
An Estimation of the Determinants of Microcredit Demand by Small Farmers to Enhance Agricultural Production: A case of Huye District, Rwanda

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Abstract

Microcredit was considered as a strategic empowerment tool that has talent to improve the well being of the poor and vulnerable especially small farmers. However, the low level of microcredit provision to small farmers is the fundamental issues hamper their agricultural productivity and income. The study estimates the determinants of microcredit demand by small farmers for enhancing agricultural productivity in Huye District, Rwanda. Primary data have been collected from 136 borrowers and 164 non-borrowers from several financial institutions. The data were analyzed using Tobit Regression Model. The results show that education, household size, total annual income, total annual expenditure, cooperative membership and distance were the main determinants of microcredit demand by small farmers to boost agricultural production in Huye District, Rwanda. However, in order to increase agricultural production and to improve small farmers' livelihood, formal financial institutions should put more efforts to provide microcredit to small farmers. The Government of Rwanda and others stakeholders should organize trainings especially for rural small farmers to increase their skills and knowledge about the use and how to manage their loan expenditures much better.

Keys Words: *Agricultural production, Microcredit, Small Farmers, Tobit Regression, Huye District, Rwanda*

Introduction

Microcredit is one of the requirements for small farmers to increase the agricultural production in the process of economic development of the Sub-Saharan African Countries. The microfinance institutions have extended microcredit loans for allowing small farmers to achieve better quality of life and reduce poverty. Microcredit in Rwanda was considered as a key strategy in building global financial system that eliminates extreme poverty and hunger. Microcredit access serves as an additional capital accumulation for small farmers' assets which would leads to improvement in consumption of the rural poor (Rweyemamu et al., 2003). Credit has played a significant role

in increasing agricultural productivity and enables small scale farmers to adopt new agricultural technologies that raise their income (Zeller and Sharma, 2000). Access to credit has also resulted to advanced technical efficiency of agricultural producers (Kibaar, 2005).

According to Yunus and Alan (2003), the credit access by small farmers has increased the agricultural production which has led to the economic growth. Microcredit benefits poor people who lack collateral to access formal credit (Bauchet et al., 2011). Akudugu (2012) reported that access to credit is vital for agricultural production and livelihoods improvement to farmers by taking their responsibility to establish self- dignity and integrity. Arif (2001) stated that small farmers who have utilized the credit to get inputs, have increased their cropping intensity especially in wheat production and have also increased their income.

Access to microcredit could improve productivity of farmers and contributing to uplifting the livelihoods of disadvantaged rural farming communities in order to achieve the goal of output maximization (Nosiru, 2010). According to Zhu *et al.* (2007), credit facilities contribute to the farmers' income which is used to improve their farm productivity. Credit can play that role of securing a household's livelihood and increasing productivity and agricultural investments. Adebayo *et al.*, (2008) found that agricultural financing determine the farmers' access to most of farm resources with improved inputs and farm technologies.

However, several studies on the factors determining microcredit demand have been done. See for example, Judes *et al.*, (2011) in their study carried out in Nigeria had found that farm income profit, interest rate and education have been the main factors influencing credit demand and use.

Balogun and Yusuf (2011) have found that organizations' membership density index, meeting attendance index, distance from the offices of credit institutions and interest rate significantly explained households demand for credit. Mohamed (2003) started that age, gender, education, income levels and degree of awareness on credit availability were significant factors that determine income levels and value of productive assets owned by both users and non-users.

Ayamga &al. (2006) found that that age, value of farm output, non-farm income, number of microcredit institutions, level of education and distance of microcredit institutions from borrowing households influence individuals' decision to demand for microcredit.

Kangogo *et al.* (2013) started that household size, farm income and distance to the nearest financial institution positively influenced a household to join microcredit whereas age, gender, education, farm size and interest rate were found to be significant and negatively influenced household decision to join microcredit groups.

Okurut *et.al* (2005) showed that informal credit demand is positively and significantly influenced by age, sex, education level, dependency ratio, household expenditure, and regional location.

However, in Rwanda the lack of access to microcredit has negative consequences for rural small farmers for their welfare, for their agricultural development and for their income generating activities. This study sought to estimate the determinants of microcredit demand by small farmers for enhancing agricultural production in Huye District, Rwanda.

Methodology of the study

Study Areas

This survey mainly considered three sectors of Huye District, Southern Province of Rwanda namely Maraba, Mukura and Ngoma. Huye District is one of the eight districts that make up Rwanda's Southern Province. It has fourteen sectors and 77 Cells with a total of 509 Umudugu. The district covered an area of 581.5 square kilometers and total population of 328,298 inhabitants with an average of 540 inhabitants per square kilometer (NISR, 2012). The district has rainfall distribution pattern of 1.200 mm and an average climate of 19°C. The major source of revenue for the population in Huye District is related to agricultural farming and livestock.

Research design

The study used quantitative and qualitative methods. The quantitative aspect focused on description of demographic and socio-economic variables of both small farmer's access and non-access to microcredit.

