Determinants of Loan Repayment Behaviour of Smallholder Cooperative Farmers in Yewa North Local Government Area of Ogun State, Nigeria: an Application of Tobit Model

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Abstract

The loan repayment performances of smallholder farmers were examined along with their determinants using data from selected cooperative members in Yewa area of Ogun State, Nigeria. A multistage random sampling technique guided the selection of 110 respondents on whom data were collected using structured questionnaire. Data were analyzed using descriptive statistics, correlation, and multivariate regression analytical techniques. Results revealed that the average age of respondents was 44.7 years with 36.4% falling into the 20-40 years active working population. Loan distribution showed that 67.3% of respondents received cooperative credit while the remainder received loan from other sources. Only 74.0% of all loans was fully repaid at due dates. Respondents' average credit use experience was 9 years. A negative association was found between age and repayment performance, suggesting that younger farmers were better performers. From regression results, repayment performances were positively influenced by non-farm income ($p<0.05$) but negatively affected by loan size ($p<0.01$). Rates of response were inelastic for all variables: a 100% increase in loan size caused a 27.7% decrease while corresponding increase in non-farm income resulted to a 14.5% increase in repayment performance. Decomposed elasticities revealed that a small change in each variable resulted to a relatively higher change in the elasticity of repayment intensity than it had in elasticity of probability to repay by borrowers that have started repaying. The synergy between repayment performance and non-farm income underscored the strength of livelihood strategies and diversification in boosting economic activities of rural farmers. Loan packages that recognize this synergy and educate borrowers on befitting complementary livelihood options would likely achieve less rates of default from beneficiaries.

Keywords: Farm credit, repayment performance, smallholder, cooperative farmers, Nigeria.

1. Introduction

Strengthening agriculture is critical to tackling the challenges of rural poverty, food insecurity, unemployment, and sustainability of natural resources (Acharya, 2006). This is because credit plays a crucial role in amplifying the development of agriculture and the rural economy. As Oladeebo and Oladeebo (2008) argued, it acts as a catalyst or elixir that activates the engine of growth, enabling it to mobilize its inherent potentials and advance in the planned or expected direction. Rahji (2000) also described credit/loanable fund or capital as more than just another resource. The limitations of self-finance, uncertainties in level of output, and time lag between inputs and output are justification for use of farm credit (Kohansal and Mansoori, 2009).

However, to truly serve as a waterway for agriculture and rural development, credit should be accessible to the farmers. Kohansal and Mansoori (2009) believed that credit access is important for improvement of the quality and quantity of farm products to increase farmer's income and reduce rural-urban migration. On their part, the benefitting farmers were expected to make the best or productive use of the borrowed fund and be able to repay on or before the due date, to enable the loan administrators' extension of the facility to other farmers in need of it. This has not always been the case as credit administration has been plagued by numerous challenges, including incessant cases of loan default that has characterized the scheme in many parts of the developing world. In the case of Nigeria, Osakwe and Ojo (1986) reported that the large rate of loan default has been a perennial problem confronting most agricultural credit schemes organized and/or supported by different levels of government.

Loan repayment performance or non performance (default) and their determinants have been variously discussed in literature. Different analytical techniques/models have been applied. Included among the commonly used techniques is the ordinary least square regression analysis that defined the actual amount of money repaid or in default as a dependent variable (as in Oladeebo and Oladeebo, 2008). For some authors, the proportion or percentage of loan due for repayment that was actually repaid or not repaid was used as dependent variable

instead (for example, see Oke *et al*., 2007). Other works have used the togit model, with the proportion of credit repaid or in default as a dependent variable (as in Gebeyehu, 2002), the logit/probit analysis, using dummies assigned 1, if borrower repaid in full and 0, if otherwise as dependent variables (as in Oni *et al*., 2005; Kohansal and Manosoori, 2009; Roslan and Karim, 2009). However, in the case of Afolabi (2010) a linear discriminant analysis was used to discriminate the socio-economic characteristics of defaulters and non-defaulters in the south western Nigeria.

