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Evaluating Amhara Credit and Saving Institution and Determinants of Profitability in Rural People: In the Case of Gozamin Woreda; East Gojjam Zone, Ethiopia

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Abstract
Financial services like microfinance for the poor, can be a powerful tool to fight poverty. Microfinance is considered to be as one of the most efficient instruments to support economic development and to struggle against poverty in poorer countries. Many studies have been done to assess the outreach and effectiveness of microfinance in different parts of the region. But to the best of researchers' knowledge there is no published study in the research area whether borrowers are profitable or not and determinant factors. The main objective this study was to identify factors that contribute to Amhara credit and saving institution to make borrowers profitable. Cross sectional study design was used to collect primary data. The study population were rural borrowers from Gozamin Woreda, East Gojjam Zone. Partial proportional odds model was used as method of data analysis. From the total of 431respondents, 18.33% were loser, 29.47% neither profited nor lost and 52.20% were profitable. Borrowers who spent their money for other purposes(OR=0.188) were unlikely to be profitable as compared to those who spent to buy animals. Those who lost property in loan period(OR=0.306) were less likely to be profitable compared to those did not lost. Being medium in economy were important to be profitable. When borrowers take money for one additional year, their profitability increased by 1.15 times. ACSI was established for the poor to come out of property. But almost half of borrowers did not get extra property/ income. Buying animals with borrowed money was good opportunity to be profitable and single borrowers should not be encouraged. Special follow up should be made on poor and female headed borrowers not to spend the money on consumable items and home construction.
Keywords: ACSI, Profitability, Partial proportional odds model, Gozamin Woreda

1. Introduction

1.1. Background of the study

Financial services like microfinance for the poor, can be a powerful tool to fight poverty. Access to a well-functioning financial system able to empower individuals both economically and socially which allow them to put together more successfully into the economy of their countries, actively contribute to country's development, and protect themselves against economic shocks. Microfinance is not an end, and many other areas of development are also necessary to reduce poverty, access to financial services can help poor people to take control of their financial lives. With microfinance services on their access way, poor people are enabled to generate additional income and employment to support their own initiatives.(USAID, 2006)

In history, the main target of microfinance was the alleviation of poverty. Alleviation of poverty was the crucial social objective and so traditional microfinance institutions consisted of only of nongovernmental organizations. In developing countries it is important to note that in the recent times the market place has been evolving such that the traditional microfinance institutions have and are transforming themselves into profit seeking institutions.

Microfinance has been around in most developing countries for over 30 years providing small scale financial services to poor rural and urban communities. However the concept has gained a lot of popularity recently with the award of the 2006 Nobel Peace Prize to professor Muhammad Yunnus with his Grameen Bank. Professor Muhammad Yunnus , after realizing the dire need of microcredit by the poor in Bangladesh , initiated a savings program from where the poor would access microfinance (Simeon N, et.al,2013)

The financial sector plays a central role in meeting the Ethiopian government's developmental goal of poverty reduction and private sector growth. It is increasingly understood that adequate financial services such as loans, savings , insurance and payment services for the wide-ranging population, including poor households and poor farmers promote equality and productivity.

After the fall of Derg Regim , several micro financial institutions were come out in Ethiopia. Thirty one micro-finance institutions have been registered legally with their considerable variations in geographical distribution, capital and customer size (Gowri, 2011). Among these, eleven Micro finance institutions (MFIs) (about 41%) are located in Addis Ababa and thirteen MFIs (about 48%) are located in Oromia region, with 21.1% and 18.2% of the shares in total capital of all the MFIs, respectively. Moreover, about 81.3% of total capital of all MFIs in the country are belonging to only four of them i.e Amhara (25.6%), Dedebit (24.3%), Addis (16.3%) and Oromia (14.7%).

Amhara credit and saving institution, Dedebit credit and saving institution and Oromia credit and saving institution having major share have gone to association and NGO. Quarter of the total ownership of micro finance is controlled by regional Governments. The Ethiopian microfinance market is dominated by these three MFIs, all of which are linked to regional state government ownership ; 65% of the market share in terms of borrowing clients, and 74% by loan provision are accounted by the three largest institution (Ebisa. et.al,2013).

In Ethiopia the total number of active borrowing clients to the microfinance institutions have reached more than 2.4 million in 2011 whereas the total credit enlarged by all microfinance institutions amounted to Birr 6.9 billion. Out of these total credit granted, Birr 5.1 billion was the share of the three largest Microfinance institutions. Based on the number of borrowing clients the market shares are 28.1%, 16.1% and 20.4% for Amhara Credit and Saving Institution (ACSI), Dedebit Credit and Savings Institution (DECSI) and Oromia Credit and Savings institutions respectively. The market share in terms of the total loan provision for Amhara Credit and Saving Institution (ACSI) is 28.2%, for Dedebit Credit and Savings Inst (DECSI) and Oromia Credit and Savings (OCSSCO), the market shares are 26.9% and 18.6%, respectively.

