Microcredit and Technical Efficiency of Rural Farm Households in Egba Division of Ogun State Nigeria

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Abstract. This study examined the effect of microcredit on technical efficiency of rural farm households in Egba division of Ogun State. Multistage sampling procedure was used to select 160 rural farm households used for the study. The data collected were analyzed using descriptive statistics, probit regression model and stochastic frontier production analysis. The findings revealed that majority of the rural farm household heads are in their active ages. It was also revealed that most farm household heads are fairly educated with relatively high experienced in farming. The significant factors that determine access to credit among rural farm households as revealed by the probit result include age($p<0.05$), farm size($p<0.01$), household size($p<0.01$), farming experience($p<0.01$) and education($p<0.10$). The stochastic frontier production function result revealed that farm output increases with farm size($p<0.05$), family labour($p<0.05$) and hired labour($p<0.05$) but decreases with increase in intermediate materials($p<0.10$). The inefficiency model revealed that age ($p<0.05$), farming experience($p<0.05$), education($p<0.05$), household size($p<0.10$) and credit($p<0.05$) increase the technical efficiency of the farmers. The mean technical efficiency of 0.69 implies there is room for improvement in the technical efficiency level of the rural farm households by 31 percent. Policy option requires the strengthening of the education of farmers and increase in the level of awareness on the benefit of credit to increase the production efficiency among rural farm households in the study area.

Key words: microcredit, rural, households, stochastic frontier.

Introduction

Agriculture is a major contributor to Nigeria Gross Domestic Product (GDP) and small-scale farmers play a dominant role in this contribution (Rahji and Fakayode, 2009), but their productivity and growth are hindered by limited access to credit facilities. Agriculture is the most important sector of the country because the main policies of output growth, poverty alleviation, social justice and equity are best served in this sector. When the country faced the problem of food shortages in the early sixties, agricultural policy was aimed at increasing the productivity and production of food crops to meet this challenge.

Agricultural credit was largely dominated by private informal sources (Badal, 2010). The participation of commercial banks was negligible in agricultural loans. Farmers' level of income was low and they were hesitant to use technology. Therefore, agriculture credit policy aimed at increasing the flow of institutional credit at reasonable rate of interest to agriculture sector. The cooperative credit structure was strengthened by reorganizing and merging weak societies with strong societies. The number of village level cooperative societies also increased. Presently, more than 92,000 primary agricultural cooperative, credit societies are working in villages (Badal, 2010).

Credit institutions can be categorized into three groups: Formal Financial Institutions: such as Commercial banks, Microfinance Banks, Development Finance Institutions (DFIs), and State Government – owned Credit Institutions. Semi-Formal Financial Institutions: such as Non- governmental Organizations – Microfinance Institutions (NGOs – MFIs) and Cooperative Societies. Informal Financial Institutions: such as money lenders and rotating savings and credit association (ROSCAS) and Self-Help Groups (SHGs). The three features that distinguish informal microcredit from formal financial services include: smallness of loans advanced and/or savings; the absence of asset-based collateral and simplicity of operations (Ogbunaka, 2003).

The Nigerian agriculture is mainly rain fed especially in the southern part of the country. Achieving food security in Nigeria is a challenging issue. The need

for continual cultivation of land in order to exploit the dry season farm income potential necessitated the small scale low income farmer managed irrigation scheme to develop "Fadama land". Also, the need to make food production surpass average population growth rate and guarantee food security called for the major food production areas in the country (Khan, 2000).

Agricultural credit specifically involves enjoying control over the use of money, goods and services in the present in the exchange for a promise to repay at a future date. With agricultural credit, a lender forgoes the use of his money or it's equivalent in the present by extending credit to a borrower who promises to repay on terms specified in the loan agreement. Many microcredit policies had seen launched in Nigeria with the objectives of providing microcredit to the rural poor farm households.