The underlying explanatory factors can be basically classified under four headings, namely, individual/borrower, firm, institutional/lender, and loan characteristics affecting repayment performance (Nawai and Shariff, 2010). The identified individual borrower's characteristics have included the age of borrower, gender, level of education, farming experience, farm size, household size, credit use experience, household farm income, non-farm income, type of business activity, and amount of business investment. The characteristics of the project include ownership structure, type of project, and distance between project location and the lending bank. The loan size, repayment period, collateral value, number of installments, and application costs are among the identified loan characteristics while the institutional/lender factors had included the time lag between loan application and disbursement, interest rate, access to business information, access to training on loan use, cooperative membership and penalty for lateness to group meetings. An alternative classification by Roslan and Karim (2009) identified three broad categories as characteristics of the borrower, characteristics of the project, and attributes of the loan. The classification adopted in this study follows Roslan and Karim (2009).

The analyses had led to mixed conclusions. For example whereas Oni et al. (2005) reported a negative influence of individual borrower's level of education on loan repayment performance, Oladeebo and Oladeebo (2008) reported a positive influence. Also, the amount of loan approved or received, that is loan size, could have a positive effect on repayment performance (Oke *et al*., 2007; Kohansal and Manosoori, 2009) but Roslan and Karim (2009) also reported a negative effect of the variable. There is an inexhaustible list of works on determinants of loan repayment behaviours of borrowers (Ojiako and Ogbukwa, 2012; Afolabi, 2010; Nawai and Shariff, 2010; Kohansal and Mansoori, 2009; Papias and Ganesan, 2009; Roslan and Karim, 2009; Acharya, 2006; Oni *et al*., 2005; Oladeebo, 2003; Gebeyehu, 2002; Rahji, 2000).

As a step towards enhancing loan repayment performance and curtailing loan defaults among farmers, cooperative movements were introduced. Under the cooperative membership model, farmers were encouraged to become members of cooperatives associations, which would be registered, have elected officials, and be holding regular meetings with documented minutes. The belief was that working under such associations and groups, farmers would be empowered to speak and act with one voice and, consequently, it would become easier to process credit requirements through financial institutions and also facilitate the recovery of credit granted to members. It becomes imperative to investigate the loan repayment capacity of the smallholder cooperative farmers with a view to determining the factors that influenced it. This is the purpose of this study.

The general objective of the paper is to analyze the loan repayment performance of smallholder cooperative farmers in a rural community in Ogun State, south-west of Nigeria. The specific objectives are to: examine the socioeconomic characteristics of respondents, determine the loan default rate, identify the sources of credit, and constraints associated with credit access from formal sources, and to analyze factors influencing repayment performance. It is expected that finding from the study will guide policy makers, credit and loan administrators, agriculture ministries and agencies, and management of financial institutions, in their credit and loan policies and decisions, especially as it affects the poor rural cooperative farmers in Nigeria.

2. Materials and Methods

2.1 Study area

The area of study was Yewa North Local Government Area (LGA) of Ogun State, Nigeria. The LGA has its headquarters at Ayetoro located on latitude 7° 15'N and longitude 3° 3'E (YNLG, 2005) in the deciduous derived savannah zone of Ogun State. Yewa LGA has the largest expanse of land measuring 2043.60 square hectares. It is bounded in the west by the Republic of Benin, in the south by Yewa South LGA, in north by Oyo State and in the east by Abeokuta North and Ewekoro LGAs of Ogun State. Other important settlements in the LGA include Joga-Orile, Saala-Orile, Owode-Ketu, Igbogila, Igan-Okoto and Imasayi. The inhabitants are mainly Yoruba speaking people comprising of the Yewas and Ketus. Farming is the main occupation of the Yewa people. The major crops grown include yam, tomato, beans, pepper, maize, vegetables, cassava, potatoes and oranges.

2.2 Study data

Primary data were used for the study. The data, which were mainly on the respondents' socio-economic characteristics, loan access, use, and repayment behaviours during the 2008 cropping season, were collected from January – March 2009 using structured questionnaire. Yewa North Local Government Area was purposively selected for the study due to cost and time constraints and the prevalence of resource poor farmers that belonged to cooperative societies in the area. Besides, multistage sampling technique was used to select the study sample. In the first stage four wards were randomly selected from the eleven wards that make up Yewa LGA. In the second stage, three cooperative societies were randomly selected from the list of societies obtained for each ward to give twelve cooperative societies. In the third stage, ten respondents were selected from each cooperative society, to give a total of 120 respondents. However, ten questionnaires could not be used for the analysis because they were either badly filled or contained observed inconsistencies in information supplied by respondents. The analysis for the study was based on information supplied by the remaining 110 respondents.

