation between the output obtainable from acquisition of modern technologies with enhancement of farmers' purchasing power through loan is postulated to be a function of observed farm size, socio-economic characteristics of farmers (age, farm size, farming experience, distance to nearest farm service centre, availability of inputs, membership of cooperative society, non-farm income) and loan specific characteristics (transaction cost, time of disbursement, availability of complimentary inputs and loan amount) and a random term having a zero mean:

$$Q_{ij} = \alpha F_i(X_{ij}, Y_{ij}) + e_{ji} \quad j=1,2 \quad i = 1 \dots n \quad (1)$$

Equation (1) does not restrict the function F to be linear. As the outputs Q_{ij} are random, the i th farmer will choose the alternative $j=1$ if $Q_{i1} > Q_{i2}$ or if the non-observable (latent) random variable $a^* = Q_{i1} - Q_{i2} > 0$. The probability that Q_{ij} equals one (that is that the farmer acquired credit) is a function of the independent variables.

$$\begin{aligned} P_i &= \Pr(A_i = 1) = \Pr(Q_{i1} > Q_{i2}) \\ &= \Pr(\alpha_1 F_i(X_{i1}, Y_{i1}) + e_{i1} > \alpha_2 F_i(X_{i2}, Y_{i2}) + e_{i2}) \\ &= \Pr(e_{i1} - e_{i2} > F(X_{i2}, Y_{i2}) - F(X_{i1}, Y_{i1})) \\ &= \Pr(u_i > F(X_{i2}, Y_{i2}) - F(X_{i1}, Y_{i1})) \\ &= F(K \delta) \dots \dots \dots (2) \end{aligned}$$

Where K is the $n \times m$ matrix of the explanatory variables, and δ is a $m \times 1$ vector of parameters to be estimated, $\Pr(\cdot)$ is a probability function, u_i is a random error term, and $F_i(K \delta)$ is the cumulative distribution function for u_i evaluated at $K \delta$. The probability that a farmer will acquire loan from either formal or informal credit sources is a function of explanatory variables and of the unknown parameters and error term. Following equation (2), the functional form of F is specified with a Tobit model, where U_i is an independently and normally distributed error term with zero mean and constant variance ($e_i \approx N(0,1)$)

$$A = \begin{cases} 1 & \text{if } i^* = K \delta + u_i > S \\ 0 & \text{if } i^* = K \delta + u_i \leq S \end{cases} \dots \dots \dots (3)$$

Where A is the probability of acquiring (and intensity of acquisition of) credit from either formal or informal source; i^* is a non-observable latent variable and S is a non-observable threshold level. The Tobit model (Tobin, 1958) therefore measures not only the probability that a farmer will acquire credit but also the intensity of credit acquisition from preferred source. Hence equation (3) is a simultaneous and stochastic decision model according to Akinwumi (1993). If the non-observed latent variable i^* is greater than S , the observed qualitative variable (a) that indexes credit acquisition decisions becomes a continuous function of the explanatory variable, and 0 otherwise (i.e. no credit acquisition). In this study, the 2-limit Tobit proposed by Rossett and Nelson (1975) was used because a substantially large proportion of farmers have acquired one form of credit or the other from different sources. This is consistent with Gould *et al.*, (1989).

MATERIALS AND METHODS

Study Area

This study was conducted in Southwest Nigeria. The area is characterized by rainforest vegetation with high rainfall and humidity for the greater part of the year. Six out of the 36

States in Nigeria constitute the Southwestern geo-political zone. The prevalent occupation in the area is farming and the crops produced range from food crops such as maize, cassava, yam, rice, vegetables to tree crops like cocoa, oil palm,

coffee and rubber. The farmers in the area are, however, mainly small-scale farmers who produce for family consumption and sell any surplus to be able to meet their need for manufactured goods and other services.