Achieving a robust economic growth requires putting in place a well focused programme through empowering the rural farm households by increasing their access to production inputs. The capacity of the rural farm households for entrepreneurship would be significantly enhanced through provision of microcredit services to enable them engage in economic activities and be more self-reliant, increase employment opportunities, enhance household income and create wealth (Iganiga, 2008). Microcredit deals with providing financial services to the poor who are traditionally not served by the conventional financial institutions.

Over many decades, microcredit has emerged as an effective strategy for alleviating poverty. Micro, small and medium enterprises are array of financial services in the developing countries. Microcredit has also been acknowledged as one of the prime strategies to achieve the Millennium Development Goals (MDGs). Access to adequate financial services enables small-holder farmers to procure productive assets, reduce their vulnerability to external shocks and increased production efficiency.

Access to financial services also enable the poor farm households to move from everyday for survival to planning for the future, investing in better nutrition,

children education, health and empowering women socially (Iganiga, 2008). Micro-financing is not a new concept in Nigeria as evidenced by such cultural economic activities as "ESUSU", Rotating Savings and Credit Associations (ROSCAs), Self-Help Groups (SHGs), etc which were practiced to provide funds for producers in most rural communities. The recent things however is the effort of Nigerian government to modernize micro financing in rural and urban communities to improve the productive capacity of the poor farm households, enhance their economic standing which alleviates the level of the national economy.

The failure of some of the past policies and programmes such as Rural Banking Programme, People's Bank of Nigeria Programme, necessitated the enactment of legislation for the establishment of Community Banks (now Microfinance Institutions). Many Non-governmental Organizations (NGOs) have been formally licensed to operate as microfinance institutions to complement government efforts. Some of the existing NGO-microfinance institutions have also been transformed and Universal Banks were encouraged to engage in microcredit services and government inaugurated microcredit banks regulation and supervisory guidelines in year 2005 (CBN, 2005).

Microcredit involves the supply of loans, savings and other basic financial services to the poor farm households. The small-holder farmers require diverse range of financial instruments to meet working capital requirement, build assets, stabilize consumption and shield themselves against risks (Iganiga, 2008). In practice, microcredit is much more than disbursement, management and collection of small amount of loans. Petrick (2004) emphasized that microcredit refers to "flexible processes and structures by which financial services are delivered to owners of micro enterprises on a sustainable basis". It recognizes the peculiar challenges of micro enterprises and their owners. It also recognizes the inability of the rural farm households to provide tangible collateral and thus promotes collateral substitution. Farmers, especially rural farm households are constrained by credit from both formal and informal sources (Petrick, 2004).

Disbursement and repayment are structured to suit credit need and cash flow pattern of small businesses (Aderibigbe, 2001).

As the microcredit revolution spreads the rural farm households are seen as micro-entrepreneurs with no collateral to pledge but with a business world to conquer with the help of micro credit. The rural farm households in Nigeria are diverse group of vulnerable households with complex livelihoods requiring a full set of micro financial services. No doubt, inadequate financial services have affected the livelihood and technical efficiency of the rural farm households in Nigeria. Financial services are needed by the rural farm households to improve their wellbeing through the upgrading of their farms and small scale businesses for positive impact on their livelihood. Judicious use of credit to acquire productive resources will not only lead to on farm capitalization but will also increase the production efficiency of the farmers. From the foregoing, this study assess the effect of farm household socio-economic characteristics on access to credit and examine the effect of credit and use of modern input on the technical efficiency of the rural farm households in Ogun State with particular reference on Egba Division of the State.

