

## Determinants of Repayment Decision among Small Holder Farmers in Southwestern Nigeria

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**Abstract:** The study examined the factors that determine the loan repayment decision among the small-scale farmers of Nigerian Agricultural Cooperative and rural Development Bank (NACRDB) in Southwestern Nigeria. Data for the study were collected through a three- multi stage sampling technique, which culminated in the final selection of one hundred and eighty respondents from 3 branches of the bank in Oyo and Ondo states. The results obtained revealed that the higher repayment rate (78.02%) in 2001 was as a result of merger effect of Nigerian Agricultural Cooperatives Bank (NACB) with the risk assets of the defunct Family Economic Advancement Programme (FEAP) and Peoples Bank of Nigeria (PBN). The Tobit regression results on loan repayment of Log-likelihood function (-17.99385) showed that farm experience, farm location, cost of obtaining loan, visitation, borrowing frequency and education with normalized coefficients of -0.0285, -0.0661, -0.1196E<sup>-04</sup> 0.1048, 0.0518 and 0.0112, respectively were very important factors in determining the repayment performance of the beneficiaries in all the institutions. The study concluded that there was a great potential for improving the loan repayment capacity of the beneficiaries if adequate visitation policy and timely disbursement lag policy that increase the accessibility of farmers to loan are adopted and this would be an effective measures to aid flow of funds into the agricultural sector.

**Key words:** Loan, repayment, NACRDB, decision, credit and tobit, NACB, FEAP, PBN

### INTRODUCTION

In 1999, the Nigerian Agricultural Cooperative Bank was merged with other Agricultural production facilitating banks like the People's Bank of Nigeria (PBN) and the risk assets of the Family Economic Advancement Programme (FEAP) to become an integrated banking system called the Nigerian Agricultural Cooperative and Rural Development Bank (NACRDB). It was to grant loans for agricultural production for the purposes of storage, distribution and marketing connected with such production to any state, group of states or any institution for on-lending to farmers, group of farmers or corporate body subject to the states or group of states or state institutions guaranteeing repayment of the loan.

Major problems however facing these agricultural credit programmes, irrespective of the institution channel, are low credit recovery rates and patronage. The main effect of non-repayment of loans is that it reduces the vitality and viability of credit institutions. It appears that if the obstacles relating to loan repayment are eliminated, the resolve of the government to encourage massive

participation of small-scale farmers in credit programmes is apt to yield desirable results (Armah and Park, 1998). An increasing number of decisions need be based on project productivity of the loan itself, as well as on the likelihood that the farmers will successfully manage the borrowed funds for more effective management of their farms. Repayment ability of a farmer is affected by the riskiness of his farming operations, the effectiveness of the farmers in resource allocation and the prevailing socio-economic environment.

The issues of loan repayment that has an indirect bearing on the default or recovery rates should be well handled to avoid distress and a shaky foundation for the establishment of the financial institutions. This problem of non-repayment of agricultural loans has been observed as one of the problems against the development of the agricultural sector in Nigeria, as it dampens the willingness of the financial system to increase lending to the sector. It is therefore a matter of serious concern that the financial institutions must among other things, ensure repayment of their loans bearing in mind the need to operate in an economic environment that emphasizes self-survival (Oboh, 1981).

However, previous studies have not been able to statistically establish how the new credit administration has influenced repayment decisions of the beneficiaries. Viewing from this background, it is felt that there is the need to examine the key determinants of loan repayment decision among agricultural loan beneficiaries of the Nigerian Agricultural Cooperative and Rural Development Bank (NACRDB) in terms of loan requested for, loan approved and cost of obtaining loan.

**The conceptual model:** To determine the effect of various explanatory factors on loan repayment as well as the extent of determining the loan size upon repayment, this study follows from Siles *et al.* (1994). Loan repayment decisions are assumed to be based upon the strength of feeling of the *i*th beneficiary to repay the loan. According to Gustafson *et al.* (1991) beneficiaries are assumed to make loan approval decision based upon an objective of utility maximization. If *j* represents various sizes of loan where *j* = 1 for the large amount of loan and *j* = 2 for the small amount of loan, then the non-observable and unavailable underlying utility function, which ranks the preference of the *i*th beneficiaries, is given by  $\mu_i(M_{ji}, A_{ji})$ . Thus the utility, derivable from the various sizes of loans obtained depends on  $M_i$ , which is a vector of farm and farmer-specific attributes of the loan beneficiary and  $A_i$ , which is a vector of attributes associated with the sizes of loan obtained. Although the utility function is unobserved, a linear relationship is postulated between the utility derivable from a *j*th loan size and the vector of observed farm, farmer specific characteristics,  $X_i$  (e.g., farm size, age, gender, project type, experience of farmer) and the loan specific characteristic (e.g., small or medium, long term), project type specific characteristics (e.g., food crops, cash crops), institutional characteristics (e.g., extension contact), location specific characteristics (e.g., agro ecological zones) and a disturbance term having a zero mean,

$$e_j: \mu_{ji} = \beta_j X_i + e_{ji} \quad j = 1, 2; i = 1, \dots, n \quad (1)$$

and

$$X_i = F_i(M_i, A_i) \quad (2)$$

Beneficiaries are assumed to repay a loan size that gives them the largest utility. Thus, Eq. 2 does not restrict the function *F* to linear, such that as the utilities  $\mu_{ji}$  are random, the *i*th beneficiary will select the alternative.

