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Research Article

Assessing the Factors Affecting Smallholder Farmers' Access to Formal Credit in Bo District, Southern Sierra Leone

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Abstract: Agricultural credit plays an important role in making farming segment supplementary productive and efficient in developing economies like Sierra Leone. Increasing food production and attaining food security in Sierra Leone require timely and adequate supply of agricultural inputs including agricultural credit. It is generally recognized that credit plays a crucial role in economic development in general and agricultural development in particular. Amid other things in Sierra Leone, lack of finance is one of the major problems impeding productivity and income of smallholder farmers. Since access to formal finance is very limited, the majority of the poor are forced to search financial services through informal channels. This study is anxious with analysis of factors affecting smallholder farmers' access to formal credit. As credit is one of the most important factors required for smallholders input utilization, it is important to have sustainable agricultural development. A two stage sampling method was employed. A total of 148 farm households were selected randomly using probability proportional to size. Descriptive statistics and logit model were used for analyzing quantitative data. The respondents were interviewed using a structured questionnaire and results revealed that 34.5% of the samples of smallholder farmers were official credit customers, whereas the remaining 65.5% were non-customers. Respondents accessed loans to finance their farming activities in areas such as land preparation, harvesting and threshing. The results revealed that respondents derived benefits from the use of credit including purchasing inputs and use of machinery to ensure high yield, undertaking land preparation. It was concluded that even though majority of the farmers in the study area take loans, yet they faced certain challenges like late disbursement of loans, small loan sizes whilst others also complain of the interest rate being too high. The study concluded that, access to loan is not a security for higher productivity; hence borrowing may allow farmers to respond to households needs rather than input market to increase productivity. Based on the findings, farm precise factors such as education needs to be nonstop, this would enable farmers make better technical decision on how to allocate production input effectively.
Keywords: Smallholder farmers, Access to finance, productivity and financial institutions.

Introduction

Since Sierra Leone's independence, agricultural development policy has been focused on the achievement of food self-sufficiency among other intentions. Major interventions in the sector have included both direct government participation and indirectly, through the donor-funded integrated agricultural/rural development projects. All of these interventions targeted smallholder farmers who form the majority of the farm population. The performances of the various interventions were generally disappointing and during the last two decades, the overall performance of the agricultural sector has been poor (Ayegba and Ikani, 2013).

The accessibility of good financial services is considered as one of the apparatuses of economic development. The establishment and expansion of financial serves is also one of the instruments to break the vicious circle of poverty (Akram *et al.,* 2008). Governments of less developed countries have frequently practiced the policies of providing cut-rate credit to the agricultural sector through financial arbitrators. This cut-rate credit, it was hoped, would lower the dependence on the rural money lenders (Ayegba and Ikani, 2013).

The provision of credit has increasingly been regarded as an important tool for raising the incomes of rural populations, mainly by mobilizing recourses for more productive uses. In Sierra Leone, the rural financial system is dichotomous in nature. The formal and informal sectors co-exist, which differences in accessibility. The two sources continue to be the major sources of agricultural credit, through their proportion differs. According to Ayaz and Hussain (2011) the basic distinction bet the formal and informal sectors is that the latter operates outside the rules and regulations between posed on the farmer by the formal financial institutions.

Commercial Banks and other formal institutions fail to cater to the credit need of smallholders farmers, however, mainly duet other lending terms and conditions. It is generally the rule and regulations that have created the Myth (ancient story) that the poor are not bankable, and since the cannot afford the required collateral, they are considered un credit worthy (Islam, 2008), financing of agricultural input and labor wages requires liquid cash that often is not readily available with the smallholder farmers. Therefore, it is essential to expand the states of rural credit at large to improve agricultural productivity.

Agricultural finance is regarded as a decisive factor input in farming production, helping poor farmers to maintain consumption of basic necessities, adopt advanced technology and raise their incomes. Therefore, access to credit is a potent tool to enhance agricultural productivity, to encourage economic development and thereby to alleviate poverty. Accordingly, governments in most developing countries have exerted ambitious efforts aimed at improving credit accessibility by farmers, particularly in the rural areas. Moreover, the growing attention in this regard is derived from the view that the provision of credit to rural population is a very effective strategy for poverty reduction (Zeller and Sharma, 1998). Nevertheless, the majority of farmers in developing countries have only limited access to commercial banks and other formal financial institutions. The lending terms and conditions created by the commercial banks like collateral and terms of repayments also deny small farmer from accessing credit.