(Gosa, 2014)

ACSI was founded by the Organization for the Rehabilitation and Development in Amhara (ORDA), a local NGO engaged in development activities in the Amhara region. It was recognized in 1991 to give relief to the people affected by drought and the war against the earlier Dergue regime. In moving to head off from the more usual direct supply of relief, the NGO formed a department to provide small amounts of credit to rural people on a pilot basis. That department grew into a separate institution and ACSI was licensed as a micro finance share company in April 1997 with the primary mission of improving the economic situation of low income productive poor people in the Amhara region through increased access to lending and savings services.

The other shareholders of ACSI are the Amhara State Government (25%), Amhara Development Association (ADA) (20 %), Amhara Women's Association (AWA) (10%) and Endeavor (10%) (USAID, 2006).

The objective of ACSI is providing loans for poverty alleviation in both rural and urban particularly focusing on rural poor households. This study tried to address the effectiveness of ACSI program to improve the life of poor households in rural areas of Gozamin Woreda, East gojjam Zone, Amhara Region.

1.2. Statement of the problem

Micro Finance Institutions are institutions established to provide small loans or micro loans to the unemployed, to poor entrepreneurs and to others living in poverty that is not bankable.

These individuals lack guarantee, regular employment and a verifiable credit history and therefore cannot meet even the most minimum qualifications to gain access to traditional credit. Apart from loans, they also provide other micro finance services to the very poor such as savings, micro insurance and other financial innovations(Dagnew. et al, 2008).

Microfinance (MF) is considered to be as one of the most efficient instruments to support economic development and to struggle against poverty in poorer countries. Several microfinance institutions (MFIs) all over the world have confirmed that financial services can be offered on sustainable basis with high outreach. With the increasing importance, MFIs and their partners have started to initiate projects and programs that support the MF industry as a whole.

The main purpose of ACSI's credit and saving program is to aid poor households of the region to build up their assets. Loans are based on collateral granted to groups of five to seven people, jointly responsible as borrowers. Loan amounts and terms vary depending on many factors with a maximum loan size of 5,000 ET and a maximum loan term of three years. Loans have to be paid back by the end of each loan season with an interest rate of 18%. A compulsory saving of 1% of the total loan amount must be paid on a monthly basis throughout the loan period(Aschale, et. al 2012).

Many studies have been done to assess the outreach and effectiveness of microfinance in different parts of the region. A descriptive analysis study for Dedibit Credit and Saving Institution, showed that MIs is playing an important role in poverty reduction and women's empowerment in Mekelle city(Gosa ,2014). Bamlaku Alamirew(2006), using different analysis technique with 500 samples from five different Zones, indicated that ACSI smoothed the life of poor households. However he observed that there was a case of using loan for unintended purposes and clients lack technical skills to engage in more profitable business activities. Asmamaw(2014) , using frequency distribution, described that those who borrowed money from ACSI, 65.4% faced problem to pay back loan and 34.6% have no problem to pay loan. A survey study in Ebinat Woreda showed that of the total credit beneficiary households in the study area, 81% reported a certain amount of loan diversion. The extent of loan diversion, however, was not uniform across households. About 93% of the poor have diverted a certain amount of the loan to meet other needs compared to 68% of better-off households. Results also showed that credit failed to enable poor households to move out of poverty and food insecurity, whereas better-off and labor rich households used credit to improve their livelihoods(Aschale et.al, 2012). A study in Jimma city showed that microfinance improved employment opportunity, asset holdings and

expenditure patterns. However, improvement' relating to housing and other assets of higher value tends to be limited(Bisrat Gebru, 2011).

To the best of our knowledge, though there were a few studies conducted about profitability and its determinants of rural households of ACSI clients, all these studies were based on insufficient sample sizes or descriptive analysis which is not appropriate to infer about population of ACSI borrowers. In addition no published researches were found about determinants of profitability of ACSI borrowers in Gozamin Woreda. Therefore this study tried to analyze the profitability and determinants of rural borrowers of ACSI in Gozamin Woreda using partial proportional logit model.

1.3. Objective of the study

General objective

The general objective of this study was to evaluate effectiveness of Amhara credit and Saving institution in eradicating poverty in rural households and to identify determinants of profitability.

Specific objectives are:

1. to assess how much the program of Amhara credit and saving institution was effective in alleviating poverty .
2. to identify factors that contribute to profitability of ACSI borrowers.
3. to characterize rural people who borrowed money from ACSI in terms of their economic status

1.4 Significance of the study

The result of this study is important for the Amhara national state government at large and higher officials of ACSI in particular to review microfinance institutions' policy and program. It is also important for rural households to take corrective action how to use the loan so as to root out of their poverty.