2.3 Methods of data analysis

2.3.1 Descriptive and correlation analyses

Descriptive statistics, including charts, averages, proportions and percentages were used to, among other things, examine the behavior of the socio-economic characteristics of respondents, and identify their memberships of cooperative groups, available sources of credit, and constraints to access to credit from formal sources. Also, the nature of associations between the variables (dependent and explanatory) used in the regression analysis, was examined by using the correlation analysis.

2.3.2 Empirical tobit model

To determine and quantify the relationship between loan repayment index and the explanatory variables, the tobit, a hybrid of the probit and multiple regression analyses, was used. The method, which follows Tobin (1958), has been variously used foe analysis of loan repayment performance of rural farming households. The two-limit tobit is appropriate when the observed dependent variable lies between 0 and 1. The model can be expressed as:

$$y^* = \beta' x_i + e_i \tag{1}$$

where y^* is a latent variable that is unobserved for values less than 0 and greater than 1; x_i is an (nxk) matrix of the explanatory variables that includes factors affecting household's loan repayment performance; β is a (kx1) vector of unknown parameters i, and e_i is an independent normally distributed error term with zero mean and constant variance (σ^2), that is, $e_i \sim N(0, \sigma^2 I)$ and $i = 1, 2\ldots n$, where n is number of observations.

The functional form of the tobit model can be specified as:

$$y_i = x_i \beta, \quad if \quad y = x_i \beta + \tau_i > T \tag{2}$$

$$y_i = 0, \qquad if \quad y^* = x_i' \beta + \tau_i \leq T \tag{3}$$

where y_i is the probability of loan repayment by a household, y^* is a non-observable latent variable, T is a non-observed threshold value, which can either be a constant or a variable (Wu 1992), X_i is an (nxk) matrix of the explanatory variables, β_i is a (kx1) vector of parameters to be estimated, and τ_I is an independent normally distributed error term with zero mean and constant variance, $N(0, \sigma^2 I)$. The conceptual model of equations (2) and (3) is both a simultaneous and stochastic decision model (Adesina and Zinnah, 1993). If $y^* > T$, the observed qualitative variable that indexes loan repayment performance (y_i) becomes a continuous function of the independent variables. But if $y^* \leq T$, the observed qualitative variable (y_i) will take zero value. Equations (2) and (3) represent a censored distribution of the data. The Tobit model can be used to estimate the expected value of Yi as a function of a set of explanatory variables (X_i) weighted by the probability that Yi > 0 (Oladele, 2005).

The disturbance term of the tobit model is a function of the independent variables, hence attempting to estimate the functional form using the ordinary least squares (OLS) method would produce biased and inconsistent estimates (Wu, 1992). If the unobserved y_i^* is assumed to be normally distributed, the estimation of the tobit model could be performed using the Maximum Likelihood Estimation (MLE) method. The likelihood function is expressed as:

$$L = \prod_{y^* > T} (1 - G_i) \prod_{y^* \leq T} \frac{1}{2\pi\sigma^2} e \left[-\frac{1}{2\sigma^2} (y_i - \beta X_i)^2 \right] \tag{4}$$

where, G_i is the distribution function of τ_i. The resultant coefficients of the likelihood function are consistent, asymptotically efficient, unbiased and normally distributed.

2.3.3 Tobit decomposition framework

The tobit decomposition framework was used to disintegrate the total elasticity associated with loan repayment into two different effects: the change in the elasticity of repayment intensities for households that are already not defaulting; and the change in the elasticity of the probability of being a non defaulter. Details of the tobit decomposition framework can be found in Adesina and Zinnah (1993) and Ojiako (2011). The Limdep 7.0 econometric software was used to estimate the maximum likelihood parameters of the empirical loan repayment model.

2.3.4 Variables in the empirical model

Dependent variable: The dependent variable is the proportion of the amount of money due for repayment (principal plus interest) that was actually repaid by borrower (PREP). The proportion repaid is expected to be influenced by several factors and one of the objectives of this study is to identify and explain these variables.

Explanatory variables: Theory, evidence from past studies on loan repayment behaviours, and hypothesized relationships with the dependent variable guided our choice of the explanatory variables considered for inclusion in the empirical model. Following Roslan and Karim (2009), the explanatory variables were categorized into three: characteristics of the borrower-specific, farm-specific, and institutional variables.