Methodology

The Study Area

The study was carried out in Egba division of Ogun State in the western region of Nigeria. The Ogun State Agricultural Development Project (OGADEP) divides Ogun State into four zones. These zones include Abeokuta, Ikenne, Ilaro and Ijebu-Ode. The Abeokuta zone consists of six blocks namely, Abeokuta North, Abeokuta South, ObafemiOwode, Odeda, Ifo, Ewekoro and Ado Odo Ota. The blocks are further divided into cells while the cells composed of many farming communities. The study area lies approximately within latitude 7^0 and 8^0N and longitude $3^0$2 and $3^0$27'E. It falls within the humid tropical lowland region with 2 distinct seasons. The shorter dry season lasts for 4 months from November to February. Average annual rainfall ranges from 1,200mm in the Northern part of

the study area to 1,472 in the southern part. The mean monthly daily sunshine hours ranges between 3.8 and 6.8. The relative humidity ranges between 76% and 95% coinciding with dry and wet season respectively. The study is endowed with fertile soils which is good for arable and cash crops.

Sampling Technique

Multistage sampling method was used to select the respondents used for the study with the use of structured questionnaire. The first stage involved the purposive selection of two blocks from the existing six blocks of the ADP under the Abeokuta zone because of the high involvement of people of these blocks in farming due to the rural nature of these areas. The selected blocks are Odeda and ObafemiOwode. The second stage involved the selection of two cells from each of the blocks selected in stage one. The third stage involved the selection of three rural farming communities from each of the selected cells in stage two. This gives a total of 12 rural farming communities. In the last stage, 14 rural farm household heads were randomly interviewed from each of the rural farming communities given a total of 168 rural farm household heads interviewed. However, due to incomplete information, only 160 questionnaires were returned and used for the study.

Analytical Technique

Descriptive statistics was used to describe the socio-economic characteristics of the farm households.

Probit Regression Model

This was used to assess the influence of farm household socio-economic characteristics on access to credit.The general model following Paul (2008) and Matshe and Young (2004) is given as:

$$\{ K_i^* = \alpha X_i + e_i , K_i = 1 (K_i^* > 0)\} \qquad (1)$$

Where K_i^* is a non-observed continuous latent variable and K_i is an observed binary variable, equal to 1 if the farm household head has access to credit; X_i is a vector of the independent variables affecting credit access; and e_i is unobserved

term following a bivariate normal distribution. The set of independent variables include:

X_1 = Age of household head in year

X_2 = Sex of the household head (Male =1, Female =0)

X_3 = Religion of the household head (Christianity =1, otherwise =0)

X_4 = Household size (number)

X_5 = Farm size (hectare)

X_6 = Marital status of the household head (Married =1, otherwise =0)

X_7 = Farming experience (year)

X_8 = Years of formal education

Stochastic Frontier Production Function

This was used to examine the influence of credit and use of modern inputs on production efficiency. This methodology has been used by many researchers including Battese *et al.* (1996). The production technology of the farmer is specified by the Cobb-Douglas frontier production function.

$$In\ Y = \beta_0 + \beta_1 In\ X_1 + \beta_2 In\ X_2 + \beta_3 InX_3 + \beta_4 InX_4 + V_i - \mu_i \qquad (2)$$

Where:

Y = Output (grain equivalent)

X_1 = Farm size (hectare)

X_2 = Family labour (man day)

X_3 = Hired labour (man day)

X_4 = intermediate materials such as planting materials, fertilizer, herbicide (naira)

$\beta_0 \dots \beta_4$ = parameters to be estimated

V_i = random variables which are assumed to be independent of μi, identical and normally distributed with zero mean and constant variance i.e $N\ (0,\delta_v^2)$.

μ_i= non-negative random variables which are assumed to account for technical inefficiency in production and are assumed to be independent of Vi such that it is the non-negative truncated (at zero) of half normal distribution (Coelli,1995, Battase and Corra, 1977).