1.5 Methods of dissemination

After this study was finalized, its hard copy was first disseminated to Debre Markos University and then East gojjam zone, ACSI branch office, and finally to Amhara national state head office.

2. Research Methodology

2.1 Study area

This study principally focused on Gozamin Woreda. It is one of the largest Woreda among 18 woredas in East Gojjam zone which rounds Debremarkos city, capital of East Gojjam zone. It is subdivided into lowest administrative units of 25 rural kebeles and 5 urban kebeles.

2.2. Study population

The study population of this research were those rural households living in Gozamin Woreda who have borrowed money from ACSI in 2015/2016.

2.3. Study variables

This study was all about determinates of profitability for ACSI borrowers in rural households. Two types of variables were considered, dependent and independent variables.

The dependent variable is ordinal type where the response of households was ordered in three categories. The ordering mechanism was the extent of the profitability of rural households who took loan from ACSI while paying back their loan. Profitability was categorized as profited, neither profited nor lost and lost or sold previous home property at the time of repaying loan to ACSI.

If a household has got any additional property or income because of money borrowed from ACSI at the time of repayment, it is said to be profited.

If a household has neither got any additional income/property nor lost any previous home property while repaying loan, it is said to be no change.

If a household lost any of his previous home property to repay loan, it is said to be loss.

The dependent variable is denoted by Y *and* measured as follows:

$$Y = \begin{cases} 3 & if\ profit\ is\ gained \\ 2 & if\ no\ change \\ 1 & if\ loss\ occured \end{cases}$$

Independent variables that could possibly affect the dependent variables were: sex of household head, , amount of money borrowed, household economic level (poor, medium and rich as measured by the society), loss of property with natural conditions or accidents in the interval period of borrowing and repaying, household size, , age of household head, purpose of money spent(to buy livestock, to buy agricultural input, for both, for

food security , to pay previous loan), amount of land owned in hectare, education level of household head (illiterate, grade 1 to 4 complete, grade 5 to 8 complete and grade 9 to 12 complete) and frequency of borrowing.

2.4. Sampling design and sample size determination

This study used cross sectional study design. Because it is cost effective and important to get more information at a time with least cost.

The study population is dispersedly living in to 25 kebelies and different ecological zones implying that there are 25 different strata. Due to this ,stratified sampling with proportion was used to select samples. Each sampling units was selected from each strata using lottery method. Since the response variable was categorical and total number of borrowers in the research Woreda were not centrally documented , it was impossible to get total number of borrowers in Gozzamin Woreda. As a result researchers used the following formula to determine a representative sample size. $n = \frac{Z^2_{\alpha/2} Pq}{d^2}$

where α is level of significance, p is proportion of borrowers getting profit with the money borrowed, $q = 1 - p$ and d is margin of error.

The following values was assigned: $\alpha = 0.05$, Since there was no previous similar research in the area, and to get maximum sample size $p = 0.5\ and\ q = 0.5$ and $d = 0.05$

With these values the calculated sample size was 384. A 20% of none response rate was added and the required sample size was 461.

2.5. Data collection procedure

In order to collect the required data from respondents, a well designed structural questionnaire was prepared. The questionnaire contained items which were more of close ended. They were translated into Amharic which is native language of society in the study area. Then they were pretested for consistency and relevance using pilot survey.

Most rural people in the study were assumed to be illiterate. So that interview method was used to collect data where qualified interviewers were recruited with computation.

2.6. Data analysis methods

The nature of the response variable for this study was ordinal having three ordered categories. Observations on an ordinal scale are classified in ordered categories, but the distance between the categories is generally unknown. Because of this ordinal logistic regression was used as data analysis method.

2.6.1. Ordinal logistic regression

Ordinal logistic regression or (ordinal regression) is used to predict an ordinal dependent variable given that one or more independent variables.

It enabled us to determine which independent variables (if any) were statistically significant on the dependent variable.

In the ordered logit model, there is a continuous, unmeasured latent variable Y*, whose values determine what the observed ordinal variable Y equals .