Characteristics of the borrower

- *AGE*: The influence of age on borrower's repayment ability can be positive or negative (Roslan and Karim, 2009) and so hypothesized in this study.
- *GDR*: Gender of the respondent (dummy: 1=female; 0=male), hypothesized that women borrowers would have high propensity to repay and positive sign was expected.
- *EDL*: Respondent's level of education (0=no formal education; 1=primary education attempted; 2=formal education completed; 3=secondary education attempted; 4=secondary education completed; and 5=tertiary education). Following Roslan and Karim (2009), a positive sign was hypothesized.
- *EXP*: Experience, described as the number of years the borrower had used credit. A positive sign was hypothesized as experience would lead to relative use efficiency.
- *HHS*: Household size, defined following Cogill (2003) as either single persons, who had made provision to live with no assistance, or multi-persons, who are related or unrelated, or a combination of both. The effect on loan repayment may be positive or negative.
- *MST*: Marital status of respondent (dummy: MST=1, if married and staying with spouse; MST=0, if otherwise). A positive sign was hypothesized for marital status.
- *OJB*: An index for the borrower's engagement in other jobs outside farming. It was expected that *OJB* will have a positive sign.
- *NFY*: Net farm income, defined as the difference between the gross farm income and the total cost of running the farm during the period under review and .measured in Nigerian Naira. A positive sign was hypothesized for *NFY*.

Characteristics of the farm

- *FMS*: Farm size, measured in hectares. A positive sign was hypothesized for *FMS*.
- *TCH:* Technology index (dummy: TCH=1, if a farmer used the borrowed fund to support farming of improved crop variety; TCH=0, if used to support a local or quasi-improved variety). A positive sign was hypothesized.
- TRT: Tractorization of farming activities to support commercial farming. A positive relationship was hypothesized accordingly.

Characteristics of the loan

- *AMT:* Absolute amount of loan (loan size) approved for the borrower. A negative sign was hypothesized for AMT.
- *INT:* Interest rate (or price paid by borrower for use of the creditor's fund), expressed in percentage. A negative sign was hypothesized for *INT*.

3. Results and Discussion

3.1 Descriptive statistics and socioeconomic characteristics of respondents

Descriptive statistics of the variables are presented in Table 1. The proportion of potential credit actually repaid by respondents is 0.74. This compares with the repayment rates found by Olagunju and Adeyemo (2007), which ranged between 28.2% and 78.0% from 1999 to 78.0% in 2001. Breakdown reveals that 42% of respondents

repaid over 90% of the amount that had fallen due. This is as against 20% that repaid less than 50%, 17% that repaid 50-69% and 20% that repaid 70-89% of the actual of the amount due for repayment. The average age of respondents is 44.75 years with standard deviation of 9.18. Breakdown of respondents' ages shows that 36.4% falls into the 20-40 years of active working population; majority (59.1%) falls into the 41-60 years age bracket while the remaining 4.5% is above sixty years old. A negative association was determined between respondents' age and loan repayment performance of respondents (r=-0.002). This suggests that younger farmers were more likely to repay borrowed facility than older farmers.

Table 1. Descriptive statistics of variables

Variable	Measurement	Mean/Proportion (for dummies)	Std. dev	Min.	Max.	Std error
PREP	Proportion	0.74	0.28	0	1	0.026
AGE	Years	44.75	9.18	28.00	70.00	0.875
GDR	Dummy (0, 1)	0.08	0.27	0	1	0.026
EDL	Graded (0-5)	1.80	1.15	0	5	0.109
EXP	Years	9.13	6.51	2	30	0.621
HHS	Number	6.97	1.80	1	12	0.172
MST	Dummy (0, 1)	0.98	0.13	0	1	0.013
OJB	Dummy (0, 1)	0.17	0.38	0	1	0.036
NFY	Naira (local currency)	1.07+e5	1.04+e5	2000.00	6.88+e5	9.93+e3
FMS	In hectares	2.08	1.32	1	6	0.126
TCH	Dummy (0, 1)	0.57	0.49	0	1	0.047
TRT	Naira (local currency)	5.09+e4	4.76+e5	0	5.00+e6	4.541+e4
AMT	Naira (local currency)	1.20+e5	86824.76	20000.00	7.70+e5	8.278+e3
INT	Percentage	3.22	5.59	1.50	25.00	0.532

Source: Calculated from Field Survey, 2009; the prevailing exchange rate is ₦150.00/US$1.00

The respondents' levels of educational attainment show that 12.7% do not have any formal classroom education. Further analysis reveals that 25.5% attempted but could not complete primary education, 41.8% completed primary education, and 11.8% attempted secondary education while 5.5% completed it. Only 2.7% of respondents either attempted or completed tertiary education. The result evidences low level of formal educational attainment among the respondents, which is expected to have negative influence in their farm productivity and loan repayment behaviour.