Data Collection and Sampling Technique

Multi-stage technique was used to select the respondents. The first stage involved random selection of three out of the six States constituting Southwest Nigeria. The States were Ondo, Ogun and Oyo. In the next stage, one ADP zone well known for agricultural activities covered in the study was purposively selected in each of the three States. Then, two Local Government Areas (LGAs) were randomly selected from the senatorial district chosen in each State. The six LGAs in which data were collected were Idanre and Ondo West in Ondo State, Ipokia and Odeda in Ogun State and Iddo and Egbeda in Oyo State. Information on the communities with comparatively high production data on specific crops from the selected LGAs were obtained from the respective State's Agricultural Development Programmes (ADP) together with the list of registered farmers involved in the production of food and cash crops. A probabilistic random sampling technique was applied to select respondents based on the population of registered farmers in the selected LGAs. The primary data for the study were collected from 300 farmers split into 150 food crop farmers and 150 tree crop farmers. The data on which the empirical model was based were collected using a pre-tested structured questionnaire.

Analytical Technique

The estimated empirical model, derived from equations (1) to (3), was developed using the farmer-specific socio-economic characteristics and institutional attributes of formal credit source(s). The dependent variable is the proportion of the total credit portfolio mix (i.e. formal, cash and kind) that constitutes the various credit means. The attribute vector X in equation (1) was specified in the model to

include the following variables: transaction costs, the loan size, time of disbursement and availability of complimentary inputs. High transaction cost, and non-availability of complimentary inputs were hypothesized to be negatively related to credit acquisition and utilization (Ada-Okungbowa and Aigoro, 1992); Imoudu and Akinbami, 1997. Thus, any policy to reduce or completely remove transaction cost, synchronize loan disbursement with farmers' operations and provide adequate loan size with complimentary inputs will not only improve credit acquisition by farmers but also increase the intensity of credit acquisition.

The farmer-specific socio-economic characteristics included in the model (i.e. vector Y_i) were age, farm size, type of crop grown, membership of cooperative society, farming experience and educational status. Studies have shown that some of these characteristics especially farmer's age, level of education, membership of cooperative societies are related to credit acquisition and utilization decisions. Younger and educated farmers having affiliation with cooperative societies have been found to be more willing to bear risk due to their extended planning horizon (Akinrinola, 1989; Poison and Spencer, 1991). Therefore, it is hypothesized that the sign on these variables in the empirical model is positive except for age. Three variations of the empirical model were estimated with data disaggregated as follows:

- Using farmers' socio-economic characteristics alone,
- Using institutional attributes of both formal and informal credit sources alone, and
- Using both farmers' socio-economic characteristics and institutional attributes of credit sources.

An iterative maximum likelihood algorithm (White, 1978) was used to estimate the empirical models in order to obtain asymptotically efficient parameter estimates. In order to estimate the effects of changes in institutional attributes on farmers' decision to acquire credit and intensity of credit acquisition, a Tobit decomposition framework suggested by McDonald and Moffitt

(1980) was used. Intensity of credit acquisition in this study connotes propensity to acquire more credit.

Let the expected value of the dependent variables across all observations be denoted by $E(D)$, the expected value of the dependent variable conditional on the farmer being above the threshold limit (i.e. already acquired credit and now concerned with acquisition intensities) be given as $E(d)$, the probability of the farmer being above the limit (i.e. the probability of acquiring credit) be represented as $F(q) = K\beta / \delta$.

The relationship between these variables is in the form.

$$E(D) = F(q) * E(d) \dots \dots \dots (4)$$

For a given change in the level of the credit institution's attributes, the effect of farmers' decision to acquire credit can be disaggregated into two components by differentiating equation (4).

$$\delta E(D) / \delta K_i = F(q) \left[\frac{\partial E(d)}{\partial K_i} \right] + E(q) \left[\frac{F(q)}{\partial K_i} \right] \dots 5$$

Multiplying through by $K_i / E(D)$, converts the relation in equation (5) into elasticity forms:

$$\left[\frac{\partial E(D)}{\partial K_i} \right] K_i / E(D) = F(q) \left[\frac{\partial E(d)}{\partial K_i} \right] K_i / E(D) + E(q) \left[\frac{F(q)}{\partial K_i} \right] K_i / E(D) \dots (6)$$

Re-arranging 6 by using equation (4), we obtain

$$\left[\frac{\partial E(D)}{\partial K_i} \right] K_i / E(D) = \left[\frac{\partial E(d)}{\partial K_i} \right] K_i / E(d) + \left[\frac{F(q)}{\partial K_i} \right] K_i / F(q) \dots 7$$

Therefore, the total elasticity of a change in the credit institution's attributes consists of two effects viz: the change in the elasticity of the probability of acquiring credit and the change in the elasticity of credit acquisition intensity for farmers who have acquired credit.