Let Y_i denote the i^{th} borrower's profitability level, Y_i*the latent profit gained measure, X the matrix of independent variables, j the borrower profitability level (1 = loss occurred, 2 = no change and 3 = profit gained in the household), and J the number of profitability levels (in this case J = 3).The latent profit gained Yj* can be estimated as follows:

$$Y^*_j = X_i\beta + \varepsilon_i \quad \text{..... (1)}$$

where β is the regression coefficients for X, $\varepsilon_i$is the identically and independently distributed error term . Let μ_k be the thresholds (cut offs) for profitability level and $\mu_1 \leq \mu_2 \leq \mu_3 \leq \cdots \leq \mu_{j-1}$, k = 1,2,.J − 1. Note that level k = 1 represents the minimum threshold, loss occurred. The different values of Y are as follows:

Y = 1 loss occurred ($Y^* \leq \mu_1$)
Y = 2 no change ($\mu_1 \leq Y^* \leq \mu_2$)
Y =3 profit is gained ($Y^* \geq \mu_3$)

As J is the number for profitability levels, then the probability of profitability level (j) for a given borrower (i) can be written as

$$P(Y_i \leq j) = p_{ij} = \frac{e^{\alpha_j - (\beta_1 x_1 + \beta_2 x_2 + \ldots + \beta_p x_p)}}{1 + e^{\alpha_j - (\beta_1 x_1 + \beta_2 x_2 + \ldots + \beta_p x_p)}}, \text{ i=1,. . ., n and j=1, 2 ,3}$$

where β is the regression coefficients for X (difference in the log odds of profitability level j-1 vs. other j profitability level), α_j is the intercept for j^{th} logit. It is to be noted that for proportional odds models β

values for all J profitability levels is the same and this is called parallel line assumption. Taking logarithm both sides of the above equation, it gives the ordered logistic regression model expressed in logit form as :

$$logit\big(P(\boldsymbol{X})\big) = \alpha_j - (\beta_1 x_1 + \beta_2 x_2 + \cdots + \beta_p x_p)$$

where $P_j(X) = P(Y \leq j|x_1, x_2, \ldots x_p)$, j=1,2,3 which is probability of being at or low category j given a set of predictors

2.6.1.1 Parallel Lines Assumption

In ordinal logistic regression models there is an important assumption which belongs to ordinal odds. According to this assumption parameters should not change for different categories. In other words, correlation between independent variable and dependent variable does not change for dependent variable's categories, also parameter estimations do not change for cut-off points. In an ordinal logit regression, when the assumption holds for j – 1 logit comparison in a J categorized variable, α_{J-1}, cut-off points and j -1 β parameters are found (Kleinbaum and Klein, 2010).

In a way, this assumption states that the dependent variable's categories are parallel to each other. When the assumption does not hold, it means that there are no parallelism between categories (Fullerton and Xu, 2012).

To test the hypothesis that the effect of each explanatory variable is constant across all categories but the cut points are different, consider parameters for cumulative logit model:

$\boldsymbol{\beta}^{(K)} = \left[{\beta_1}^{(K)}, {\beta_2}^{(K)}, \ldots {\beta_p}^{(K)}\right]'$ for the first K-1 response categories with

$$logit\big(P(Y \leq K|\boldsymbol{X})\big) = \alpha_K - \boldsymbol{\beta}^{(K)}\boldsymbol{X} \quad H_0: \quad \boldsymbol{\beta^{(1)} = \beta^{(2)} = \cdots \beta^{(k-)}} \quad \boldsymbol{VS} \quad H_1 : not\ H_0$$

(Http://www.ibm.com/support/knowledgecenter/en/SSLVMB_21)

Likelihood Ratio Test, Wald Chi-Square test and the other related tests are used to test parallel lines assumption (Long, 1997; Agresti, 2002). The proportional odds assumption for all independent predictors considered in this study was tested using the Brant test for parallel regression. The Brant test compares the slope coefficients of (j − 1) binary logit implied by the ordered logistic regression model. It uses a series of Wald Chi-square tests for all predictor variables comparing different levels of profitability.

If the assumption does not hold, interpretations about results will be wrong, therefore in order to find correct results alternative models are used instead of ordinal logit regression models. When parallel line assumption does not hold , Partial Proportional Odds Model (PPOM) can be used which allow the variation of βs for each category ,J, of Y.

2.6.2. Partial proportional odds model

Ordinal models demand the data to adhere to the proportional odds assumption between different profitability levels. The most relevant property of partial proportional odds (PPOM) models is that they allow certain individual independent variables to affect each level of the response variable differently, while other independent predictors adhere to the proportional odds assumption.

Suppose one set of effects X has P_1 parameters that satisfy the parallel lines assumption (that is, they have equal slopes), but the remaining set Z has P_2 parameters that do not and instead require the general model (that is, they have unequal slopes). This model is written as:

$$g(j) = \alpha_j + X'\beta + Z'^{\gamma_j}, j = 1,2, \ldots J$$

It has $(J-1) + P_1 + J - 1)P_2$ parameters and, when used with the cumulative logit link, is called the partial proportional odds model (Peterson and Harrell 1990).

The PPOM model for this study was fitted using **gologit2** program in Stata**.** The marginal effects of the model were used in this study for interpreting the results of the model. The marginal effects estimated for an independent variable, measure how changes in the independent variable affect the dependent variable. The marginal effects of continuous predictors were computed by taking the partial derivative of the expected value of the dependent variable given the predictor [E(Y|X)] with respect to the predictor X. For dummy variables, a difference rather than the derivative was computed.