The average experience with credit use is 9.13 years with a standard deviation of 6.5. This is very much lower than the average general farming experience calculated as 20.1 years. Majority of the respondents (58.2%) have less than 10 years of credit use experience. This is in comparison with 30.0% with 10-19 years and 11.8% with above 20 years of credit use experiences.

The average household size is 7 persons with standard deviation of 1.8. Majority of the respondents (80.0%) has 6-10 household members as against 17.3% with 1-5 members and 2.7% with more than 10 members. Thus, there is high dependency ratio among the sampled households. Also, the average farm size of respondents is 2.08 hectares. Of the total respondents, 94.5% owned farm sizes ranging from 1-5 hectares and only 5.5% owned farms with sizes above 5 hectares. By implication, respondents are mostly smallholder farmers with low income which by extension would negatively influence their credit use and repayment behaviour.

The average size of the annual net farm income is ₦106,880.54, an equivalent of US$712.53/annum going by the prevailing exchange rate of ₦150.00/US$1.00 as at the time of the study. This consists of 36.4% below US$1.00 per day, 23.6% from US$1.00 – US$2.00 per day and 40% above US$2.00 per day. This means that although an average respondent was lively slightly above US$1.00 per day; most respondents are poor farmers that depend on other means of livelihoods and coping strategies for daily survival.

Among the respondents, the percentage that is women is 8.2% as against 91.8% men. This tends to suggest that men are more accessible to loan than women. Also, the married is 98% while 17% engages in other jobs apart from farming. Distribution according to religion shows that 64.5% practice Christianity compared with 34.5% that practice Islamism and 1.0% that is of the traditional religion. Finally, 57% of respondents used their borrowed funds to support farming of improved crop variety while 43% used theirs to grow local varieties.

3.2 Association of variables

The correlation matrix of the included variables is presented in Table 2. It reveals existence of positive significant associations between age of respondents and their loan use experience (r=0.49, p<0.01), household size (r=0.32, p<0.01), and marital status (r=0.22, p<0.05). Thus the older respondents were mostly married, had more resident households' members, and also received more volumes of loan than the younger respondents. Similar positive associations were established between gender of respondents and their levels of education (r=0.22, p<0.05) and non-farm income (r=0.24, p<0.01). This implies that the sampled women were relatively more educated and earned more income from non-farming activities than the men.

Significant positive correlations were also established between loan use experience and household size (r=0.28, p<0.01) on the one hand and farm size (r=0.21, p<0.05) on the other. The positive connection with household size implies that households with more members had in the past years used loan more often than households with less members. This is revealing because it seems to support the argument that most household heads request for loan just for use in the upkeep of their households rather than for supporting their farming business. The consequence is that often the facilities were misapplied leading to increase in default rate. However, it could also have resulted if households with large sizes had maintained large farms following from farm supportive services being enjoyed from household members.

Table 2. Correlation matrix of the variables

Variable	AGE	GDR	EDU	EXP	HHS	MST	OJB	NFY	FMS	TRT	LSZ	INT	IMP
AGE	1.000	-	-	-	-	-	-	-	-	-	-	-	-
GDR	-0.057	1.000	-	-	-	-	-	-	-	-	-	-	-
EDU	-0.011	0.226**	1.000	-	-	-	-	-	-	-	-	-	-
EXP	0.496***	-0.031	-0.177*	1.000	-	-	-	-	-	-	-	-	-
HHS	0.321***	-0.180*	-0.025	0.280***	1.000	-	-	-	-	-	-	-	-
MST	0.220**	0.041	0.036	0.076	0.263***	1.000	-	-	-	-	-	-	-
OJB	-0.222***	0.039	0.185*	-0.172*	-0.274***	-0.298***	1.000	-	-	-	-	-	-
NFY	0.106	0.248***	0.099	-0.004	0.008	0.001	-0.071	1.000	-	-	-	-	-
FMS	0.055	0.133	-0.053	0.210**	0.041	0.111	-0.273***	0.014	1.000	-	-	-	-
TRT	-0.157	-0.028	0.103	-0.106	-0.055	0.012	-0.039	-0.083	0.211**	1.000	-	-	-
LSZ	-0.074	-0.081	0.001	0.041	-0.132	-0.102	-0.128	-0.052	0.107	-0.019	1.000	-	-
INT	0.183*	0.048	-0.027	0.133	0.152	0.042	-0.113	-0.053	0.172*	-0.032	-0.100	1.000	-
IMP	-0.013	0.124	0.058	0.161*	-0.013	-0.118	-0.043	-0.098	0.071	0.086	0.007	0.018	1.00