*j* = 1 if  $\mu_{1i} > \mu_{2i}$  or if the unobservable (latent) random variable

$$Y^* = \mu_{1i} - \mu_{2i} > 0 \quad (3)$$

Since the primary aim is to interpret the dependent variable in the model as the probability of making a choice, given information about  $X_i$  there is need to use some notion of probability as the basis of the transformation. This involves translating values of  $X_i$ , which may range over the entire real line, into a probability that ranges in value from 0-1. A monotonic transformation is also required since it is desirable that the transformation should maintain the property that increases in  $X_i$  are associated with increases (or decreases) in the dependent variable for all values of  $X_i$ . According to Pindyck and Rubinfeld (1997) the cumulative probability function provides a suitable transformation. This is defined as one having as its value the probability that an observed value of a variable  $X_i$  (for every  $X_i$ ) will be less than or greater than the threshold value. Since all probabilities lie between 0 and 1, the range of the cumulative probability function is the (0, 1) interval.

Hence, the standard cumulative normal distribution of  $X_i\beta$  is expressed as:

$$F(X_i\beta) = \frac{1}{\sqrt{2\pi}} \int_{-\infty}^{X_i\beta} e^{-\frac{s^2}{2}} ds \quad (4)$$

Where, *s* = a random variable which is normally distributed with mean zero and unit variance. Thus, the probability that

$$Y_i = \frac{\text{Value repaid}}{\text{Total value of loan}} \times 100$$

(i.e., the proportion of loan repaid as at when due) is a function of the independent variables:

$$\begin{aligned} P_i &= P_r(Y_i = 1) = P_r(\mu_{1i} > \mu_{2i}) \\ &= P_r(\beta_1 X_i + e_{1i} > \beta_2 X_i + e_{2i}) \\ &= P_r[e_{1i} - e_{2i} > X_i(\beta_2 - \beta_1)] \\ &= P_r(\mu_i > X_i\beta) \end{aligned}$$

$$\text{Therefore, } P_i = P_r(Y_i = 1) = F_i(X_i\beta) \quad (5)$$

Where;

$P_r$  = A probability function

$\mu_i$  = A random disturbance term ( $e_{1i} - e_{2i}$ );  $\mu_i \sim N(0, \sigma^2 1)$

$X$  = The  $n \times k$  matrix of the explanatory variables

$\beta$  =  $k \times 1$  vector of parameters to be estimated

$F(X_i\beta)$  = Cumulative distribution function for  $\mu_i$  evaluated at  $X_i\beta$ .

Thus, the probability that a beneficiary will repay a certain loan size is a function of the vector of explanatory variables, the unknown parameters and the error term.

However, Eq. 5 cannot be estimated directly without knowing the form of F. following Rahm and Huffman (1984) it is the distribution of  $\mu_i$  that determines the distribution of F. therefore, if  $\mu_i$  is normal, F will have a cumulative normal distribution.

The functional form of F (which is the decision component of the model) can be specified as a linear combination of observable explanatory variables as:

$$Y_i^* = \beta X_i + \mu_i \quad (6)$$

This can be represented algebraically for the  $i$ th beneficiary as:

$$Y_i = \beta_0 + \beta_1 X_{i1} + \beta_2 X_{i2} + \dots + \beta_N X_{iN} \dots \dots \dots; i = 1, 2, \dots, N$$

such that

$$Y_i = \begin{cases} 0 & \text{if } Y_i^* \leq T \\ Y_i^* & \text{if } 0 < Y_i^* < T \\ 1 & \text{if } Y_i^* > T \end{cases} \quad (i = 1, 2, \dots, n) \quad (7)$$

Where,

$Y_i$  = Observed dependent variable e.g. the size of the loan repaid by the  $i$ th borrower.

$Y_i^*$  = Non-observable latent variable representing the continuous dependent variable when decision is made on the loan size. (e.g., the proportion of loan repaid)

$T$  = Non-observable threshold (cut-off) point

$N$  = Number of observations.