In addition, the farmer characteristic such as level of literacy, income and degree of awareness of credit availability are regarded as main factors determining the farmer's access to formal credit market. Therefore, the smallholder farmers in developing countries have relied almost exclusively on informal credit gathering from friends, relatives, village traders and landlords. This study was analyzed what determines the extent of small holder farmers access to formal credit markets in Bo district. This study also to analyze household demand for formal credits and will provides empirical evidence on the substitutability between formal and informal credits in Bo district.

Statement of the problem

In Sierra Leone, the low level of community financial assistance among the smallholder farmers, processors and marketers suggests that indeed access of credit and finance is a major bottleneck for the development of agriculture. Besides the crucial importance of agriculture in the overall development process, farmers in Sierra Leone are to a large extent constrained by credit. The non-availability of adequate credit when needed negatively impacts the farm output (Feder *et al.,* 1990; Boucher *et al.,* 2008).

The exclusion of masses from basic services of a financial system leads to significant loss in gross domestic product (GDP) of a country (Chattopadhyay, 2011). As the agriculture sector in such

economies is dominated by smallholder farmers, governments play an active role and initiate several policy measures time-to-time to improve situation of such farmers (Khandker and Koolwal, 2016). Still the majority of these farmers lack the timely access to institutional credit in adequate amounts needed in the production process.

Credit provision is one of the principal components of rural development, which helps to attain rapid and sustainable growth of agriculture. Rural credit is a temporary substitute for personal savings, which boost the process of agricultural production and productivity. To increase agricultural production and productivity farmers have to use improved agricultural technologies.

However, the adoption of modern technologies is relatively expensive and small farmers cannot afford to self-finance. As a result, the utilization of agricultural technologies is very low. It is argued that enhanced provision of rural credit would accelerate agricultural production and productivity (Bravo-Ureta and Evenson, 1994).

Hitt and Frei, (2002), stated that access to financial services by smallholders is normally seen as one of the constraints limiting their benefits from credit facilities. However, in most cases the access problem, especially among formal financial institutions, is one created by the institutions mainly through their lending policies. This is manifested in the form of prescribed minimum loan amounts, complicated application procedures and restrictions on credit for specific purposes.

They further argue that the type of financial institution and its policy would determine the access. Where credit duration, terms of payment, required security and the provision of supplementary services do not fit the needs of the target grow, potential borrowers would not apply for credit even where it exists and when they do, they would be denied access.

Farm Households in rural areas do not usually have adequate access to formal sources credit, which provide funds through formal financial institutions such as Commercial Banks. This situation contributes to a virtual exclusion of the smallholder farmers from formal credit markets.

The high cost of obtaining loans from informal sources are also not placed them as better alternatives; however, several classes of institutional arrangements offer to these borrowers' valid substitutes for individual collateral and to the lenders low cost alternatives to imperfect credit worthiness information (Omonona and Agoi, 2007).

In Sierra Leone there is a wide gap between owned and required capital to finance the agricultural activities of smallholder farmers since the income from subsistence they tend to be biased towards men. It is the men headed household which is usually approached and registered agriculture does not yield much surplus beyond family consumption and other social obligations. The lack of access to capital in rural areas is one of the major factors which hinder the development of agriculture (Latif, 2001).

Research objectives

Major objective

The general objective of this study is to examine the determinants of smallholder farmers' access to finance for agricultural productivity in Bo district.

Specific objectives

1) To describe the socio-economic characteristics of smallholder farmers in the study area.
2) To identifies and measure factors that affect smallholder farmers' access to formal credit.
3) To assess smallholder farmers 'perception of the strengths and weaknesses of formal financial institutions in the study area.

Research Methodology

Design of the study

The study is a mixed design that will be based on qualitative and quantitative approaches to collect primary data from self-completed questionnaires and interviews. The multiple-method strategy will be adopted for this study so as to reduce the leeway of personal predisposition by not depending on only one method or response from only one smallholder farmer.

Adopting this approach enhances the genuineness of the study. The study will be designed to combine primary survey-based data with secondary information from the community bank records.

Description of the study area

Bo is the second largest city in Sierra Leone by landscape/geographical location (after Freetown) and the largest city in the Southern Province. Bo is an urban centre, and lies approximately 160 miles (250 km) east-southeast of Freetown, and about 40 miles (71 km) to Kenema. Bo is the leading financial, educational and economic centre of southern Sierra Leone.