3. Result and Discussion

In order to fully explore the information obtained from collected data, both descriptive and inferential analysis were used where descriptive analysis was used to fully describe the collected data and inferential analysis was used to give general conclusion about all borrowers including from whom data were not collected. From a total of 461 sample respondents, 431(93.5%) responded to the interview and the remaining 30(6.5%) were unable to respond to the interviews making the response rate of 93.5%.

3.1 Descriptive analysis

ACSI lent money exclusively to women in the study area. This is because women are not only better payers but also their income has a great impact on household and social well being in terms of food security, education and

overall economic level.

As the pie chart below shows out of total respondents who borrowed money from ACSI, 18.33% lost (sold their previous properties to return their loan), 29.47% neither profited nor lost to their previous property and 52.20% gained additional property(profited)

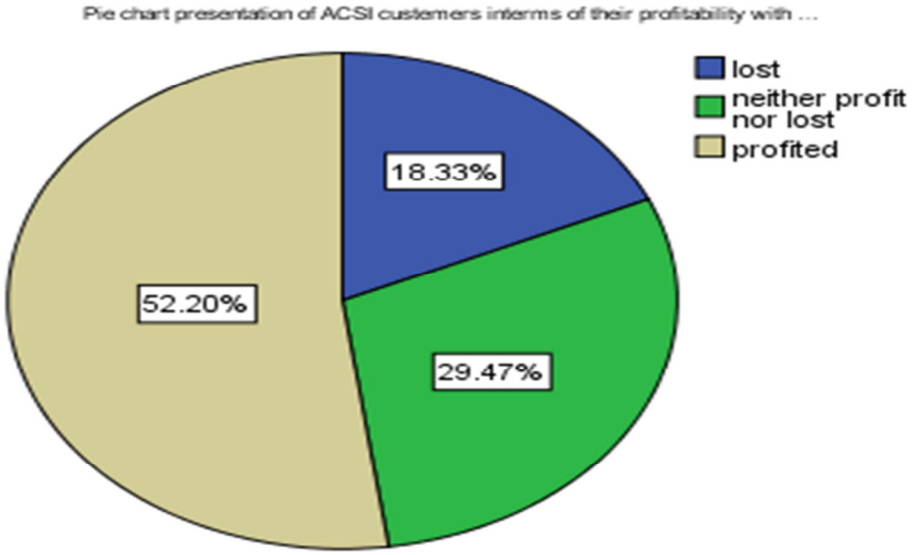

Table 3.1 shows SPSS(version 20) output for age of household, number of educating children, amount of land owned in hectare, family size, number of times borrowed from ACSI and amount of money borrowed measured with interval scale.

Table 3.1. Outcome of descriptive analysis for scale variables.

Descriptive measures	age of household head	number of educating children	Amount of land owned in hectare	Family size	Number of times borrowing from ACSI	Amount of money borrowed
Mean	40.23	2.10	0.9	4.66	3.14	5892.11
Median	39.00	2.00	1.00	5.00	2.00	5500.00
Mode	40	2	1.0	4	2	5000
Std. Deviation	9.575	3.267	2.3487	1.600	2.396	2106.321
Minimum	22	0	.0	1	1	2000
Maximum	77	53	12.0	9	18	12000

From this table, it can be seen that the mean, median and mode of age of customers were 40.23, 39, and 40 respectively implying that most customers were adults. It also shows that mean, median and mode of land size owned by customers are 0.9 ,1 and 1hectare respectively which is inefficient for a family of average size 4.66 . From the table, it can be seen that customers have minimum family size of (single) and maximum family size of 9. Individual(s) borrowed a minimum of once and a maximum of 18 times from ACSI. The average loan amount was Birr 5892.11, Median loan size was Birr 5500 and mode of loan size was 5000. In addition the age of household head, number of educating children and amount of land owned by customers are almost symmetrical.

Table 3.2 below shows status of customers with borrowed money.

From total households interviewed, 105(24.4%) were female headed and 326(75.4%) were male headed. Out of female headed families 22.9% lost the property they had before borrowing money while returning their loan; 32.4 % of them neither profited nor lost property while repaying their loan; and 44.8% of them got additional property(profited) while repaying their loan. Out of male headed families 16.9% lost home property to repay their loan; 28.5% neither lost nor gain while repaying borrowed money and 54.6% were profitable.

Considering educational status of household heads, most of them (62.3%) were unable to read and write and only 3.7% were 9 to 12 grade completed. This shows that the majority of loan takers are illiterate making them unable to know how to manage money they borrowed from ACSI.