Since the disturbance term,  $\mu_i$  is a function of the independent variables, an attempt to estimate Eq. (7) using Ordinary Least Square (OLS) will result in biased and inconsistent estimates (Maddala, 1983). If  $Y_i^*$  is assumed to be normally distributed, then consistent estimates can be obtained by performing a Tobit estimation using an iterative Maximum Likelihood Algorithm (White, 1978). The use of maximum likelihood estimation guarantees that the parameter estimates will be asymptotically efficient and the appropriate statistical tests can be performed. This means that all the parameter estimators are asymptotically normal, such that test of significance analogous to the regression t- test can be performed (Pindyck and Rubinfeld, 1997). The likelihood function is of the form:

$$L = \sum_{t=1}^S \log [1 - F(\sigma Y_t - I_t)] + \sum_{t=S+1}^N \log f(\sigma Y_t - I_t) \quad (8)$$

Where  $F_i$  and  $f$  are the cumulative normal distribution function of  $\mu_i$  and  $T$  is the critical (cut-off) value which translates  $Y_i^* > T$ , as borrower repays and  $Y_i^* = T$ , as

borrower defaults. The Tobit model (Tobin, 1958) therefore measures not only the probability that an applicant will repay the loan but also the influence of the loan size if repaid. Thus, Eq. 7 is a simultaneous and stochastic decision model. If the non-observed latent variable  $Y_i^*$  is greater than  $T$ , the observed qualitative variable  $Y_i$  that indexes repayment becomes a continuous function of the explanatory variables and 0 otherwise (no repayment as at when due).

**Decomposition of loan repayment/loan size:** The single-limit Tobit decomposition framework suggested by McDonald and Moffit (1980) was used to assess strategies aimed at enhancing risk-averseness of the beneficiaries in the study area. This was done by examining the effect of changes in variables of specific factors (i.e., farmer's socio-economic specific, resource, security and institutional) on loan repayment and the volume of loan. According to Tobin (1958) the expected value of the dependent variable ( $Y$ ) in the Tobit model is given by:

$$EY = X\beta F(z) + \sigma f(z) \quad (9)$$

Where  $Z = X\beta/\sigma$  normalized index

$f(z)$  = Standard unit normal density function

$F(z)$  = Cumulative standard normal distribution function. The expected value of  $Y$  for observations above the limit,  $y^*$ , is  $X\beta$  plus the expected value of the truncated normal error term (Amemiya, 1978):

$$\begin{aligned} E y^* &= E(Y|Y>0) \\ &= E(Y|\mu>-X\beta) \\ &= X\beta + \sigma f(z)/F(z) \end{aligned} \quad (10)$$

Thus, McDonald and Moffit (1980), Adesina and Zinna (1992) postulated that the basic relationship between the expected value of all observations,  $EY$ , the expected value conditional upon being above the limit,  $Ey^*$  and the probability of being above the limit  $F(z)$ , is:

$$EY = F(z). Ey^* \quad (11)$$

They employed a useful decomposition of these marginal effects under the single- limit Tobit, which can be extended to the two-limit situation. Thus for a given change in the level of specific characteristics in the loan repayment decision model (Eq. 7), the effects on borrower decision behaviour can be disaggregated into two parts; by differentiating Eq. 11 with respect to specific factor change:

$$\partial EY/\partial X = F(z)(\partial Ey^*/\partial X_i) + Ey^*(\partial F(z)/\partial X_i) \quad (12)$$

Equation 6 can be converted into elasticity forms by multiplying through by  $X_i/EY$ :

$$\begin{aligned} (\partial EY/\partial X_i) X_i/EY &= F(z)(\partial EY^*/\partial X_i) X_i/EY + \\ &EY^*(\partial F(z)/\partial X_i) X_i/EY \\ (\partial EY/\partial X_i) X_i/EY &= (\partial EY^*/\partial X_i) X_i/EY^* + \\ &(\partial F(z)/\partial X_i) X_i/F(z) \end{aligned} \quad (13)$$

Therefore, the effect of a change in an independent variable,  $X_i$ , on  $E(Y_i/X_i)$  in elasticity form comprises two effects: The change in the elasticity of the probability of repaying loan (i.e., effects of the probability of being above zero), The change in the elasticity of determining the loan size, for those beneficiaries who repaid loan as at when due (i.e., effects conditional upon being above zero). The relative magnitudes of these two quantities are an important indicator with substantive economic implications (Tobin, 1958). It should be noted that Tobit beta ( $\beta$ ) coefficients do not measure the correct regression coefficients for observations above the limit as the effect of a change in  $X_i$  on  $Y^*$  is not equal to  $\beta_i$  (McDonald and Moffit, 1980). The estimated coefficient vector  $\beta$  is simply the marginal effect of the independent variables on the latent variable  $y^*$  (not the observed  $y$ ). This can be shown following from Eq. 10:

$$\begin{aligned} \partial EY^*/\partial X_i &= \beta_i + (\sigma/F(z)) \partial f(z)/\partial X_i - \\ &(\sigma f(z)/F(z)^2) \partial F(z)/\partial X_i \end{aligned} \quad (14)$$

Thus, the effect of a change in  $X_i$  on  $y^*$  is not equal to  $\beta_i$  (Eq. 9). This is true only when  $X = 8$ , in which case  $F(z) = 1$  and  $f(z) = 0$ , which will of course not hold at the mean of the sample or for any individual observation (Judge *et al.*, 1988).