RESULTS AND DISCUSSION

When only the socio-economic characteristics of farmers were considered (Model 1), only type of crop grown was significantly related to credit acquisition decision at 1% with a t-ratio of 2.7543 while all other postulated socio-economic characteristics of farmers were significant at 5% level with t-ratio as follows: Age, -2.2235; farm size, 2.3580; farming experience, 2.3494 and membership of co-operatives, 2.1235. All farmer socio-economic characteristics except age were positively related to credit acquisition (Table 1). This finding that all postulated farmer-specific variables were significant at the conventional levels of 1% or 5% lends credence to the result of an earlier study by Poison and Spencer (1991) that farm size, farming experience and membership of cooperative societies positively influenced credit acquisition. The fact that there

was a negative relationship between age and credit acquisition decision indicated that the older the farmer, the less the probability of acquiring credit. This is probably as a result of the risk-averse attitude of older farmers in peasant agriculture (Mafimisebi *et al.*, 2006).

When only the credit source attributes were considered (Model II), all the variables were highly significant at either 1% level (transaction cost) or 5% level (loan size, timeliness of disbursement and availability of complimentary inputs) with the following t-ratios: transaction cost, -3.1118; loan size, 2.3916; timeliness of loan disbursement, -2.3318 and availability of complimentary inputs, -2.3332 in explaining credit acquisition and intensities of acquisition (Table 2).

The results for decomposition of total elasticity for changes in the attributes of credit sources indicated that farmers who grow tree crops have higher propensity to acquire credit than their food crop counterpart. Probable reasons for increased use of credit among tree (cash) crop farmers could be their need for higher recurrent expenditures on agrochemicals to keep pest and diseases at bay. This result conforms to the maintained hypothesis that all the institutional characteristics of credit sources except loan size affects farmers' credit demand (Table 2).

Estimates from Model III (Table 3) showed that membership of cooperative society and age conformed to established findings and previous argument in the agricultural credit literature. Transaction cost and complimentary inputs (significant at 1% with t-ratios of 3.8992 and 3.4584) and age, membership of co-operatives and timely loan disbursement (significant at 5%

with t-ratios of -1.9037, 2.4775 and 2.5048, respectively) were the determinants of farmers' decision to acquire credit.

Transaction cost and complimentary inputs which were significant at 1% level had the strongest influence on farmers' decision to acquire credit. The empirical result implies that a 10% reduction in transaction cost will lead to about 7% increase in credit demand and acquisition intensities. Disbursement time and membership of co-operatives, which were significant at 5%, were found to condition farmers' drive to acquire credit in the study area. This implies that most of the farmers would have acquired credit if there is correct timing of loans to coincide with the production season complimented with availability of improved production inputs. This probably explains the negative signs of credit institutions' parameter on probability of credit demand.

Table 1: Tobit estimate for farmers' socio economic attributes

Independent variables	Parameters	Standard error	T-ratio
Age	-0.7431	(0.33421)	2.2235**
Farm size	0.40636	(0.1723641)	2.3580**
Farm experience	0.41168	(0.185231)	-2.3494**
Membership of cooperative society	0.33432	(0.15743)	2.1235**
Type of crop grown	0.37283	(0.13536)	2.75431***
Constant	-2.34351	-(1.6100)	

Source: Data analysis.

The predicted probability of $Y > \text{limit}$ given average $X(1) = 0.7132$

The observed frequency of $Y > \text{limit}$ is = 0.4823

At mean value of all $X(1)$, $E(Y) = 1.1323$.