Bo District is the fourth most populous District in Sierra Leone. Its capital and largest city is the city of Bo, which is the third most populous city in Sierra Leone. Other major towns in the district include Baoma, Bumpeh, Serabu, Sumbuya, Baiima and Yele. Bo District borders Kenema District to the east, Tonkolili District to the north, Moyamba District to the west, Bonthe District to the southwest and Pujehun District to the south.

The district population as of 2015 is 574, 201. Bo District occupies a total area of 5, 219 km² and is subdivided into fifteen chiefdoms. The population of Bo District is mainly from the Mande ethnic group, though the city of Bo has a very ethnic diverse population.

Bo is the leading financial, educational and economic centre of southern Sierra Leone. The Southern Province is one of the three provinces of Sierra Leone. It covers an area of 19, 694 km² and has a population of 1, 438, 572 (2015 census).

Data analysis method

Both qualitative and quantitative techniques were used to analyze the data. Qualitative data that were obtained by observation, focus group interview were organized in the field. Quantitative data were analyzed using descriptive statistics such as mean percentage, standard deviation, tabulation, ratio and frequency distribution. In addition, the t-test and chi-square statistics were employed to measure the mean and percentage differences between credits users and non-users.

A binary logit, model which fits the analysis for factors that affects smallholder farmer's access to formal credit was employed. The questionnaire was designed to capture information on socio-economic and demographic data like age, gender, household size, size of landholding, years of formal schooling, household income, types of agricultural enterprises, household composition, occupational statistics, average monthly income of each member of the households; and level of household access to formal credit.

The questionnaire was pre-tested to remove the possibility of any ambiguity in its interpretation and validate its effectiveness and relevance to the study objectives. Household data was collected from the cross-sectional survey of households in Bo district.

Method of data collection

Sources of data include both primary and secondary data sources. Qualitative data that helped to access smallholder farmer's perception of the strengths and weaknesses of formal financial institutions in the study area were collected through personal observation, focus group discussion; semi structured and opens ended questionnaires.

Structured questionnaire was equipped to collect quantitative data for the study. Primary data sources were the sample farm households both male and female headed from different wealth groups. Secondary sources were from Bo district ministry of agriculture, credit and saving share Cooperation and micro financing institution (MFI).

Econometric Analysis

This study was envisioned to analyze which and how much regressors were related to the smallholder farmer's access to formal credit. Dummy variable takes a value of zero or one depending on whether or not smallholder farmers use formal credit. However, the independent variables were both continuous and discrete.

There are several methods to analyze the data involving binary out comes. However, for this particular study, logit model were selected over discriminant and linear probability models. If the independent variables are normally distributed the discriminant-analysis estimator which follows ordinary least square procedures (OLS) is the true maximum likelihood estimator (MLE) and therefore, asymptotically more efficient than the logit model which requires maximum likelihood method. However, if the independent variables are not normal the discriminant-analysis estimator is not consistent, whereas the logit MLE is consistent and therefore, more robust (Amemiya, 1981; Maddala, 1983), the linear probability model (LPM) which is expressed as a linear function of the explanatory variable is computationally simple. However, despite its computational simplicity as indorsed by Pindyck and Rubinfeld (1981), Amemiya (1981), and Gujarati (1988), it has a serious defect in that the estimated probability values can lie outside the normal zero and one range.

Hence logit model is advantageous over LPM in that the probabilities are bound between 0 and 1. Moreover, logistic model best fits the nonlinear relationship between the probabilities and the explanatory variables. In the analysis of studies involving qualitative choices, usually a choice has to be made between logit and probit models.

According to Amemiya (1981), the statistical similarities between logit and probit models make a choice between them difficult. The justification for using logit is its simplicity of and that its probability lies between 0 and 1.

Moreover, its probability approaches zero at a slower rate as the value of explanatory variable gets smaller and smaller, and the probability approaches 1 at a slower and slower rate as the value of the explanatory variable gets larger and larger (Gujarati, 1995). In the analysis of studies involving qualitative choices, usually a choice has to be made between logit and probit models.

According to Amemiya (1981), the statistical similarities between logit and probit models make the choice between them difficult. However, Maddala (1983) and Kmenta (1986) reported that many authors tend to agree in that the logistic and cumulative normal functions are very close in the mid-range, but the logistic function has slightly heavier tails than the cumulative normal functions.

Pindyck and Rubinfeld (1981) and Gujarati (1988) illustrated that the logistic and probit formulations are quite comparable, the main difference being that the former has slightly fatter tails; that is, the normal curve approaches the axes more quickly than the logistic curve.