Data sources and sampling techniques

This study employed primary and secondary sources. Primary data has been collected using structured questionnaire and a simple random sampling technique were used to select 300 small farmers in the three sectors of Huye District. The sampling respondents were taken from 136 participants and 164 non-participants in microcredit programme during the year 2015.

Econometric Model used in the study

Tobit Model

To estimate the determinants of the demand of microcredit by small farmers from financial institutions, the Tobit model was used. The Tobit model allows us to identify the factors that affect small farmers to demand for microcredit.

The study used Tobit Regression Model to analyze the impact of microcredit on rural household wellbeing. The Tobit model is a censored normal regression method proposed by James Tobin (Tobin 1958) as a method to evaluate the relationship between dependent variable and independent variables. The general formulation of the Tobit model is usually given in terms of an index function.

This is given in equation as:

$$Y_i^* = \beta_1 + X_i\beta_2 + \varepsilon_i \dots\dots\dots \text{Equation (1)}$$

Where Y_i^* is the unobserved latent variable

X_i is a set of explanatory variables and ε_i

$y_i = Y_i^*$ if $Y_i^* > 0$ for demanding microcredit from financial institutions

$y_i = 0$ if $y^* \leq 0$ for not demanding microcredit from financial institutions

Where Y_i is the dependent variable: "Small Famers' decision to demand microcredit"

Marginal Effect

To obtain the marginal effect of the observed variables, the following formula is used.

According to Green (2008), the Log-likelihood function for the Tobit model is specified as:

$$\ln L = \sum_{i=1}^N \left\{ d_i \left(-\ln \delta + \ln \phi \left(\frac{Y_i - X_i \beta}{\delta} \right) \right) + (1 - d_i) \ln \left(1 - \phi \left(\frac{X_i \beta}{\delta} \right) \right) \right\} \dots\dots\dots \text{Equation (2)}$$

The overall log-likelihood is made up of two parts. The first part corresponds to the classical regression for the uncensored observations, while the second part corresponds to the relevant probabilities that an observation is censored.

Dependents variables used in the Tobit Model

X₁= Gender (Gender of small farmers 1=Male, 0= Female)

X₂= Age (Age of the small farmers in years)

X₃= Education (Education level of small farmers)

X₄= HHsize (Size of the small farmers’ household)

X₅= Off_Farm_Inc (Off-farm income of small farmers)

X₆= Tot_Ann_Incom (Total annual income of small farmers)

X₇= Total_Ann_Exp (Total annual expenditure of small farmers)

X₈= Coop_Member (Cooperative membership =1 if small farmer is a member of cooperative society and small farmers is not a member of cooperative society=0)

X₉= Distance (Distance from homestead and financial institutions’ offices in km)

X₁₀= Ann_Int_rate (Annual interest rate).

Results and Discussion

Descriptive Analysis

Table 1. Small Farmers’ Users and Non-users of microcredit according to Age categories

Age Category in years	Microcredit Users N= 136 (45.3%)		Microcredit Non-Users N=164 (54.7)		All respondents N= 300 (100%)	
	Male	Female	Male	Female	Male	Female
18-25	0 (0)	0 (0)	0 (0)	1 (0.3)	0 (0)	1 (0.3)
26-35	2 (0.7)	4 (1.3)	3 (1)	6 (2)	5 (1.7)	10 (3.3)
36-45	11(3.7)	19 (6.3)	13 (4.3)	21(7)	24 (8)	40(13.3)
46-55	20 (6.7)	33 (11)	14 (4.7)	35 (11.7)	34 (11.3)	68 (22.7)
56-65	16 (5.3)	17 (5.7)	17 (5.7)	24 (8)	33 (11)	41 (13.7)
Over 66	6(2)	8 (2.7)	16 (5.3)	14 (4.7)	22 (7.3)	22 (7.3)
Total	55 (18.3)	81 (27)	63 (21)	101(33.7)	118 (39.3)	182 (60.7)

Source: Author’s computation from field survey, 2015

Notes: Figures in parenthesis are percentage

The results from table 1 show that out of 136 (45.3 percent) of users of microcredit, 55 (18.3 percent) were men and 81(27 percent) were women. The results also show that between the age of 18-25 years, person of the small farmers had demanded microcredit while between the age 26-

35 years, the results show that 2(0.7 percent) of male small farmers and 4(1.3 percent) of women small farmers were users of microcredit whereas 3 (0.1 percent) of men and 6(0.2 percent) of women were non-users of microcredit. Between the age of 36-45 years, 11 (3.7 percent) of men and 19(6.3 percent) of women were users of microcredit whereas, 13(4.3 percent) and 21(7 percent) were men and women non-users of microcredit respectively.