## MATERIALS AND METHODS

### Study area, sampling procedure and data collection:

The study was conducted in Nigerian Agricultural Cooperative and Rural Development Bank limited (NARCCDB) in Oyo and Ondo states, southwestern Nigeria between May and August, 2005. One hundred and eighty respondents were selected on a three-stage sampling procedure. In the first stage, Oyo and Ondo States were purposively selected because they had higher number of the banks' branches with high number of agricultural loan beneficiaries. During the second stage, 6 branches were purposively chosen for the institution based on the concentration of the applicants. Finally, in the third stage, having found that the average number of applicants for each branch was 250 during the preliminary survey period, 12% of the number that is, 30 beneficiaries were randomly selected from the 6 branches of the bank.

The study made use of both primary and secondary data to accomplish the objectives. The data for this study contained the 2004/2005 production year. Two different sets of structured questionnaires were used in the collection of primary data. The first sets were directed at the Agricultural Officers of the bank and it involved an in-depth interview process. The information collected includes requirements for accessing agricultural loans of the institution, the organizational structure in relation to credit delivery functions, loan monitoring, loan supervision and loan recovery procedures of the institution. The second sets, were directed at the agricultural loan beneficiaries of the institution. The data collected include, among others, the loan size obtained, amount of loan repaid, total amount spent on different activities, cultivated land area, disbursement lag, farming experience with credit used, various uses to which credit were put, reasons for non repayment of loans as and when due. Secondary data were sourced from the bank's draft operating manual, official publications of CBN, such as statistical bulletin, published reports on Agricultural Credit and Banking and notes on Nigeria Agricultural Bank, Federal Office of Statistics Publications and International Financial Statistics published by the World Bank. Data collected were analysed with the use of descriptive statistics such as percentages, frequency and means. Loan Repayment Index, Borrower Repayment Rate, Borrower's Default Ratio and Loan Default Index were used to complement descriptive statistics and were used to assess the loan repayment and delinquency. The performance of the credit institution was assessed based on the mentioned indices. Tobit regression analysis was also used to obtain the repayment performance of the beneficiaries from the credit institutions. The model contains the demographic and socio-economic variables that were found to be important determinants of repayment (Olomola, 1989), Olomola and Akande, (1999).

**Model specification:** Fourteen variables were proposed and reasons for their inclusion offered. The expected signs of their coefficients were predicted *a priori* based on past studies, economic theory and / or logical reasons. The specification for the Tobit model is

$$\begin{aligned} \text{RPMNT}(Y) &= \beta_0 + \beta_1 \text{LOANVOL} + \beta_2 \text{EDUC} + \beta_3 \text{FRMZE} \\ &+ \beta_4 \text{FRMEXP} + \beta_5 \text{HHZE} + \beta_6 \text{SEX} + \beta_7 \text{NFI} \\ &+ \beta_8 \text{DBMTLAG} + \beta_9 \text{FRMLOC} + \beta_{10} \text{COBT} \\ &+ \beta_{11} \text{SAVGS} + \beta_{12} \text{VISIT} + \beta_{13} \text{BWFRQ} + U \end{aligned} \quad (15)$$

Where

$\text{RPMNT}(Y)$  = Limited Dependent Variable defined as

$$\frac{\text{Value repaid}}{\text{Total value of loan}} \times 100$$

= 0 if otherwise.  
 LOANVOL = Loan Volume Disbursed (Naira).  
 EDUC = Educational level (years).  
 FRMZE = Farm size (hectares).  
 FRMEXP = Farming experience (years).  
 HHZE = Household size (No).  
 SEX = Sex of the beneficiary. Dummy:  
 Male = 1, Female = 0  
 NFI = Net farm income (Naira).  
 DBMTLAG = Disbursement lag (weeks).  
 FRMLOC = Farm location (km).  
 COBT = Cost of obtaining loan (Naira).  
 SAVGS = Amount of Savings (Naira).  
 VISIT = Number of visits by loan Officials (No).  
 BRWFQCY = Borrowing frequency (No).  
 U = Error Term.

## RESULTS AND DISCUSSION

**Socio-economic characteristics of the respondent:** The age factor in traditional agricultural is significant in at least two important respects. The first consideration is increased productivity while the second has to do with increased rate of adoption of innovations. Since traditional agricultural production systems still rely on rudimentary implements powered by human used it means that very old farmers will face severe energy constraints and will be less productive than the younger and energetic farmers. Older farmers tend to be conservative and less vulnerable to the wind of change involving the younger farmers. The average age was 46 years.