Hosmer and Lemeshew (1989) pointed out that a logistic distribution (logit) has got advantage over the others in the analysis of dichotomous outcome variable in that it is extremely flexible and easily used model from mathematical point of view and results in a meaningful interpretation. Hence, the logistic model is selected for this study. Therefore, the cumulative logistic probability model is econometrically specified as follows

Results and Discussion

Socio-economic Characteristics

Table 1. Socio-economic characteristics of beneficiaries of loan who are in Rice Farming Household

Variable	No of Respondents	Percentage	Mean
Gender			
Male	113	51	
Female	109	49	
Total	**222**	**100**	
Age (years)			
20-39	20	9	55.5 Years
40-59	85	37	
≤ 60	120	54	
Total	**225**	**100**	
Educational level			
Primary Education	41	18	
Secondary Education	113	51	
Tertiary Education	68	31	
Total	**222**	**100**	
Years of experience			
1-10 years	117	53	1-10 Years
11-20 years	85	38	
21years and above	18	9	
Total	**222**	**100**	
Marital status			
Single	89	40	
Married	133	60	
Total	**222**	**100**	
Farm size			
1-3 ha	117	53	1-3 ha
4-6 ha	85	38	
6ha and above	20	9	
Total	**222**	**100**	
Source: Computed from Field Survey Data, 2020			

The respondents' socio-economic characteristics are summarized in Table 1. The result revealed that average age of the respondents was 55.5 years with majority (54%) old 60 years and above. This inferred that rice farming household in Bo district were dominated by the old men and women who had inadequate energy to tackle the dares of rice production. Furthermore, most (59%) of the rice farming households in the study area were married and majority were males (51%). This could be that male farmers are more suited to withstand the rigidities associated processes of rice production.

Most (51%) of the farmers acquired either secondary school education or above. This implies that good number of farmers in the study area had formal education, while majority (53%) had years of experience between 1 and10 year. These tend to be in line with the findings of Duy (2012), that the rice farmers are educated.

Further finding on socio-economic factors showed that majority (53%) of the farmers were small scale subsistence farmers because they were operating on 1-3 hectares of land. The reason could be that lack of adequate credit facilities hinders them to fund large scale production operation.

Table 2. Mean Amount of Loan Requested and Granted to farmers by the community banks

Variable	Amount	SD	N	t-Statistic	Prob.	Level of Significance	Decision
Amount requested	215,780,000	166,884.45	219	1.0360	0.0132	0.05	Reject Ho
Amount granted	199,900,000	148,958.14		1.8927	0.0180		
Loan Granted and Spent on Rice Farming							
Amount granted	199,900,000	148,958.14	219	1.8927	0.0180	0.05	Reject Ho
Amount spent on farming	105,201,000	19,807.05		4.3563	0.0031		
Source: Computed from Field Survey Data, 2020							

Table 2 shows the mean difference test result, which indicates a significant difference between the amount of loan requested and amount granted to farmers. This implies that the loan tends to meet the demand of farmers. This could be attributed to the fact that most rice farmers applied for loan below Le 2,000,000 due to lack of collateral security while result on the relationship between amount of loan granted and amount of loan spent on farming showed a significant difference. This could be as a result of farmers spending greater part of loan granted to them on household needs rather than investing on farming.

Table 3. Summary Statistics of Gross Margin Earned by Beneficiaries of BOA loan Scheme who are Rice Farming Households in Benue State

Item	Mean	SD	Minimum	Maximum
Total revenue (Le)	317500	24312.48	140.0	1875000
Cost of fertilizer (Le)	30600	30841.79	0.0	192000
Cost of herbicides (Le)	17640	19845.32	0.0	84000
Cost of seeds (Le)	5772.18	6842.41	0.0	27600
Cost of labour (Le)	83929.30	82376.08	600.0	460000
Transport cost (Le)	9950	10127.25	0.0	93800
Sacks (Le)	800	674.15	200.0	26000
Total variable cost (Le)	148691.48	109635	0.0	575330
Gross margin (Le)	168808.52	194628	-7600.0	1638400
Average rate of return (Le)	2.14			

Test of Difference of Means of Total Revenue and Total Variable Cost Per Hectares of Rice Obtained by Beneficiaries of BOA loan Scheme

Item	Mean	SD	Difference	t-Statistic	Prob.	Level of Significance
Total Revenue (Le)	317500	243112.48	168808.52	8.3895	0.0000	0.05
Total variable Cost (Le)	148691.48	109635		3.2939	0.0014	

*T-test significant at 5% level of significance.
Source: Computed from Field Survey Data, 2020