***=Significant at 1%; **=significant at 5%; *=significant % 10%.

The relationship with farm size implies that respondents who had used loan facilities more often in the past had bigger farm sizes. This is usual because the loan is expected to be used for expansion and sustenance of the farm holding of the beneficiary. It is normal for credit administrators to request information on the farmer's holding as a condition for processing the facility.

Other variables showing significant positive correlations are marital status and household size (r=0.26, p<0.01) and farm size and use of tractor (r=0.21, p<0.05), which is also expected. The results further revealed significant negative association between age and respondent's engagement in other jobs (r=-0.22, p<0.01), meaning that relatively younger respondents were more engaged in other jobs than the older ones. Similar significant negative associations existed between engagement in other jobs and household size (r=-0.27, p<0.010), marital status (r=-0.29, p<0.01), and farm size (r=-0.27, p<0.01) respectively. Whereas the relationships with age, marital status and farm size were anticipated, that with household size was somewhat surprising.

3.3 Types of respondents' cooperative groups

The types of cooperative societies the respondents belonged to are presented in Table 3. Majority (33.6%) of respondents belonged to farmers' cooperative societies as against 31.8% belong that belonged to credit cooperative multipurpose societies, 25.5% to cooperative thrift and credit societies, and 7.3% to cooperative investment societies. The remaining 1.8% of respondents belonged to one or two other societies not classified above.

Table 3. Types of cooperative societies to which respondents belonged

Cooperative Type	Frequency (%)	Cumulative Frequency (%)
Coop. Thrift and Credit Societies	25.45	25.45
Cooperative Multipurpose Societies	31.82	57.27
Cooperative Investment Societies	7.27	64.54
Farmers' Cooperative Societies	33.64	98.18
Others	1.82	100.0
Total	100.00	--

Source: Computed from Field Survey Data, 2009

It follows that there were no barriers against respondents' choice of cooperative movement they would wish to belong to. As full-time farmers it would have been expected that respondents be registered members of the Farmers' Cooperative Societies, which was among the societies listed, but for some other personal reasons most farmers chose to membership of other cooperative movements to satisfy their other needs.

3.4 Sources of credit to respondents

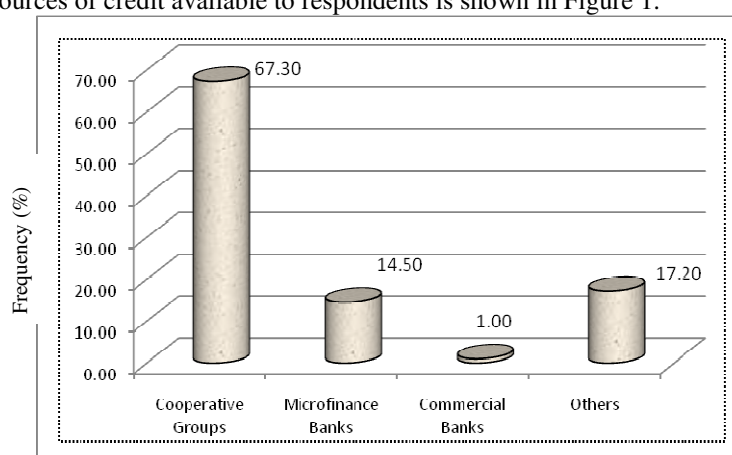The breakdown of sources of credit available to respondents is shown in Figure 1.

Figure 1: Sources of credit to households

It shows that 67.3% received cooperative credit as against 14.5% and 0.9% respectively that received assistance from microfinance and commercial banks during the period. The remaining could only get financial support from non-organized arrangements, like private money lenders (3.6%), daily contribution or *ajo* (12.73%), and borrowing from meetings groups (0.9%). It follows from the finding that borrowing from the cooperative purse was the most popular source of credit among respondents. Respondents had little access to formal banking institutions' credits and loan facilities and rely more on cooperative credits to support their farming activities. This could result from several factors, among which the respondents identified as constraints in the following section.