The number of years a farmer had spent in the farming business could give an indication of the practical knowledge which has been acquired over a number of years it is possible to observe an improvement in a farmer's production activities based upon his experience may be willing to take risk like for example, purchase modern farm inputs even when he has less experience. Farmers who have longer experience in farming may have become more efficient through trial and error. As shown in Table 1 the beneficiaries are well experienced in farming activities with the average years of 12.

The relevance of the literacy level of farmers to farm productivity and production efficiency has been documented by several authors including Olomola, 1986. The educational attainment of a farmer does not only raise his productivity but also increases his ability to understand and evaluate the information on new techniques and processes being disseminated through extension. Table 1 shows that the literacy level among the sample of beneficiaries included in this study is generally low. With about 56% of no education at all. Although the farmers will count more on their experience for increased productivity rather than their educational attainment.

Table 1: Socio-economic characteristics of the beneficiaries

Age of producers (Years)	Frequency (No)	Percentage of total (%)
20-30	12	6.7
31-40	141	22.7
41-50	67	37.2
51-60	45	25
>60	15	8.3
Total	180	100
Mean age = 46		
Marital status		
Married	141	78.3
Single	11	6.11
Divorced	20	11.11
Widowed	8	4.4
Total	180	100
Educational qualification (years)		
1-6	34	18.8
7-9	23	12.78
10-12	18	10
>13	5	2.78
None	100	55.6
Total	180	100

Source: Field survey, 2003

Table 2: Volume of loan disbursement and repayment

Year	Amount repaid (N)	Amount due (N)	Repayment rate (%)
1996	3,020,218.00	5,893,496.00	51.25
1997	6,421,033.00	10,540,958.28	60.92
1998	3,662,101.00	9,049,879.20	40.47
1999	680,314.00	2,413,281.40	28.19
2000	2,682,428.00	4,636,436.48	57.86
2001	9,998,279.00	12,815,756.00	78.02
2002	11,831,468.00	15,312,133.40	77.27
2003	17,893,926.00	23,329,596.36	76.70
2004	21,812,603.00	29,246,390.96	74.58

Source: NACRDB'S record, OYO and ONDO states

The availability of family labour for farm work depends in no small way, on the size of the household. Participation in farm work depends also on the opportunity cost and the age structure of household members. The productivity differences resulting from age differentials of family members can be controlled while determining available family labour by expressing it in man-days. That is the number of days devoted by the male and female adults as well as juvenile members of the family could simply be converted to man- days. The size of household depends on the marital status of the respondents and in particular, on the number of wives of the head of the household. Majority (70%) of both the beneficiaries between 6 and 9 members in their household.

**Analysis of loan repayment performance:** Some definite pattern on the proportion of loan repayment to loan disbursed is revealed from Table 2. Over the years, the amount repaid had been lower than the amount due for repayment with the rate ranging from 28.19% in 1999 to 78.02% in 2001. The decreasing rate of repayments by the beneficiaries over the years had made it impossible for the institution to meet the cash requirement for its borrowers, especially in some projects.

Table 3: Summary of the NACRDB loans repayment performance (1996-2004)

Year	Loan Vol. approved	Loan Vol. disbursed	Amount repaid	Amount due	Outstanding balance	BBR (1)	LRR (2)	BDR (3)	LDI (4)
1996	6,415,200	5,080,600	3,020,218	5,893,496	2,873,278	46.5	48.2	53.5	51.8
1997	10,804,690	9,087,033	6,421,033	10,540,958	4,119,252	48.8	53.1	61.2	56.9
1998	8,405,150	7,801,620	3,622,101	9,049,879	5,427,778	40.3	41.4	59.7	58.6
1999	4,608,600	2,080,415	680,314	2,413,281	1,732,967	42.2	43.8	57.8	56.2
2000	5,817,315	3,996,928	2,682,428	4,636,436	1,954,008	40.7	41.5	59.3	58.5
2001	12,733,640	1,048,066	9,998,279	12,815,756	2,817,477	53.9	54.8	46.1	45.2
2002	15,483,414	13,200,115	11,831,468	15,312,133	3,480,665	57.9	56.7	42.1	43.3
2003	22,941,731	20,111,721	17,893,926	29,329,596	5,435,670	63.6	64.8	36.4	35.2
2004	27,816,372	25,212,406	21,812,603	29,246,390	7,433,787	65.3	69.2	34.7	30.8

Source: Adapted From NACRDB Data, 2005, BRR= Borrower's Repayment Rate, LPI = Loan Repayment Index, BDR = Borrower's Default Rate, LDI = Loan Default Index

The study further revealed that out of the overall volume approved, about 2,216 were not disbursed. A number of varying reasons were adduced for this and these ranged from improper completion of application forms, unsatisfactory visitation/ inspection reports on proposed projects, inability to produce guarantors and relevant records as well as the failure of the applicant to return the appropriate satisfactory document as expected. In essence, the number of "non disbursement" accounted for 17.4% out of the overall approval made for the period under consideration.