Table 3 reveals that the mean total revenue and production costs incurred for rice farming households who are beneficiaries of BOA loan scheme was Le 317,500.00 per hectare and the mean total variable cost was Le 148,691.48 per hectare. The result also revealed a significant difference ($t=8.951$, $p<0.05$) between total revenue (TR) and total variable cost (TVC). This implies that the mean total revenue is greater than the mean total variable cost which indicates that there is cost efficiency in the use of inputs by the respondents in the study area. The result also showed that the mean gross margin was Le 168,808.52 per hectare and the mean labour cost of Le 82,376.08 was the highest among other costs. This shows that the farmers spent more on labour than other inputs. Furthermore, the maximum gross margin of Le 1638400.00 and minimum gross margin of Le 7600 per hectare implies that some farmers experience positive returns while some experienced negative returns from the mix inputs and outputs got from their farms. There is need for the farmers to be educated on the required inputs needed to obtain optimal gross margin to ensure the sustainability of rice production.

When the gross margin of Le 168, 808.52 was compared with the total variable cost of Le 148,691.48 per hectare, the result shows that the two variables were significant farmers, thereby increasing their profit margin. On the output of rice produced by the respondents, the result reveals that the mean output of 2280.0 kilogrammes of rice produced by farming households in the study area with minimum of 34 kilogrammes and a maximum of 16500 kilogrammes. This implies a moderately high output of rice produced by rice farming households. The result further reveals that 88.0 percent produced over 1000 kilogramme of rice in the study area; this is an indication that rice farming households are profitable, all other things being equal. The average return on gross margin which is the measure of financial success, weakness or failure was Le 2.14 indicating that, on the average a gross margin of Le 2.14 was made per Leones credit borrowed and invested in rice production in Bo district.

Determinants of Households Access to Formal Sources of Credit

Descriptive statistics of selected variables

In order to have a pure image of the quantitative demographic, socio-economic, and institutional and communication variables which differentiate between formal credits users from the non-users t-test was applied. Six continuous and five discrete variables were found significant with 1%, and 5% and probability level. Only these significant variables are described in table 4.

Table 4. Mean differences continuous variables for formal credit users and non-users

Variables	Non-users Mean	Credit users Mean	t-value	Significance Level
AGE	42.97 (16.01)	51.90 (17.55)	-3.02**	0.9989
FREQDA	2.44 (0.84)	3.05 (1.19)	3.65**	0.0002
DIST	2.90 (0.83)	2.17 (0.97)	4.79*	0.0000
FAMILYSZ FARMSZ	6.23 (2.56)	7.17 (3.29)	-1.91**	0.9712
EXCRIFS	2.17 (0.73)	4.07 (1.84)	8.92*	0.0000

Represent level of significant at 1% and 5% level respectively numbers in the brackets indicate standard deviations. The outcome of the survey exposed that credit users and non-user farmers have an average age of 51.90 and 42.97 years respectively. The difference in terms of age between the groups was significant at 5% probability level. This indicates that farmers with higher age have better connotation with credit sources that could deliver better information about the institutions that can enable access to formal credit sources.

Frequency of contact is also associated to access formal credit for smallholder farmers. It was imagined that farmers who have frequent contact with extension agents were predictable to have more information that will influence farm household's demand to use credit from the formal sources.

An average number of extension contact days for credit non-user and credit user sample households were 2.44 and 3.05 days per three months, the difference between the non- users and credit-users group was significant at 5% probability level. Physical distance of farmers from lending institutions is a significant variable that touches access to formal credit. Non-users from the formal sources have an average distance of 2.90 hours whereas the users have an average distance of 2.17 hours. The mean difference between the non-users and credit users group was significant at 1% level of significance. That means, farmers travel a short distance to access credit from the formal financial institutions have better opportunity to access credit from these institutions.

Family size is another variable that affects access to formal credit. Non-users from the formal sources have an average family size of 6.23 whereas the credit users have an average family size of 7.17. The mean difference between the non-user and credit user groups was significant at 5% level of significance. The mean value of number of household members who used formal credit was 4.33 ha for users and 1.46 ha for non-users. The mean difference between credit users and non-users was significant at 1% level. The result of the survey was as expected because, farmers who cultivate larger size of land can utilize more capital and also, larger land size reflects ownership of an important asset, which is expected to affect access to agricultural credit.