3.5 Constraints to formal credit's access

The identified constraints to credit access are presented in Table 4. It shows that the first ranking constraint was respondent's inability to provide, which was identified as a major impediment by 56.4% of respondents. This is not surprising and could further explain why loan from commercial banks could only be accessed by 1% of respondents.

Table 4. Constraints to respondents' access to credit

Constraint	Rank	Respondents (%)[X]
Inability to provide collateral	1st	56.4
Untimely approval and disbursement of loan	2nd	30.9
High interest charges	3rd	17.3
Protocols and bureaucracy	4th	12.7
Others constraints	--	11.8

Source: Computed from Field Survey Data, 2009

[X] Figures do not add to 100% because there were interactions

Formal lending institutions like commercial banks usually require collateral items, often a document title to landed property like Certificate of Statutory Right of Occupancy (C of O), before processing credit requests.

Majority of farmers in rural areas do not register their property and as such do not have such security documents to present. The implication is that the farmers often avoid making advances to such institutions. It is common to hear such persons complain of bank's protocol and bureaucratic bottlenecks. As depicted in the Table 12.7% of respondents mentioned this among the problems characterizing loan request activities. With such premonition, it will be difficult to convince the farmer on why he/she should be approaching the bank for loan in the first place. Other identified constraints include untimely approval and disbursement by 30.9% and high interest charge by 17.3%.

3.6 Determinants of loan repayment performance

The output of the empirical restricted tobit model is reported in Table 5. Apart from gender and level of education, all retained variables produced the hypothesized signs. Among these variables with a priori signs are loan size and non-farm income, which were statistically significant in explaining households' loan repayment performance. Loan size was significant at $p<0.01$ and produced the expected negative sign. The result reveals that the household's loan repayment performance increased as the loan size decreased, meaning that borrowers that received less amounts of loans paid higher proportion compared with those who received larger amounts. This result agrees with Oni et al. (2005) who found that the greater the loan size the greater the probability of borrowers defaulting in repayment. This revelation was in agreement with the calculated significant negative correlation ($r=-0.25$; $p<0.01$) between proportion of loan repaid and amount borrowed. The implication is that increase in loan size cannot necessarily be used to enhance farmer's repayment performance.

Table 5. Factors influencing households' loan repayment performance

Variable	Expected sign	Coefficient Estimate	Standard Error	Z-value	Prob.
Constant		0.833[***]	0.263	3.155	0.001
Age	+/-	-8.907e-04	3.625e-003	-0.246	0.806
Gender	+	-0.069	0.100	-0.695	0.487
Level of education	+	-0.029	0.023	-1.227	0.219
Loan use experience	+	4.767e-03	4.691e-003	1.017	0.309
Household size	+/-	-0.017	0.0171	0.171	0.330
Marital status	+	0.330	0.204	0.575	0.565
Engagement in other job (s)	+	0.033	0.076	0.440	0.660
Non-farm income	+	5.028e-07[**]	2.537e-007	1.982	0.047
Farm size	+	0.028	0.021	1.333	0.182
Supported improved tech.	+	0.031	0.031	0.598	0.598
Tractor use	+	4.597e-08	0.553e-07	0.832	0.406
Loan size	-	-8.570e-07[***]	3.013e-007	2.844	0.004
Interest rate	-	-5.478e-04	4.638e-003	-0.118	0.906
Sigma		0.258[***]	0.018	14.596	0.000
Conditional mean at sample point		0.742			
Scale factor for marginal effects		0.998			
Log likelihood function		-10.322			
R-squared (R^2)		0.155			
Adjusted R^2		0.040			
F-value [13, 96]		1.350			
Prob. of F-value		0.197			

[***]=Significant at 1%; [**]=significant at 5%; [*]=significant % 10%.
Source: Computed from Field Survey Data, 2009

The non-farm income was significant at $p<0.05$. It also produced a priori expected positive sign, meaning that repayment performance increased with increases in non-farm income. Other studies (Oke *et al.* 2007; Olagunju and Adeyemo, 2007) also found direct relationships between loan repayment and income of borrowers in their respective studies in southwest Nigeria. This could result from farmers that had sufficient resources to absorb the cost and risk of failure of agricultural ventures that enabled them to repay their loans (Olagunju and Adeyemo, 2007). This was corroborated by the fact that a positive sign was established for engagement in other jobs, although not significant. It revealed that farmers that repaid higher proportions of their loan must have depended mainly on income from other sources and not essentially from the size of credit borrowed.