The highest number of repaid loans (78%) was recorded in the year 2001 while the least repayment was recorded in 1999 with 28%. (Table 2). This could be attributed to merger effects of the Nigerian Agricultural Cooperative Bank limited with other agricultural production facilitating banks like Peoples' Bank Of Nigeria (PBN), integrated banking system of Nigerian Agricultural Credit and Rural Development Bank (NACRDB).

The repayment performance index within the period 1996-2000 was low when compared with that of the period 2001-2004 (Table 3). This could be attributed to the fact that there was a lack of consistency in the growth performance of the agricultural sector in the period 1981-2000 with some evidence of unstable or fluctuating trends, probably due to policy instability and inconsistencies in policies and policy implication. This probably reflects the declining trend in the Federal Government's investment priority in the agricultural sector. The pattern of RPI movement in the latter period was a reflection of government priority for agriculture and recent increase in public sector salaries thereby improving people's purchasing power. Following from this is the high demand for products and more importantly the degree of compliance of the banking system with the agricultural credit guidelines. The level of disbursement each year is regarded as a function of the preceding year's repayment performance of the beneficiaries as implicit in the recovery of loans by the bank (Table 3). The high default rate could also be attributed to the poor monitoring and

Table 4: Causes of loan repayment problems among the beneficiaries

Causes	% of respondent*
(1) Borrower-related	
Ill- health	32
Burden of some other debt	6
Family Problems	8
(2) Lender-related	
High interest rate	12
Late disbursement Lag	15
(3) Loan use related	
Low sales	92
Fall in product prices	88
Poor yield	12
Low product prices	68
Perishable nature of products	3
High incidence of pest and diseases	4
Inclement of weather condition	62
Low demand for product	68
(4) Extraneous factors	
Fuel Scarcity	56
Poor transportation system	92
High transportation cost	22

Source: Field survey, 2005, \*Multiple responses

supervision in the management structure. On the average, the agricultural credit assistants do visit the applicant's farms only once before the loan is given to them. The supervision and monitoring activities are either carried out randomly or never at all during the period of farming. It was discovered that there is little or no extension role being carried out. This could therefore result to diversion of loan into other things apart from agricultural activities for which it was meant.

**Nature of repayment problems:** The delinquency and default problems observed among the beneficiaries can be evaluated in four categories.

- Borrower related causes
- Causes related to loan utilization
- Lender-related sources
- Extraneous causes

The borrower- related causes include sickness such as infections; burden of other debts and family problems. The causes which are related to loan utilization are low

sales; fall in product prices; low or poor yield; low product prices; low demand for product; perishable nature of product; pest attack and weather condition (especially inadequate or too much rainfall). The lender-related causes are high interest rate and late disbursement of loans. Other critical but extraneous factors are fuel scarcity, poor transportation and communication system and high cost of transportation. One category of causes appears to be particularly troublesome judging by the high proportion of borrowers who attributed their inability to repay to it. This cause is associated with loan utilization.

Table 4 showed that the poor transportation system in the rural areas which is a major impediment to produce marketing was regarded by 92% of the respondents as the cause of their inability to repay on schedule. The production related problems are poor yield, high incidence of pests and diseases and inclement weather. The unsatisfactory weather condition (especially inadequate or too much rainfall) is the most crucial production-related problems as indicated by 62% of the respondents. Nonetheless, the problems associated with marketing seem to be far more important than the production-related problems. Of the marketing problems, fall in the product prices, low sales, low product prices and low demand for product adversely affect the ability of majority of the respondents (88, 92, 80 and 68%, respectively) to repay promptly. These factors need to be taken into consideration in fully understanding the effects of loan use on repayment performance in the rural financial system.

#### Determinants of repayment decision: tobit regression:

The variables used in the models were LOANVOL, EDUC, FRMZE, FRMEXP, HHZE, SEX, NFI, DSBMT, FRMLLOC, COBT, VISIT and BRWFQCY representing loan volume, education, farm size, farm experience, household size, sex, net farm income, farm location, cost of obtaining loan, bank's staff visitation and borrowing frequency, respectively. The dependent variable used in this study is defined as the proportion of total amount of loan repaid as at when due that is the date given by the bank while repayment is equal to 0 if otherwise.