The inefficiency effect, μ_i was modeled in terms of the socio-economic factors that affect the technical efficiency of the farmers.

$$\mu i = \delta_0 + \delta_1 Z_1 + \delta_2 Z_2 + \delta_3 Z_3 + \delta_4 Z_4 + \delta_5 Z_5 + \delta_6 Z_6 + \delta_7 Z_7 + \delta_8 Z_8 + \delta_9 Z_9 \qquad (3)$$

Z_1 = Sex (Male =1, Female =0)

Z_2 = Age (year)

Z_3 = Age-square (year)

Z_4 = Off-farm income (naira)

Z_5 = Farming experience (year)

Z_6 = Educational level (year)

Z_7 = Household size

Z_8 = Extension contact (number of contact with extension personnel in the last production year)

Z_9 = Access to credit (Yes =1, No =0)

Results and Discussion

Socio-economic Characteristics of Rural Farm Households

The distribution of socio-economic characteristics of rural farm households is presented in Table 1. Majority (67.5 percent) of the household head are aged between 51 and 60 years. The distribution gave a mean age of 53.4 years which implies that the farmers are still in their productive age. Majority (88.8 percent) of the farm household heads are male implying that men are more involved in farming than women. Also, majority (75 percent) of the sampled respondents were married. This indicates that most of the household heads have marital responsibilities in addition to farming. The study also revealed that 46.3 percent of the sampled household heads had primary education which implies that the farmers are fairly educated. The mean farming experience is 23.1 years with majority (59.4 percent) of the farmers having between 21 and 30 years of experience in farming. In addition, most household heads (75.6 percent) have between 4 and 7 members and the mean household size was 6 persons. This is an indication that most of the farmers in rural areas of Nigeria enjoy family labour in farming. As revealed by the finding, religion may not influence the decision of

the farmers as 51.2 percent of the household heads sampled are Muslims while 48.8 percent are Christians.

Table 1: Distribution of Socio-economic Characteristics of Farm Household Heads

Variables	Frequency	Percentage	Mean
Age			
≤ 30	2	1.3	
31-40	6	3.7	
41-50	32	20	
51-60	108	67.5	53.4
> 60	12	7.5	
Sex			
Male headed	142	88.8	
Female headed	18	11.2	
Marital Status			
Married	140	87.5	
Single	12	7.5	
Widow	8	5.0	
Educational Level			
No Formal Education	46	28.7	
Primary Education	74	46.3	

Secondary Education	37	23.1	
Post Secondary Education	3	1.9	
Farming Experience			
≤ 10	10	6.3	
11-20	25	15.5	
21-30	95	59.4	23.1
> 30	30	18.8	
Household Size			
≤ 3	30	18.8	
4-7	121	75.6	6
>7	9	5.6	
Religion			
Christianity	78	48.8	
Islam	82	51.2	
Total	**160**	**100**	

Source: Computed from Survey Data, 2011.

Effect of Farm Household Socio-economic Characteristics on Access to Credit

The probit regression result on the effect of farm household socio-economic characteristics on access to credit is presented in Table 2. The Chi-square value of 43.2 which was significant at 1 percent attests to good fit of the model. The age, farm size, household size, farming experience and education have significant positive effect on the farmers' access to credit. These variables are significant at 5

percent, 1 percent, 5 percent, 1 percent and 10 percent level, respectively. The marginal effect results thus revealed that the likelihood of accessing credit increases by 0.312 as the household heads grow older, by 0.14 as the farm size increases, by 0.21 as the household size increases, by 0.56 as the experience of farmers in farming increases by one year and by 0.22 as the year of formal education of the farmers increases by one. The implication of this is that young and experienced farmers tend to demand for credit and this demand is also influenced by their level of education, farm size and household size.

Table 2: Probit Regression Results on the Effect of Farm Household Socio-economic Characteristics on Access to Credit

Variables	Coefficient	Marginal Effect	T-value
Constant	-0.0431***	-0.027	-4.4
Age	0.321**	0.312	2.1
Sex	-0.65	-0.63	0.29
Religion	0.85	0.798	1.25
Farm size	0.15***	0.14	3.72
Household size	0.23**	0.21	2.2
Marital status	-0.26	-0.21	-0.85
Farming experience	0.58***	0.56	4.6
Educational Level	0.26*	0.22	1.91
Chi-square	43.2***		
Log likelihood function49.5			

Source: Computed from Survey Data, 2011.