The results revealed also that small farmers with the age between 46-55 years, 20 (6.7 percent) of men and 33(11 percent) of women were users of microcredit whereas, 14 (4.7 percent) of men and 35(11.7 percent) of women were non-microcredit users respectively. Small farmers with the age 56-65, 16 (5.3 percent) were men and 17 (5.7 percent) were women users of microcredit whereas 17(5.7 percent) of men and 24 (8 percent) of women are non-users of microcredit. Small farmers with the age of more than 66 years, only 6 (2 percent) of men and 8 (2.7 percent) of women are users and 16 (5.3 percent) of men and 14(4.7 percent) of women are non-users of microcredit. Finally, the results revealed that adult’s small farmers were better in accessing and demanding microcredit as compared to young small farmers. It may be due to that old small farmers are aware of the advantage and benefits to access and demand microcredit for enhancing agricultural productivity and for poverty reduction.

Results from Tobit Model

Estimation of the determinants of Microcredit Demand by Small Farmers

Table 2. Tobit Results of determinants of Microcredit Demand by Small Farmers

Explanatory Variables	Coef.	Std. Err.	t	P> t	Marginal Effect Coefficient (dy/dx)
Gender(X ₁)	.1042127	.1159366	0.90	0.369	.1042127
Age(X ₂)	-.0111781	.0533261	-0.21	0.834	-.0111781
Education(X ₃)	.1365055	.0668325	2.04	0.042**	.1365055
HHsize (X ₄)	.0518304	.0308593	1.68	0.094*	.0518304
Off_Farm_Inc(X ₅)	-.0177709	.0171209	-1.04	0.300	-.0177709
Tot_Ann_Incom(X ₆)	1.95e-07	9.59e-08	2.03	0.043**	1.95e-07
Total_Ann_Exp(X ₇)	4.44e-07	1.26e-07	3.52	0.000***	4.44e-07
Coop_Member (X ₈)	.4597932	.1153459	3.99	0.000***	.4597932
Distance(X ₉)	-.21622	.0719178	-3.01	0.003***	-.21622
Ann_Int_rate (X ₁₀)	-.0081612	.0234015	-0.35	0.728	-.0081612
_Cons	-.4014187	.4797173	-0.84	0.403	

Number of Obs = 300; LR chi2(10) = 68.60 ; Prob > chi2 = 0.0000; Log - likelihood = -272.27616
Pseudo- R² = 0.1119; Y(predict) = .03740938

Note: * significant at 10%; ** significant at 5% and * significant at 1%**

Source: Author’s computation from field survey, 2015

Pseudo R-Square of 0.1119 is the proportion of total explanation variables explained by the Tobit regression model. This implies that about 11.19 percent of change that occur in dependent

variable is jointly explained by the independent variables.

The results from Tobit model showed that out of 10 independent explanatory variables, 6 variables were significant. The demand for microcredit was significantly related with *Household education, Household size, Total Annual Income, Total Annual Expenditure, cooperative membership and distance*.

- **Education** status of small farmers was significant at 5 percent level and has a positive sign implying that one year increase in education level will affect the demand for microcredit by 13.6 percent. Thus, education was hypothesized to have a positive relationship to the decision to demand microcredit.
- **Size of Household** positively influenced the demand of microcredit and was significant at 10 percent. This indicates that if there is an increase of family member in the household, the likelihood to demand microcredit will increase by 5.18 percent in order to enhance agricultural production.
- **Total Annual Income** was found significant at 5 percent level and positively influenced the demand of microcredit. The probability for the small farmers to access microcredit will increase with an increase of their total annual income. This implies that small farmers need income for investing in farming activities.
- **Total Annual Expenditure** was found significant at 1 percent level and influenced positively the demand for microcredit. The probability to demand microcredit for small farmers will increase with an increase of their total annual expenditure.
- **Cooperative membership** was found significant at 1 percent level and influenced positively the demand for microcredit. Thus, if there is an increase of 1 member in cooperative, the probability to demand for microcredit will increase by 45.9 percent. This implies that when small farmers take decision to join the cooperative society, the probability to demand microcredit to enhance agricultural production will also increase.
- **Distance** from homestead and financial institutions' office was found significant at 1 percent level and influenced negatively the demand for microcredit. The results from marginal effect show that if the *distance* will increase by one kilometer, the probability to demand for microcredit will decrease by 21.6 percent. This implies that if small farmers are living far from microcredit office, they are unlikely to demand microcredit to increase their agricultural production.

Conclusion and Policy Implications

This paper estimated the factors determining small farmers' demand for microcredit in order to boost agricultural productivity. The study finds that household education, Household size, total annual income, total annual expenditure, cooperative membership and distance from small farmers' residence to formal financial institutions' office are significant determinants of microcredit demand by small farmers in Huye District, Rwanda.

Based on the findings, some policy implications are given below:

- The Government of Rwanda and financial Institutions should organize training for small farmers to improve literacy level of small farmers and increase skills about how to manage and use the loans received.
- To encourage farmers to demand for microcredit for increasing their agricultural production which lead to the economic development of the District in particular and in Rwanda in general
- Government of Rwanda should implement policies and strategies which are targeting the supply of credit to small farmers by formal financial institutions and encouraging small farmers to join agricultural cooperatives which can help them to access microcredit thus to increase their production.

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