**Tobit regression results on loan repayment for NACRDB:** Tobit regression estimates for NACRDB showed that the coefficient of the variables FRMZE, HHZE, DSBMT, FRMLLOC, VISIT and BRWFQCY were significant at 0.01, 0.05 and 0.10 levels while the coefficients the variables LOANVOL, EDUC, FRMZE, SEX, NFI and COBT were not significant (Table 5). All the coefficients of the significant variables have positive

Table 5: Tobit parameter estimates of loan repayment for NACRDB

Variables	Normalized coefficients	Standard error	Asymptotic t-ratio
Constant	0.7473	0.3521	2.1222
LOANVOL	0.9127E <sup>06</sup>	0.1459E <sup>-05</sup>	0.625
EDUC	0.0112	0.0077	1.458
FRMZE	-0.0285	0.0244	-1.168*
FRMEXP	0.0091	0.0048	1.900*
HHZE	-0.0421	0.0213	-1.977**
SEX	0.0705	0.0761	0.926
NFI	0.305E <sup>-05</sup>	0.306E <sup>-05</sup>	0.996
DSBMT	0.1122	0.0671	1.673*
FRMLLOC	-0.0661	-0.0173	-3.820***
COBT	-0.1196E <sup>04</sup>	0.5114E <sup>-04</sup>	-0.234
VISIT	0.1048	0.0282	3.718***
BRWFQCY	0.0518	0.0234	2.214**

Source: Field survey, 2005, \*\*\* Significant at 0.01 levels \*\* Significant at 0.05 levels \* Significant at 0.1 levels, Log - likelihood Function = - 17.99385, The predicted probability of  $Y > \text{Limit}$  given average var. (i) = 0.483333, The observed frequency of  $Y > \text{Limit}$  = 0.2253, Mean square error = 0.719667, Standard error of estimate = 7.365

signs except for the variables HHZE and FRMLLOC that exhibited negative signs. All the coefficients of the non-significant variables exhibited positive signs except FRMZE and COBT. The positive relationship of the coefficient of variable FRMEXP with loan repayment is in line with the *a priori* expectation. The primary determinants of a potential borrower's capabilities are experience in business and the quality of the financial information provided as far as the banks are concerned. Based on their exposure, it could be adjudged that they possess greater ability to predict possible problems and likely solutions that result in higher income.

The coefficient of the variable HHZE conformed to the *a priori* expectation that the burden imposed by a large family was likely to squeeze agricultural resources from which loan could be repaid. The implication of this is that borrowers with lower number of household members would meet their repayment obligation better than those with high number of household members.

The *a priori* expectation in terms of disbursement lag was based on the essence of timeliness in agricultural production. Most agricultural activities are time bound and if production credit is delayed beyond the critical period of production, such a credit would no longer be relevant or at best sub - optimally utilized. This would invariably create condition precedent to default particularly when viewed from the perspective that even in the most extreme case of non-utilization of the loan; certain costs related to approval transaction would still have to be borne by the borrowers. The implication of this result is that loans that are timely disbursed are fully repaid as at when due.

The empirical findings in the study revealed that the coefficient of the variable FRMLLOC conformed to the *a priori* expectation since the distance covered by the

farmers before securing the loan was short, thus encouraging repayment because it reduced the cost of traveling, the time required and the risk of life involved. The result for the number of VISIT made by extension agents to the beneficiaries showed that the lending officials paid frequent visits to borrowers, which invariably improved their repayment capacity. The coefficient of the variable BRWFQCY conformed adequately to the *a priori* expectation. This variable was used as a proxy to measure whether a borrower was a regular or an irregular customer. The banks maintain a policy under other credit schemes wherein it is expected that a customer must have operated his account consistently for twelve months before eligible for a credit facility. The whole essence is to familiarize with the customer, under-study his character, consider his business acumen and managerial competence as well as acquaint with his various sources of income. The result from this study therefore indicates that a regular customer is more likely to meet his credit obligation than his irregular counterpart.

The positive (non significant) sign exhibited by the coefficient of variable EDUC was as expected, that is, borrowers with higher level of education would have a better repayment performance on the basis of the fact that such farmers would readily respond to improved technologies and innovations that could enhance a better returns from farm investment. The non-significance of the variable's coefficient contradicts the assertion. A possible reason is that the institutions were not directly linked to any extension services agency such that the degree of exposure to improve techniques by borrowers were uniform and such, adoption decision by farmers were directly attributable to willingness. In essence, the result showed that the adoption of better farm management practices by the farmers was more of a chance phenomenon based on the best practices in the farming locality with scant regard to the level of education of the borrowers.

The negative sign recorded by the coefficient of the variable FRMZE indicated that the size of the farm holdings can not be used to predict the output of a farmer because of the risk involved in agricultural ventures. The positive sign of the coefficient of variable LOANVOL showed that the repayment status on current loan was positively associated with its size based on the proposition of World Bank. The bank posited that small borrowers would be more prone to delinquency stemming from high tendency to use borrowed funds for consumption purposes and in poor crop years they are less able to generate the marketable surplus needed to repay their loans. In addition, as the amount of credit increases, borrowers will be able to adopt profitable technology to raise their level of output, which has positive effect on repayment.