The table 3.2 below also shows that majority of borrowers were poor (56.1%) from which 19% lost, 34.3% neither profit nor lost and 46.7% profited with borrowed money. Few of them (4.2%) were rich of whom 16.7% lost, 27.8% neither profit nor lost and 55.6% were profitable which is higher than poor groups.

Table 3.2. Frequency distribution of categorical variables with category of dependent variable

Variable	Category	Status of loan takers with money they borrowed			
		Lost	Neither	profited	Total
sex of household head	Female	24 (22.9%)	34 (32.4%)	47 (44.8%)	105
	Male	55 (16.9%)	93 (28.5%)	178 (54.6%)	326
Educational status for household head	Unable to read and write	45 (16.7%)	91 (33.7%)	134 (49.6%)	270
	1 to 4 grade	24 (20.2%)	24 (20.2%)	71 (59.7%)	119
	5 to 8 grade	6 (23.1%)	8 (30.8%)	12 (46.2%)	26
	9 to 12 grade	3 (20.0%)	4 (26.7%)	8 (53.3%)	16
Marital status of household head	Married	64 (17.8%)	98 (27.3%)	197 (54.9%)	359
	Unmarried	1 (12.5%)	3 (37.5%)	4 (50.0%)	8
	Divorced	9 (20.5%)	15 (34.1%)	20 (45.5%)	44
	Widowed	5 (25.0%)	11 (55.0%)	4 (20.0%)	20
family economic status	Poor	46 (19.0%)	83 (34.3%)	113 (46.7%)	242
	Medium	30 (17.5%)	39 (22.8%)	102 (59.6%)	171
	Rich	3 (16.7%)	5 (27.8%)	10 (55.6%)	18
purpose of money spent	to buy animals	51 (16.4%)	68 (21.9%)	192 (61.7%)	311
	to buy food cereals	2 (66.7%)	1 (33.3%)	0 (0%)	3
	to buy agricultural inputs	13 (14.6%)	48 (53.9%)	28 (31.5%)	89
	to pay previous loan	4 (66.7%)	2 (33.3%)	0 (0%)	6
	to construct home	9 (40.9%)	8 (36.4%)	5 (22.7%)	22
loss of properties within loan period	No	49 (13.8%)	96 (27.0%)	210 (59.2%)	355
	Yes	30 (39.5%)	31 (40.8%	15 (19.7%)	76
amount of property lost within loan period	No loss	50 (14.2%)	95 (27.0%)	207 (58.8%)	
	less than loan amount	8 (18.2%)	26 (59.1%)	10 (22.7%)	
	equal to loan amount	4 (66.7%)	2 (33.3%)	0 (0.0%)	
	Greater than loan amount	17(65.4%)	4 (15.4%)	5 (19.2%)	

From those who bought animals with the money they borrowed,16.4% lost, 21.9% neither profited nor lost and 61.7% profited. Respondents who borrowed money to buy consumable goods, to build their house and to pay their previous loan did not gain any profit. Those who bought animals with borrowed money were more profitable compared to those who spent borrowed money to buy consumable goods, to construct their house and to pay their previous loan.

From the interviewed ACSI clients 17.6% lost property in any case ,such as due to illness, death, natural disasters, within the loan period of which 39.5% sold properties they had before loan to pay back borrowed money; 40.8% neither profited nor lost while repaying money; and only 19.7% gained additional property while repaying money.

3.2 Ordinal logistic Regression Analysis

Ordinal logistic regression analysis is a type logistic regression where the response variable has more than two categories where there is natural ordering in the categories. In other words we can rank the values assigned to each category but real difference between categories is unknown.

Proportional odds model/parallel lines model and generalized ordered logit model/partial proportional odds model were considered for data analysis.

3.2.1 Proportional odds model

The basic assumption towards proportional odds model is parallel lines assumption. Which means each explanatory variable exerts the same effect on each cumulative logit with different intercepts/ cut points.

In order to check the goodness-of-fit of an estimated proportional odds model one should assume that the model contains those variables that should be in the model and have been entered in the correct functional form.

The likelihood ratio test was used to test the goodness of fit of the model by comparing two nested models:- one with no variable called empty (intercept only or a model with no predictor) model and the other with all variables called full model.

Table 3.3 below showed that full model, that is model with all explanatory variables, having AIC=875.9, BIC=82.7 and LL=-383.7 were better than intercept only model having AIC=874.9 ,BIC=883.1 and LL =-435.5). That means a model with smaller value of AIC and BIC and larger log likelihood value is better one.