Maximum Likelihood Estimates of the Stochastic Frontier Production Function

The results of the maximum likelihood estimates of the stochastic frontier production function are presented in Table 3. The sigma-square which is significant at 1 percent attests to the goodness of fit of the model while the gamma value of 0.81 shows that about 81 percent of the variation in the output of the farmers is due to differences in their technical inefficiency. The determinants of the output of the farmers are land, family labour, hired labour and intermediate materials and they are significant at 5 percent, 5 percent, 5 percent and 10 percent respectively. This implies that one percent increase in farm size, family labour and hired labour will increase the output margin by 0.48, 0.11 and 0.29 respectively while one percent increase in the intermediate materials will reduce the output margin by 0.19. The study revealed that the farmers are operating at the rational stage of production as the return to scale is 0.69. Most of the variables examined in the inefficiency model have negative signs which imply that these variables have positive effect on the technical efficiency of the farmers. The significant variables include age, farming experience, educational level, household size and access to credit. They are significant at 5 percent, 5 percent, 5 percent, 10 percent and 5 percent respectively. This implies that the technical efficiency of the farmers increases with age, farming experience, level of education and household size. Also, access to credit increases the efficiency of the farm households.

Table 3: Maximum Likelihood Estimates of the Stochastic Frontier Production Function

Variables	Coefficient	Standard Error	T-value
Production Function			
Constant	0.62***	0.16	3.88
Farm size	0.48**	0.20	2.4
Family labour	0.11**	0.05	2.2
Hired labour	0.029**	0.012	2.42
Intermediate materials	-0.19*	0.10	-1.9
Inefficiency Model			
Constant	-0.167***	0.05	-3.34
Sex	0.0321	0.0249	1.29
Age	-0.89**	0.38	-2.34
Age-square	-0.12	0.69	-0.17
Off-farm Income	0.13	0.19	0.68
Farming experience	-0.34**	0.15	-2.27
Educational level	-0.23**	0.10	-2.3
Household size	-0.19*	0.101	-1.88
Extension contact	-0.28	0.23	-1.22
Access to credit	-0.14**	0.07	2.00
Diagnostic Statistics			
Sigma square	0.512***	0.14	3.66
Gamma	0.81***	0.121	6.69

Source: Computed from survey data, 2011.

Efficiency Estimates of the Rural Farm Households

The distribution of the technical efficiency estimates of the farm households is presented in Table 4. The efficiency of the farmers is fairly distributed with 22.5 percent of the farmers having their efficiency in the bracket of 0.71 and 0.80 followed by 21.3 percent in the bracket of 0.41 and 0.50 and 20 percent in the bracket of 0.91 and 1.00. The mean technical efficiency of 0.69 implies there is potential to increase the technical efficiency by 31 percent.

Table 4: Technical Efficiency Estimates of the Farm Households

Group	Frequency	Percentage
≤ 0.40	16	10
0.41-0.50	34	21.3
0.51-0.60	14	8.8
0.61-0.70	16	10
0.71-0.80	36	22.5
0.81-0.90	12	7.5
0.91-1.00	32	20
Mean	0.69	
Minimum	0.13	
Maximum	0.99	

Source: Computed from survey data, 2011

Conclusion and Recommendation

The study revealed that most household heads are still in their active age. They are therefore expected to be productive for available resources. It was also revealed that most household heads are fairly educated but highly experienced in farming. Majority of the household heads were married with many household members that can assist in farming activities. The significant factors that affect access to credit include age, farm size, household size, farming experience and education. Farm output increases with farm size, family labour and hired labour

but decreases with increase in intermediate materials. The inefficiency model revealed that age, farming experience, education, household size and access to credit increase the technical efficiency of the farmers. Policy option requires the strengthening of the education of farmers to increase the level of awareness on the benefit of credit to boost agricultural production among rural farm households in the study area.

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