Table 6: Decomposition of the elasticity of loan repayment for NACRDB

Variables	Elasticity of		
	Probability of loan repayment	Value of loan repaid	Total elasticity
LOANVOL	1.7373	3.7269	5.4643
EDUC	0.1189	0.2551	0.3739
FRMZE	-0.2078	-0.4457	-0.6534
FRMEXP	0.0969	0.2080**	0.3051
HHZE	-0.7400	-1.5900**	-2.3300
SEX	0.1324	0.2840	0.4164
NFI	0.1718	0.3683	0.5400
DSBMT	0.6900	1.4800*	2.1780
FRMLOC	-1.5900	-3.4300***	-5.0200
COBT	-0.1099	-0.2359*	-0.7597
VISIT	0.5199	1.1223***	1.6422
BRWFQCY	0.3196	0.7017**	1.0213

Source: Field survey, 2005, \*\*\*Significant at 0.01 level, \*\*Significant at 0.05 level, \*Significant at 0.1 level

The same result was exhibited by the coefficient of variable NFI viewed as a proxy for wealth. It was an indication that the farmer had sufficient resources to absorb the cost and risk of failure of agricultural ventures, which enabled them to repay their loan as at when due although the coefficient of the variable was not significant.

#### Decomposition of total elasticity change of the dependent variable:

The decomposition of elasticity of the expected value of loan repayment for NACRDB in the study area is shown in Table 6. The computed elasticities from the model showed that marginal changes in various characteristics increase the expected value of loan repaid than it increases the probability for loan repayment. The volume of loan disbursed to borrowers FRMEXP is expected to increase the total elasticity by 30% decomposed into 9.6% increment for probability of loan repaid and 21% increment in the value of loan repaid. It is important to stress here that some dynamic incentives are associated with the banks' lending programme, which may affect the behaviour of individuals with experience of borrowing from the banks. For instance, the loan size of first-time borrowers is lower than that of borrowers who have been granted loans more than once. Theoretically, the repeated nature of the loan transactions and the threat to cut off any future lending when loans are not repaid may enhance efficiency.

#### CONCLUSION

Contrary to the widely held belief, the results showed that loan volume, farm size and net farm income did not have significant influence on loan repayment though, delay in disbursement, distance of farm location to the bank, cost of obtaining the loan, non-frequent visit made by the bank officials and low borrowing frequency from the institution tend to reduce repayment ability.

It was found that loan characteristics like disbursement lag and cost of obtaining loan have to be taken as control variables for an effective analysis of determinants of the repayment performance. Traditional variables like educational level, sex or size of the family were not significant in loan repayment hence should not be used to determine the loan size. The present study, using suitable model specification and assuming that all parameter estimates would remain stable over time, shows that the models of the type estimated will greatly inform the evaluation of prospective farmers for loan benefit.

Decomposition of repayment elasticities indicated that the elasticity of value of loan repaid in good times was more than the elasticity of probability of repayment, since the amount of loan size recovered has a long way to go in imploring the lending capabilities of the institutions. The volume of loan disbursed from the two institutions was not enough to meet adequately the financial needs of the respondents. In addition, the distances of the credit offices to the locations of most beneficiaries were too long which invariably increased the cost of obtaining loan and reduced the repayment ability.

### RECOMMENDATIONS

The following recommendations are made on the basis of the findings of this study.

- The significance of visitation on probability of repayment indicates that regular visit by the bank officials and probably processing of loan application for the applicant (farmer) right on the field would significantly improve the credit repayment rate. In this wise, the farmers would not only save the transportation cost component of obtaining the loan but the opportunity cost of time would also reduce significantly.
- The fact that the study confirmed the significance of loan disbursement lag in reducing repayment ability points to the crucial importance of timeliness in loan negotiation and delivery. When loan delivery misses the critical period of use, there is the tendency that such a loan would be diverted to relatively less productive or utterly unproductive activities. Thus, the problems of inadequate skill personnel, bureaucratic procedures and stringent conditions for fulfillment prior to disbursement and instalmental disbursement, which are always sources of delay, must be eliminated to allow the credit market to function effectively. Hence there should be timely release of capital allocations, bearing in mind that agricultural activities are exceedingly time specific.

- The positive significant influence of farm size (which can be used as a proxy for scale of operation) on the probability of loan repayment calls for the government revisitation to the Land Use-Decree and the National Agricultural Land Development Authority (NALDA) as vehicles for land redistribution to the farmers. It is also necessary for the government to encourage expansion in the scale of operation of the farmers.
- In other to reduce the time lag between loan application and the release of funds, it is recommended that power be delegated to Zonal Officers to grant credit to small farmers directly and huge amount (>N 250,000) need be referred to the headquarters. In addition, there is need for the modification of the credit delivery system to include the cooperative and community based organizations as delivery channels to reduce transactions.
- An enabling environment should be created for improved loan recovery like a legal unit in the NACRDB (under an autonomous setting) to prosecute loan defaulters.
- Long guarantee by the Federal Government should not be limited to commercial banks alone. It should be extended to NACRDB to enhance the viability of the institution, specifically to prevent it from collapse under the pressure of loan default.

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