Significance at 5%, *significance at 1%

The results of the computed elasticities, using Model IV, (Table 4) showed inelastic responses to changes in selected institutional attributes. Once again, transaction cost had the strongest impact on farmers' decision to acquire credit and intensities of credit acquisition. The total elasticity value was 0.67 broken into 0.39 for the probability of acquiring credit and 0.28 for the elasticity of credit acquisition intensity. The

probability of a farmer acquiring credit will increase by 4%, while credit acquisition intensities will rise by 3%. These results show that policy framework aimed at reducing transaction cost, enhancing the timely disbursement of loans and increasing access to complimentary inputs will increase credit acquisition decision and intensities of credit demand of farmers.

Table 2: Tobit Estimate for the Characteristics of Credit Sources

Independent variables	Parameter	Standard error	T-ratio
Loan size	0.19401	0.08112	2.3916**
Time of disbursement	-0.44397	0.19040	-2.3318**
Transaction cost	0-0.77549	0.28134E-01	-3.1118***
Availability of Complimentary inputs	0.70325	0.30140	-23332**
Constant	3.2143	.9974	

Source: Data analysis

The predicted probability of $Y > \text{limit}$ given average $X(1) = -0.6752$

The observed frequency of $Y > \text{limit}$ is 0.59621

At mean values of all $X(I)$, $E(Y) = 0.4362$

Log likelihood ratio = 2.1634

***Significance at 1%, **significance at 5%

Synchronizing loan disbursement with production season is estimated to increase the total elasticity by 0.53 decomposed into 0.30 for the elasticity of the probability of acquiring credit and 0.23 for credit acquisition intensities. Provision of adequate complimentary inputs and adequacy of loan amounts are estimated to have similar effect on credit acquisition decision and

acquisition intensities, total elasticity of the probabilities of acquiring credit of 0.48 and 0.45. These values were partitioned into 0.24 for credit acquisition probabilities and 0.24 for credit acquisition intensities for availability of complimentary inputs and 0.23 and 0.22 for credit acquisition probabilities and credit acquisition intensities, respectively.

Table 3: Tobit estimate for farmer-specific socio-economic characteristics and institutional attributes of credit sources conditioning credit demand decision

Independent variables	Parameter	Standard error	T-ratio
Age	-0.61235	032166	-1.9037**
Farm size	0.21195	0.29523	0.71791
Membership of Cooperative society	0.74232	0.2966	2.477**
Type of crop grown	0.5910E-0	0.115446E-03	1.0660
Time of disbursement	0.12482	0.49833E001	2.5048**
Transaction cost	0.45076E-01	0.11560E-01	3.8992***
Availability of Complimentary input	0.25421	0.73505E-01	3.4584***
Constant	-1.03996	0.38225	-2.7166

Source: Data analysis

The predicted probability of $Y > \text{limit}$ given average $X(1) = 0.913$

The observed frequency of $Y > \text{limit} = 0.7922$

At mean values of all $X(1)$, $E(Y) = 2.80306$

***Significant at 1%, * significant at 5%

Table 4: Tobit total elasticity decomposition for changes in the characteristics of credit source(s)

	Food crop		Tree (cash) Crop	
	Credit Acquisition	Expected Intensities of credit use	Credit Acquisition	Expected I Intensities of credit use
Transaction cost	0.3948	0.2753	0.4238	0.3126
Timely disbursement	0.3039	0.2332	0.3697	0.2633
Complimentary Input	0.2444	0.2421	0.2896	0.2613
Loan Size	0.2331	0.2211	0.3144	0.2516

Source: Data analysis

CONCLUSION

The study shows that institutional characteristics of formal credit sources are significant determinants of farmers' decision to acquire credit. The results indicate that proximity of credit sources to farmers; timely loan disbursement and provision of complimentary inputs with adequate loan size will increase credit acquisition drive of farmers. Thus, it is strongly recommended that institutional characteristics of formal agricultural credit institutions and provision of complimentary inputs, be accorded important considerations in credit policy.

The results of this study shows that a policy framework aimed at reducing transaction cost, enhancing timeliness of loan disbursement and increasing access to complimentary inputs will increase both credit acquisition and intensities of credit demand by farmers. It is recommended that institutional attributes of formal agricultural credit institutions be accorded important considerations in credit policy.