Experience in credit use from the formal sources is a significant variable that affects access to formal credit. Non-users from the formal sources have an average experience of 2.17 years whereas the credit users have an average year experience of 4.07 year. The mean difference between the non-users and credit user groups was significant at 1% level of significance. That means, farmers experience in credit use from the formal financial institutions plays an important role in accessing credit from these institutions.

Table 5. Significant level of discrete variables for formal credit users and non-users

Variables	Values	Formal credit		X^2-Value	P-Value
		Non-user	Credit use		
GENDER	0	26(26.8)	17(33.3)	34.09	0.0000*
	1	71(73.2)	34(66.7)		
EDUC	0	62(63.9)	15(29.4)	14.31	0.0008**
	1	35(36.1)	36(70.6)		
PARTIEXT	0	61(62.9)	31(60.8)	14.31	0.0008**
	1	36(37.1)	20(39.2)		
RITAKE	0	24(24.7)	43(84.3)	18.66	0.0001**
	1	73(75.3)	8(15.7)		
MEMCOOP	0	53(54.6)	12(23.5)	22.37	0.0000*
	1	44(45.4)	39(76.5)		
*, ** represent level of significant at 1% and 5% level respectively					

From the total sample farm households, 33.3 percent of the users and 26.8 percent of the non-users were female headed households. The number of credit user female headed households is lower than the credit users of male household heads. Therefore, farmer's sex is one of the discrete variables that significantly affect formal credit users. The difference between the user and non-user groups was significant at 5% probability level.

From the total sample respondents differences were observed between formal credit users and non-users in literacy level of the total sample households 63.9 per cent of credit non-users and 29.4 per cent of users were illiterate respectively. The difference in literacy level between credit users and non-users from the formal financial sources was statistically significant at 5% level of probability. This may probably mean that literate farmers have more exposure to the external environment and

information which helps them easily associate to credit sources. The amount of farm households who participated in agricultural extension package was better for formal credit users than non-users. Out of the total respondents, 39.2 per cent from the credit users and 37.1 per cent from the non-users have participated in agricultural extension package program. The difference in participating in agricultural extension package between the credit user and non-user respondent farmers was significant at 5% probability level. This implies that farmers who are willing to participate in agricultural technologies will be facilitated with agricultural credit.

Respondent's attitude towards risk was significantly different between credit users and nonusers. Among the groups 15.7 per cent of the users and 75.3 per cent of the non-users thought that formal credit is risky to repay in case of crop failure. The difference between the two groups was significant at 5% probability level. This perception difference might be one of the problems for lower status of smallholder farmers' access to formal credit.

Membership of farmers multipurpose cooperatives is also the other variable that significantly affects access to formal credit. From the total respondents 76.5 per cent were credit users while only 45.4 per cent were not credit users from the formal sources. This has significance percentage difference at 1% probability level between the user and non-user groups. This implies membership of farmer's multipurpose cooperative plays a determining role in providing access to formal credit especially in farmer's multipurpose cooperatives' source.

Analysis of Factors Affecting smallholder farmer's access to formal credit

The logit econometric model was selected for analyzing the factors affecting smallholder farmer's access to formal credit**.** Prior to running the logistic regression analysis both the continuous and discrete explanatory variables were checked for the existence of multi-collinearity and high degree of association using variance inflation factor (VIF) and contingency coefficients, respectively.

The VIF values for continuous variables were found to be very small (much less than 10) indicating that absence of multicollinearity between them. Likewise, the results of the computation of contingency coefficients reveal that there was no serious problem of association among discrete variables. For this reason, all of the explanatory variables were included in the final analysis. More specifically, five continuous and five discrete explanatory variables were used to estimate the logit model.

In the logit model analysis, we emphasize on considering the combined effect of variables between formal credit user and non-user farm households in the study area. By considering the variables simultaneously, we are able to incorporate important information about their relationship.

Twenty variables were hypothesized to explain factors affecting smallholder farmer's access to formal credit. Out of these thirteen of the variables were found to be significant, while the remaining two were less significant in explaining the variations in the dependent variable and five variables did not show variation among sample farm households.

The maximum likelihood estimates of the logistic regression model show that age of smallholder farmers (AGE) and membership of farmer's multipurpose cooperatives were less powerful in explaining smallholder farmers' access to formal credit. Frequency of contact, physical distance of farmers from lending institutions, family size, farm size, experience in credit use from the formal sources, sex of household head, education level of household head, participation of households in extension package program, attitudes towards risk, farmers' perception of loan repayment period, farmers' perception of lending procedures, farmers' perception of group lending and lack of opportunity to take a second loan were important factors influencing smallholder farmers access to formal credit in the study area.