Table 3.3 Result of Model Fit Statistics for Intercept only (empty) and Full Model

Model	Log likelihood value	AIC	BIC
.Null/Intercept only model	-435.4719	874.9437	883.0759
Full model	-383.7035	805.4071	882.663

From Table 3.3, we can see that -2LL of the full model is -2(-383.7) =767.4 and -2LL0 of the intercept only model is -2(-435.5) =871 giving the difference of the deviances is (871-767.4) =103.6. Since log likelihood ratio test is Chi-square distributed with 17 degrees of freedom,

P(χ2 (17) >103.6)=0.0000, we can reject the null hypothesis of no significant difference between the two models.

Test of Parallel line assumption

Proportional odds model would have been a legitimate model for data analysis if parallel line assumption would not be violated. The null hypothesis is that the effect of all explanatory variables is the same for each category. Table 3.4 below showed output for Brant test of parallel line assumption. The result showed that overall model violates parallel line assumption with $X^2{}_{(17)} = 46.4$ and $p > X^2{}_{(17)} = 46.4 = 0.000$

Table 3.2. Brant Test of Parallel Regression Assumption

Variable	chi2	p>chi2	df
All	46.40	0.000*	17
Grade1 to4	2.76	0.097	1
Grade5 to 8	0.01	0.939	1
Grade 9 to12	0.35	0.552	1
Medium in economy	3.01	0.083	1
Rich in economy	0.23	0.633	1
Money spent to buy agri. inputs	16.99	0.000*	1
Money spent to buy others	1.35	0.246	1
Loss of property	4.80	0.029*	1
Amount of money borrowed	0.27	0.605	1
Frequency of borrowing	2.03	0.154	1
Family size	0.35	0.553	1
Amount of land in hectare	2.28	0.131	1
Nº of educating children	0.78	0.378	1
Sex of household head	1.30	0.255	1
Marital status	0.55	0.457	1
Age of respondent	0.24	0.625	1

A significant test statistic provides evidence that the parallel regression assumption has been violated.

Hence, Parallel lines assumption does not hold even only one variable breaks the assumption. According to table 3.4 money spent to buy agricultural inputs and loss of property broke parallel line assumption, there for null hypothesis of each predictor has the same effect in each response category is rejected.

3.2.2 Partial proportional odds model(PPOM)

PPOM is an alternative model when parallel line assumption of proportional odds model were violated. It is a hybrid of general cumulative logit model and proportional odds cumulative logit model. One set of explanatory variable ,X *with parametr* p satisfies parallel line assumption but the remaining set of explanatory variable Z *with parameter* q that do not instead requires general model. In Stata gologit2 program is used to estimate partial proportional odds model of ordinal outcome variables with independent variables. The output below showed that the Wald test with 23 degree of freedom, $X^2{}_{(23)} = 109.91$ *and* $p = 0.000$,indicating that the full model with all predictor variables provided a better fit than null model with no predictor variables. In addition the Pseudo R^2 = 0.16 showed that there is relationship between profit and explanatory variables.

Goodness of fit indicators, AIC and BIC, measures whether a model with more explanatory variables was a better fit than a model with smaller/none explanatory variables. They were used to compare both nested and non-nested models(Liu, Xing ,2009). Smaller values of AIC and BIC indicated a model is a better fit. Table 3.5 below indicated a full partial proportional odds model with BIC=883.08 and AIC= 874.94 was a better fit as

compared to empty model with BIC=972.42 and AIC=874.94.

Table 3.5. Goodness of fit indicators of the Non-Proportional Odds Model

Model	Log Liklihood value	AIC	BIC
Null model	-435.47	874.94	972.42
Full model	-389.15	842.31	883.08

Partial proportional model was used if some of independent variables held parallel line assumption while some others violated this assumption. STATA allowed us to test this condition with gologit2 command with autofit option. Because of this the following output was obtained. Respondents education level of 1 to 4 grade, medium economic level, money spent to buy agricultural inputs, loss of property in loan period, number of times a respondent borrowed money from ACSI and number of educating children violated parallel line assumption ($p<0.05$) while the remaining held parallel line assumption($p>0.05$). Wald test of parallel line assumption with $X^2_{(11)} = 10.54$ and $p = 0.4823$ indicated the final model satisfied cumulative partial proportional odds model.

Results of PPOM can be seen in the appendix. In this model the parallel line assumption was tested at 5% level of confidence. The response variable is profitability of respondents with the money they took from ACSI. It was orderly categorized as lost=1, neither profit nor lost=2 and profited=3. gologit2 used higher order category (in this case profited) as reference category and the model for PPOM is logit of ($p(y \leq j|X)$. The interpretation was done in terms of odds ratio of each explanatory viable for the given category j comparing with the category greater than j.

