A PROBIT ANALYSIS OF ACCESSIBILITY OF SMALL SCALE FARMERS TO FORMAL SOURCE OF CREDIT IN OGBOMOSO ZONE, OYO STATE, NIGERIA

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Abstract

The study analyzed the determinant of small scale farmers, access to formal credit in Ogbomoso zone, Oyo-State. Access to credit is very important since financial constraints were one of the most important problems of small-scale farmers limiting adoption of new farming technologies. Formal credit is the most reliable source of credit in terms of availability in optimal size and disbursement organization. 150 small scale farmers were purposively select for the study; Data used was collected from the farmers using interviewed schedule method. The data was analyzed with Probit model using SAMAZ software. The result of the study revealed that level of education, membership of cooperative, contact with extension agent and present of collateral security positively and significantly determine the likelihood of farmers access to formal credit, while farming experience negatively determine the probabilities of farmers having access of formal credit. The result was consistent with a prior expectation in terms of direction of relationship and economy theories. The study therefore recommended that, the direction of influence of these determinants should serve as a guide, in efficient disbursement of formal credit in the future.

Key word: Probit analysis, accessibly, formal credit

INTRODUCTION

Access to credit is very crucial to small scale farmers especially in less developed nation of the world. This is because it increases farmer's total production and improves their productivity per unit input. Credit is a necessary ingredient in the various aspect of farming operation. There is high demand for credit by farmers in Nigeria, mainly because capital is required for improvement on the land, for purchase of implements, machinery, and breeding stock, purchase of seeds, fertilizer as well as payment of wages of labour. Agricultural credit can be organized into two, informal and formal sources. The informal sources of credit include cooperative societies, commercial banks and development banks. According to Olomola (1999), credit from informal sources cannot contribute much to the process of agricultural development. Some of the problem associated with the informal source of credit as stated by Akande and Oni (2000) are:

 (i) The tend to be small in size: hence they can only cater for limited number of trusted client.

 (ii) Because the volume of lending is very small they may not meet the needs of the borrower.

(iii) Many of the loans are disbursed at exceedingly high rates of interest, as well as purchasing of farmers output at unreasonably low prices.

(iv) Adoption on third party guarantees as techniques at overcoming problem of collateral is defective in that enforceability is difficult and ineffective.

Despite the problem listed above, informal sources of credit are extremely popular among smallholder frames because of the relative ease of obtaining the loan and flexibility built into repayment most especially in areas where individuals are quite familiar with and share confidence in one another, formal sources of credit although believe to be the most effective sources from the point of view of overall agricultural development. It also has it associated problem in which inaccessibility to it by small scale farmers is the major one. Other problems which are also related to the major problem as stated by Olumola (1999) include the following:

– Scarcity of collateral in the rural area

– Poorly developed communication network and other rural infrastructures in rural areas make transaction cost of dealing with small loan, and geographically widely dispersed large number of borrowers too high for institutional lenders.

– High risk associated with agriculture as a business. These include weather fluctuation as well as change in commodity price.

– Enforcing loan repayment constitutes a serious constraint to channeling credit to the agricultural sector.

– Problem of imperfect information due to adverse selection and moral hazards.
– Bureaucratization of lending slows down loan processing and exposes credit to political or religious pressures.
– Loan diversion to non-agricultural or non-productive uses.
– Counter productive government policies
– Misconception about loans is often regarded as part of the national cake instead of depositor's money. Given the importance of credit in agriculture and the fact that only formal sources of credit is the source that can disburse credit efficiently to small scale farmers, couple with the enumerated problem associated with these source, this study therefore aim at analyzing some of the major determinants of accessibility of small scale farmers to formal sources of credit using Probit model.

MATERIALS AND METHODS

Probit model

The use of qualitative response model in explaining discrete decision making is well documented. The simplest of these models, the linear probability (LPM) is amenable to the ordinary least squares method (Agada and Philip, 2002). However, it suffers the limitation that is disturbance term is potentially heteroscedastic and the model probability predictions are not necessarily bounded within (0, 1) (Pindyck and Rubin-fied, 1981). The transformation of the LPM with bounded probability values within (0, 1) are the Probit and logti model. Probit model means cumulative Normal probability functions, while Logit model is cumulative logistic probability model. The Probit model assumes the existence of some index Z such that

(a) Z_i is unobserved or unmeasured
(b) Z_i is continuous
(c) Z_i is determine by X_i
(d) Z_i is normally and independently distributed i.e $Z_i' \sim nid$

Model specification

in specifying a Probit model, a random variable Y (dependent variables) takes the value of 1 if the event occurs i.e if small scale farmers have access to formal credit and zero if otherwise.