Table 6. Maximum likelihood estimates of logit model and the effects of explanatory variables on the probability of access to formal credit

Explanatory variables	Estimated coefficient	Odds ratio	Wald statistics	Significance level
Constant	1.223	1.887	1.028	0.165
AGEHH	1.755	1.030	0.661	0.316
FREQDA	2.597	0.797	15.11	0.004***
DIST	0.861	1.225	4.79	0.097**
FAMILYSZ	1.607	1.914	10.51	0.067***
FARMSZ	1.068	2.910	10.829	0.051***
EXCRIFS	1.618	5.043	3.406	0.165*
GENDER	0.731	0.642	16.19	0.023***
EDUC	0.360	0.458	7.36	0.093**
PARTIEXT	0.371	0.273	7.35	0.089**
RITAKE	0.247	0.556	5.62	0.160**
SHOREPIN	0.194	0.443	3.227	0.241*
LEPROC	0.107	2.477	6.942	0.073**
COLLATGF	1.242	1.220	0.659	0.503
LAOPLOAN	2.381	0.491	2.261	0.172*
MEMCOOP	0.453	0.511	1.435	0.719*
***, ** and * represent level of significant at 1%, 5% and 10% respectively.				

The maximum likelihood estimates of the logistic regression model show that frequency of contact, physical distance of farmers from lending institutions, family size, farm size, experience in credit use from the formal sources, sex of household head, education level of household head, participation of households in extension package program, attitudes towards risk, farmers' perception of loan repayment period, farmers' perception of lending procedures, lack of opportunity to take a second loan, and membership of farmer's multipurpose cooperatives were important factors influencing formal credit use of smallholder farmers.

Frequency of contact was found to be important in reducing formal credit use. The Wald statistics corresponding to the variable show that it is significant at 1% probability level. The odds favoring access to formal credit use decreases by a factor of 0.797 for farmers. Physical distance of farmers from lending institutions is another factor, which is significantly related to the dependent variable and that it is significant at 5% probability level.

The odds favoring access to formal credit use increases by a factor of 1.225 for farmers. Family size would increase access to formal credit use. The odds in favor of access to formal credit use increases by a factor of 1.914 for households, which had small family size than those who had large family size. The positive relationship between family size and access to credit is that farmer who had small family size can utilize more capital for labor and other farm inputs and therefore, this will increase the demand for credit and therefore, as demand increase there will be a chance of access to credit. Farm size would increase access to formal credit use. The odds in favor of access to formal credit use increases by a factor of 2.910 for households, which had larger cultivated farm size than those who had lesser farm size. The positive relationship between cultivated land size and access to credit is that farmer who cultivated larger size of land can utilize more capital for labor and other farm inputs and therefore, this will increase the demand for credit and therefore, as demand increase there will be a chance of access to credit. Mohiuddin (1993), stated that both supply and demand factors explain women's limited access to institutional credit, although supply factors are more important.

On the other hand this result contradicts with studies by Anbes (2003), which revealed that "the level of farm credit for fertilizer and high yielding varieties (HYV) varied inversely with farm size". This

may be true for fertilizer credit use, but in the case of farm labor it is different. Since farming in rural Ethiopia especially in the study area is extensive, and in extensive farming when 14th size of the land increases the need for labor proportionally increases. This again increases operational expenses, which leads to the need for additional capital, and additional capital requirement leads to the demand for credit. However, this result is in line with the study of Miller and Ladman (1983) who applied discriminant analysis to identify a set of socio-economic, physical and psychological factors that influence credit use among small farmers with a view to differentiate between borrowers, potential borrowers, and non-borrowers. The results of the study indicated that borrowers were characterized by large farm size. Experience in credit use from the formal sources is another factor, which is significantly related to the dependent variable and that it is significant at 10% probability level. The odds in favor of accessing to formal credit use increases by a factor of 5.043 for an increase in a year of experience of formal credit use. The reason behind this is that a farmer having more experience in formal credit use will have more tendencies towards using that source. Sex of household head is another factor, which is significantly related to the dependent variable and that it is significant at 1% probability level. The odds in favor of accessing to formal credit use increases by a factor of 0.642. The result of the logit model also revealed that the variable has a negative relationship that female headed household uses formal credit less than male headed households or the female headed households would be less likely to go for formal credit.