REFERENCES

- ADA-OKUNGBOWA, C.I. and AIGORO S.K. (1992).** Agricultural Credit and Use: A Case Study of Small-scale Farmers in Osun State, Nigeria. *Applied Tropical Agriculture*, **1**(2): 18-25.
- AKINOLA, A.A. (1987).** An Application of Probit to the Adoption of the Tractor Hiring Services Scheme in Nigeria. *Oxford Agrarian Studies*, **16**: 72-82.
- AKINRINOLA, O.O. (1989).** Impact of Micro-credit on Poverty Alleviation among Small-scale Farmers in Ondo State, Nigeria: An Analysis of NDE Rural Employment Loan Scheme. Unpublished M.Sc Thesis, Department of Agricultural. Economics, University of Ibadan
- AKINWUMI, J.A. (1993).** Technology Characteristics, Farmers' Perception and Adoption Decision: A Tobit Model Application in Sierra Leone. *Agricultural Economics*, **9**(1): 297-311.
- GOULD, B.W, SAMPE W.E. and KLEMMER M. (1989).** The Role of Farm and Operator Characteristics and the Perception of Erosion. *Land Economics*, **65**:167-182.
- IDACHABA, F.S. (2000).** Tropical Issues in Nigerian Agriculture: Desirable and Workable Agricultural Policies for Nigeria in the First Decade of the 21st Century. Departmental Lecture on Issues in Nigerian Agriculture, Department of Agricultural Economics, University of Ibadan, Nigeria. Ibadan University Press.
- IMOUDU, P.B. and AKINBAMI, O.A. (1997).** Credit Demand in Agriculture: The Case of Selected Farmers in Ondo State. *Applied Tropical Agriculture*, **2**(1) 15-22.

- MAFIMISEBI, T.E.; OKUNMADEWA, F.Y., OYEKALE, A.S. and ONYEKA, U.P. (2005).** Rural Business Financing in Ibadan, Nigeria: A Statistical Analysis of Community Banks Credit to the Agricultural and Non-Agricultural Sectors. *Applied Tropical Agriculture*, **10**(1): 8-15.
- MAFIMISEBI, T.E. (2010).** Technology Adoption and Economic Development: Trajectories from the African Agricultural Industry In: Ekekwe, N. (Ed). *Nanotechnology and Microelectronics: Global Diffusion, Economics and Policy*, IGI Global publishers, New York, USA, pp 298-313.
- MAFIMISEBI, T.E., OGUNTADE, A.E. and MAFIMISEBI, O.E. (2010).** Re-engineering Agriculture for Enhanced Performance through Financing. *Journal of Economics, Finance and Administrative Sciences*, **15**(29): 35-49.
- MANOHAR, S. and MANFRED, Z. (1997).** Repayment Performance in Group-Based Credit Programme in Bangladesh: An Empirical analysis. *World Development*, **25**(10): 1731 – 1742.
- MC DONALD, J.F and MOFFIT R.A. (1980).** The Use of Tobit Analysis. *Review of Economics and Statistics*, **62**:318-321.
- OLADELE, O.I and ADESOPE, O.M. (2004).** Credit Supply Services of Non-Government Organizations to Small-scale Farmers in Nigeria. *Journal of Rural Development*, **23**(2): 375-383.
- POISON, R.A and SPENCER, D.S.C. (1991).** The Technology Adoption process in Subsistence Agriculture: A Case of Cassava in South Western Nigeria. *Agricultural Systems*, **36**:65-77.
- RAHJI, A.A. (2000).** An Analysis of the Determinants of Agricultural Credit Approval/Loan Size by Commercial Banks in Southwestern Nigeria. *Nigerian Agricultural Development Studies* **1**(1): 21-27.
- RAHM, M.R and W.E. HUFFMAN (1984).** Adoption of Reduced Tillage: The Role of Human Capital and other Variables. *American Journal of Agricultural Economics*, **66**(4): 405-413.
- ROSETT, N.R and NELSON, F.D. (1975).** Estimation of the Two-Limit Probit Regression Model. *Econometrica*, **43**: 141-146.
- TOBIN, J. (1958).** Estimation of Relationships for Limited Dependant Variables. *Econometrica*, **26**:29-39.
- WHITE, K.J. (1978).** Shazam – A General Computer Programme for Econometric Method. *Econometrica*, **46**:239-240.