$$Yi^* = Xib + ÎI$$

$$Yi = \begin{cases} 1 \text{ if } yi^* > 0 \\ 0 \text{ otherwise} \end{cases}$$

Where: $i = 1, 2, \ldots, n$

Furthermore, the probability of an event occurring depends on a vector of independent variable X and a vector of unknown b. The Probit probability functional form where a standard normal distribution function is used to transform the original data of the binary

Model is expressed as: $F(Z) = f(Z) = \int_{\omega}^{=z} \frac{1}{2\pi} e \frac{u^2 d}{2}$

Where: $(Z) = Xib$

The Probit model specified in the study to analyze farmer's accessibility or inaccessibility to formal credit can be expressed as:

Tab. 1: Factors affecting farmer's accessibility to formal credit

Variable symbol	Definition	Measurement
Y_i	farmer access to formal	the value of one if farmer have access to credit, 0 otherwise
X_1	farmers age	in years
X_2	sex	one for male, 0 otherwise
X_3	literacy level	years of schooling
X_4	farm size	in hectare
X_5	land tenure state	one for land owner, 0 otherwise
X_6	type of credit	1 if short term, 0 if long term
X_7	collateral security	1 if available, 0 otherwise
X_8	cooperative membership	1 if member, 0 otherwise
X_9	farm record	1 if available, 0 otherwise
X_{10}	project type	1 for crop husbandry 0, otherwise
X_{12}	farming experience	in years
X_{13}	contact with extension agent	no of visitation

$yi = 1 = XiP + Ei$ if $Xib + Ei > T$
$yi = 0$ if $Xib + Ei$ £ T
$i = 1, 2, …, n$

Where yi is farmers accessibility to credit which takes on the value of 1 and value 0 for non-accessibility. T is the threshold point and Ei is an independently distributed error assumed to be normally distributed with zero mean and constant variance.

$V' \sim N (06^2)$

Explanatory variables (Independent variables) expected to influence farmer access to formal credit are age, education, level, farm, size/type of credit, collateral security farm record and accounts, project type etc. The main advantage of the Probit functional form is that it is bounded between 0 and 1, hence the problem of predicting values being outside the probability range is overcome, furthermore, it compels the disturbance term to be homoscedastic because the form of the probability function depends only on the distortion of the difference between the error terms associated with one particular choice and another (Amemiya, 1973).

Hypothesis Testing

H_0: $b_j = 0$, $(j = 0, 1, 2, …, 12)$
H_i: b_j ¹ 0

Literature on probability model

Many authors have used various types of probabilities models in their studies. Ayinde (2004) used Logit regression model to study the probability of health hazard resulting from the use of insecticide in cowpea production in Kano and Ogun State, his findings revealed that insecticide usage imposes health hazard on the respondent (cowpea farmers) in the study area. This study also confirms the findings of Dung and Dung (1999). Adesina et al. (1999) also used Logit model in their study 'Policy shift and Adoption of Alley farming in West and Central Africa'. In this study, logit analysis showed that farmers socio-economic characteristic, village characteristic and farmers perception of technology attribute were all-important in explaining farmers adoption behaviour. Adejobi (2004) in his study, "Rural livelihood, poverty and household food Demand structure in Kebbi State. Nigeria", used Tobit regression model to analyze household characteristics and livelihood variables that determined food poverty level in the study area, his findings reveled that only 14 out of 23 household characteristic and livelihood variables included in the model had their coefficient significant at 5% (p = 0.05). Akinbode (2005) used logit regression modle to estimate factors affecting the willingness to pay for safety food among the respondent study in Ogun State. The study shows that

age (X_1), education (X_2), income (X_3) and consciousness (X_6) significantly affected the likelihood or otherwise of willingness to pay for safety food among street food consumers. Rahji (1996) used probit model to determine the characteristics that influenced the probability that a farm household member will participate on off farm work. The outcome of the study revealed that some of included variables like Age (X_1), level of education (X_3), and five others, significantly determine the participation in an off-farm work. Chikwendu (2002) make use of logit model to analyze the determinants of Adoption of improve technologies among farmers participating in public and alternative extension system in Nigeria. The result showed that the probability of a farmer adopting a new technology was much higher under the NGOs/PAE system than under the government financed and controlled Training and visit (T&V) extension system. Agada and Philip (2002) in their study 'A Logit Analysis of the participation in the Nigeria Agricultural Insurance Scheme by maize growing farmers in Kaduna State'. The study revealed that about 94% of the farmers studied were correctly classified by the model. The statistical significant adoption factors are the amount of loan (X_4), year of education (X_1) and contact with extension agent (X_7) and this were significant at 1% level (0 < 0.01), while job statue (X_2) was significant at the 5% level and the size of loss suffered (X_9) was significant 10% level (> 0.10).