Education level of household head affects access to formal credit negatively. The difference in literacy level between credit users and non-users from the formal financial sources was statistically significant at 5% level of probability. The odds in favor of accessing to formal credit use increases by a factor of 0.458 for a literate farm households increase experience of formal credit use. This may probably mean that literate farmers have more exposure to the external environment and information which helps them easily associate to credit sources. Participation of households in extension package program is another factor, which is significantly related to the dependent variable and that it is significant at 5% probability level. The odds in favor of accessing to formal credit use increases by a factor of 0.273 for farmers. This implies that farmers who are willing to participate in agricultural technologies will be facilitated with formal credit.

Attitudes towards risk are another factor, which is significantly related to the dependent variable and that it is significant at 5% probability level. The odds favoring access to formal credit use increases by a factor of 0.556 for farmers.

The result of the logit model also revealed that the variable has a negative relationship that farmer with risk-taker uses formal credit than non-risk-taker. The odds in favor of access to formal credit use decreases by a factor of 0.556 for households who fear risk.

Farmers' perception of loan repayment period is another factor, which is significantly related to the dependent variable and that it is significant at 10% probability level. The odds in favor of accessing to formal credit use decreases by a factor of 0.443 for farmers. This implies that the repayment period is good for farmers if it is on harvesting time or when the farmers get income to repay their loan.

Farmers' perception of lending procedures was found to be important in reducing formal credit use. This variable is significant at 5% level of significant. The odds favoring access to formal credit use decreases by a factor of 2.477 for farmers. This is implies that as lending procedure improved and being appropriate for farmers, the farmers were initiated, so that they go for credit.

Lack of opportunity to take a second loan is another factor, which is significantly related to the dependent variable and that it is significant at 10% probability level. The odds in favor of accessing to formal credit use decreases by a factor of 0.491 for farmers. This implies that farmers who are willing to repay their loan on time will be facilitated with the second formal credit.

Membership of farmer's multipurpose cooperatives is another factor, which is significantly related to the dependent variable and that it is significant at 10% probability level. The odds favoring access to formal credit use increases by a factor of 0.511 for farmers who are membership of farmer's multipurpose cooperatives. In addition, the probability of accessing formal credit was also positively and significantly influenced by being a member of farmers' multipurpose cooperatives. This is due to the fact that cooperatives provide agricultural credit from their own source for members only. While for non-members except input credit no other type of credit was provided. Therefore, this was one of the constraints that restrict farmers' credit access from service cooperative which is one of the MFI in the study area.

Conclusion and Recommendations

The smallholder farmers' access to formal credit systems is characterized by a number of distinctive features of which the most important include the following. The study concludes that good number of farmers in the area had formal education, despite the number of years of experience acquired, rice farming household were found operating on less than 5 hectares of land due to inadequate credit facilities to fund large scale agricultural activities.

Based on the findings of the study and personal observation of the situation in which the analysis of smallholder farmers' access to formal credit systems, the following recommendations are forwarded. Development solid bridge between smallholder farmers and microfinance institutions (MFIs) and other development oriented organizations. Integrated and participatory rural development strategies can achieve their target if these development agents create strong social and cultural links with the people that they are expected to assist. Therefore, organizing regular in-service and on-job training, providing adequate incentives and remuneration as well as employing adequate number of development agents will be necessary conditions to change the farmers' attitude toward using formal credit.

The policy that the country follows currently promotes market oriented economic system. This may discourage banks to serve geographically dispersed and large number of rural farmers in fear of loan administration costs and risk of default since they may have alternative clientele in and around towns who can pledge collateral to the banks. Therefore, alternative solutions should be sought to solve the current problem of formal credit accessibility procedure. In addition, the physical distance of lending institutions, bureaucratic procedures of the institutions, lack of well-organized farmers' associations or groups, etc., may worsen the smallholder farmers' access to formal credit. Therefore, it is necessary to seek other alternative strategies (such as rural credit and saving schemes, door-to-door services, ensure accountability, transparency and efficiency of the institution workers or employees) to mitigate the current formal credit scarcity problem.

The majority of the rural smallholder farmer households' especially female headed households and the very poor farmers did not use formal credit from formal financial sources. Therefore, high emphasis should be given in screening potential borrowers and to address the very poor and female headed households in the formal credit market.

The repayment period for formal credit especially which is for agricultural activity in the study area is almost uniform and regular. These inflexible repayment schedules sometimes do not correspond to period of cash availability for the poor households. Therefore, participatory development of activity and income calendars could be used to synchronize repayment schedule with credit need and income flow of different households.

Agricultural activities in general are seasonal; hence credit providers have to be conscious with regard to the timely provision of credit.

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