Although not significant, household size produced a negative sign. This implies that borrowers with smaller household members would likely meet their loan repayment obligations better than households with higher members. This corroborated the findings elsewhere (Olagunju and Adeyemo, 2007).

In general, although the $R^2=0.15$ and adjusted $R^2=0.04$ values calculated and reported in the output appeared to be low, they could usually not be interpreted as measures of the goodness-of-fit of the model, as would usually

be the case with the OLS specification. In fact, for the tobit and other non-linear specifications, the estimates, unlike what could obtain in OLS, were not chosen to maximize the R^2, but to maximize the log-likelihood functions. An assessment of adequacy of the tobit model would often require construction of some diagnostic (s) from the likelihood function or other test statistics against restricted models. The implication is that the low value of the R^2 (or adjusted R^2) could not be used as basis for invalidating the result of the estimation.

3.7 Responsiveness of repayment behaviours of respondents

The rates of responsiveness of loan repayment behaviours of respondents to changes in the explanatory variables are shown in Table 6 as coefficients of elasticity. Elasticity decomposition follows the framework described in equations (3) – (6).

Table 6. Elasticity estimates of the significant variables

Variable	Elasticity of probability	Elasticity of intensity	Total Elasticity
Age	0.053	0.054	0.107
Gender	0.101	0.102	0.203
Level of education	0.069	0.070	0.139
Loan use experience	0.058	0.059	0.117
Household size	0.155	0.156	0.311
Marital status	0.436	0.437	0.873
Engagement in other job (s)	0.007	0.008	0.015
Non-farm income	0.072	0.073	0.145
Farm size	0.078	0.079	0.157
Loan to support improved technology	0.024	0.025	0.049
Tractor use	0.003	0.004	0.007
Loan size	0.138	0.139	0.277
Interest rate	0.002	0.003	0.005

Source: Computed from Field Survey Data, 2009

The total elasticity shows that rate of responsiveness is inelastic to changes in all explanatory variables. However, with respect to a specific variable, a change resulted to a relatively higher response in the elasticity of intensity than to response in elasticity of probability to repay the borrowed money by beneficiaries. In the case of the significant factors, 100% increase in loan size leads to a 27.72% decrease in repayment performance, comprising of a 13.85% decrease in probability to repay and a 13.87% decrease in the repayment intensity. However, a 100% increase in non-farm income will result to a 14.47% positive response in loan repayment performance. This comprises of a 7.23% increase in the elasticity of probability to repay and a 7.24% increase in the elasticity of repayment intensity for borrowers that have started repaying. It follows from the finding is that non-farm income was used more by borrowers to support loan repayment ability. This synergy between loan repayment behaviour and non-farm income creates a big puzzle on the ability of the rural farmers who do not diversify their income base using the various available livelihood strategies to repay back the funds invested into farming. This will be a good issue for further empirical investigation.

4. Conclusion

The study analyzed the loan repayment performance of smallholder farmers in a rural community in Ogun State, south-west of Nigeria with a view to among other things identifying the associated constraints and performance determinants. Result reveals that the average loan proportion repaid by respondents was 0.74, implying a 26% default rate, with 20% of respondents repaying less than 50% of the amount of loan that was due for repayment. A negative association was found between age and repayment ability of respondents, implying that younger farmers were more likely to repay credit than older ones. Also, gender decomposition revealed that less than 9% of respondents were women. Respondents obtained credit mainly from the cooperative groups, although few received from microfinance and commercial banks. Among the identified constraints to formal credit access was inability to provide collateral by respondents, untimely approval and disbursement, and high interest charges. Loan size and non-farm income were significant determinants of loan repayment performance. Loan size gave an unanticipated negative sign meaning that loan repayment behavior cannot be enhanced by increasing loan sizes. However, non-farm income had positive influence on repayment behaviours, indicating that most borrowers must have depended more on their non-farm income sources for repayment of borrowed credit. This synergy between loan repayment performance and non-farm income shows the strength of livelihood strategies and

livelihood diversification in boosting rural economic activities of farmers. Credit policies should be able to recognize this synergy and ensure that loan packages are linked to self-sustaining livelihood support activities to productively engage the beneficiary farmer during the off-season.

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