Area of study

The study was carried out in Ogbomoso zone of the Agricultural development project (ADP) of Oyo State. The zone comprises of five local government areas namely, Ogbomoso North and South, Orire, Ogo-Oluwa and Surulere respectively. The Geographical location is one latitude 8.1°N longitude 3.29°E. The zone is regarded as derived savannah vegetation zone and a lowland rainforest area. The climate of the region is characterized by a fairly high uniform temperature, moderate to heavy seasonal rainfall and relative humidity. The mean annual temperature is 26.2°. Agricultural activities in the area include production of corps like Vegetable, Cowpea, Yam, Cassava Maize Pepper, Rice and Okra. Permanent fruit crops grown in the area include Cashew, Mango, Citrus, Banana, Pawpaw and Pineapple.

Method of data collection

The study make used of primary data. The primary data was collected through a survey and administering set of interview schedule to small scale farmers in Ogbomoso. Primary data provide information on the socio-econom-

ic characteristic of the farmers, their source or accessibility to credit of credit procurement, uses of credit and son on.

Sampling technique

Purposive sampling techniques was used to select 75 small scale farmers who have access to formal credit and 75 small scale farmers who did not have access to formal credit in the zone.

Method of analysis

A Probit model was estimated using SHAZAM computer software.

RESULTS AND DISCUSSION

Table 2: reveal the maximum likelihood estimates of the model investigated. About 81% of the farmers studied were correctly classified by the model. The model chi-square, statistically significant at 1% level was 172.82. The parameters for the model were evaluated at the 1%, 5% and 10% levels. Five of the twelve independent variables included in the model were found to be statistically significant at different levels.

The variables that are significant are literacy level (X_3) and cooperative membership (X_8) both were significant at the 1% level, collateral security (X_7) was significant at 5% while farming experience (X_{11}) and contract with extension agent (X_{12}) were significant at 10% level.

The signs of all the significant parameter estimates except for farming experience were positive and are consistence with a prior expectation.

The result of analysis implies that literate farmers who belong to cooperative society and have collateral security with reasonable contact with extension agent are more likely to have access to formal credit. That is a unit change in the above listed variables increased the probability of having access to formal credit by 10.48, 5.12, 7.13 and 2.11% respectively.

For farming experience (X_{11}), the higher the farming experience (in years) the less likely the farmers will have access to formal credit since it coefficient is negatively sign.

Most of the variables analyzed show an outcome that is consistent with a priori expectation. For example, literacy level is expected to increase their awareness about extent of formal credit. An educated farmer will also find it easer to process credit; all this will increase his accessibility to formal source of credit. The same argument is true for presence of collateral security, member of cooperative society and contact with extension officers which will al increases the odds of having access to formal credit. In the case of farming experience, which has negative reactive relation with access to credit, it shows that with increasing farming experience, farmers became very conservative about sourcing credits from formal source and they prefer sourcing there funds from informal institution like friends, relative, money leaders and produce buyers. Older farmers may not even believe in funding his business with borrowed capital, he may rely on his insufficient equity.

Tab. 2: Maximum likelihood estimates of the Probit Model

	Variables	Expected sign	Coefficient	T-statistic	Elasticity
1	Farms Age (X_1)	+	−0.112	0.242	0.051
2	Sex (X_2)	±	−0.004	0.013	0.022
3	Farm size (X_3)	+	2.123***	0.321	1.048
4	Farm size (X_4)	+	0.034	0.139	0.10
5	Land tenure statue (X_5)	+	0.056	0.183	0.032
6	Type of credit (X_6)	neutral	−0.086	0.184	−0.127
7	Collateral security (X_7)	+	1.077**	0.528	0.713
8	Cooperative membership (X_8)	+	1.413***	0.263	0.512
9	Farm record (X_9)	+	0.132	0.166	0.201
10	Project types (X_{10})	neutral	−0.017	0.181	−0.062
11	Farming experience (X_{11})	±	−0.416*	0.421	−0.137
12	Contact with extension agent (X_{12})	+	0.372*	0.186	0.211
	Constant	+	−4.124***	1.14	

Log likelihood = −330; Number of observation = 150; Chi-Square = 172.82; Percentage of right prediction = 81

***Significant at 1%; **Significant at 5%; *Significant at 10%

CONCLUSION

The study showed that certain variables usually determine the accessibility of farmers to formal sources of credit. Among this variables, are level of education, membership of cooperative, availability of collateral security, farming experience and contact with extension agent, were the most important, it is therefore important for policy maker to take full advantages of indicated direction of influence of this factors in designing effective credit program.

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