According to table 3.6 money spent for other purposes, loss of property within loan period and being single were significantly affecting profitability in the first category as compared to higher categories(lost Vs neither profited nor lost and profited) . More over medium in economy, money spent to buy agricultural inputs, money spent for other purposes, loss of property, frequency of borrowing and single in marriage were significant in the second category (lost and neither profited nor lost Vs profited)

Table 3.6. gologit2 output of coefficients, Standard errors of coefficients, odds ratio and p-values

Profitability	Variables	Coef.	Std. Err.	Odds ratio	Z	P>z
Lost vs Neither prifit nor lost and profited	**Respondents Education level(unable to read and write is reference category)**					
	Grade1to 4	-.461	.314	.630	-1.47	0.142
	Grade 5 to 8	-.603	.425	.547	-1.42	0.156
	Grade 9 to 12	-.758	.563	468	-1.35	0.178
	Household economic level (poor is reference category)					
	Medium	-.082	.290	.920	-0.28	0.777
	Rich	.054	.555	1.055	0.10	0.922
	Purpose of borrowed money spent(to buy animals is reference category)					
	To buy agricultural inputs	.060	.359	1.062	0.17	0.867
	Money spent for others	-1.670	.377	.188	-4.42	0.000**
	Loss of property within loan period(no is reference category)					
	Loss of property (yes)	-1.183	2 .318	.306	-3.72	0.000**
	Amount of money borrowed	.001	.0002	1.000	1.12	0.264
	Frequency of borrowing	-.014	.063	.986	-0.22	0.824
	Family size	-.124	.086	.883	-1.45	0.148
	Amount of land owned in hectare	.056	.058	1.058	0.97	0.332
	Number of educating children	.187	.103	1.205	1.82	0.069
	Sex (female)	-.352	.279	.703	-1.26	0.206
	Marital status(married is reference category)					
	Single	-.768	.405	.464	-1.90	0.048*
	age	-.017	.013	.983	-1.34	0.181
	_cons	.407	.756	30.179	4.51	0.000**
Lost and neither profit nor lost Vs profited	**Neither profit nor lost**					
	Respondents Education level(unable to read and write is reference category)					
	Grade1to 4	.286	.259	1.332	1.10	0.270
	Grade 5 to 8	-.603	.425	.547	-1.42	0.156
	Grade 9 to 12	-.758	.562	.468	-1.35	0.178
	Household economic level (poor is reference category)					
	Medium	.759	.248	2.137	3.06	0.002**
	Rich	.054	.555	1.056	0.10	0.922
	Purpose of borrowed money spent(to buy animals is reference category)					
	To buy agricultural inputs	-1.34	.285	.261	-4.71	0.000**
	Money spent for others	-1.670	.377	.188	-4.42	0.000**
	Loss of property within loan period(no is reference category)					
	Loss of property (yes)	-2.400	.368	.091	-6.52	0.000**
	Amount	.006	.005	1.000	1.12	0.264
	Frequency	.1394	.059	1.149	2.35	0.019*
	Family size	-.124	.086	.883	-1.45	0.148
	Amount of land in hectare	.056	.058	1.058	0.97	0.332
	No of educating children	-.034	.039	.968	-0.82	0.410
	Sex (female)	-.352	.279	.703	-1.26	0.206
	Marital status(married is reference category)					
	Single	-.768	.405	.464	-1.90	.172
	age	-.017	.013	.983	-1.34	0.156
	_cons	1.765	.735	5.847	2.40	0.000*

* significant at 95% confidence level, ** significant at 99% confidence level

Odds ratio less than one indicates negative relationship and odds ratio greater one indicated positive relationship.

When lost was compared to neither profit nor lost and profit, respondents who spent money for other purposes (OR=0.188) were less likely to be profitable as compared to those who bought animals keeping other

variables constant. Holding all other variables constant, loss of property within loan period (OR=0.306) made those who borrowed money to be loser as compared to those did not loss property . A respondent who was single were more subjected to lost comparing with those who were married keeping the effect of other variables constant.

When lost and neither profited nor lost were compared with profited, families with medium economy were about 3 times more likely to profit as compared to poor families with other predictors kept constant. Households who bought agricultural inputs and spent money for other purpose were (OR=0.261 and 0.188 respectively) less likely to be profitable compared with households who bought animals. Compared to households who did not lost property, those who lost were more unlikely(OR=0.091) to profit with borrowed money. When the frequency of borrowing increased by one, the chance of profitability increased by 1.15 times. The risk of losing for a single(unmarried) borrowers was higher (OR=0.464) compared to a respondent who was married.

4. Conclusion and Recommendations

In the study, both descriptive and inferential analysis were employed to extract an important information from data collected from households who borrowed Money in 2015/2016. For descriptive analysis mean, median, mode, percentages and diagrams were used. Proportional odds model was significant but Brant test showed that parallel line assumption was violated. So that Partial proportional odds model was chosen for data analysis.

Out of the total interviewed households nearly half of them (52.2%) were profitable while repaying money. This shows the aim of helping pro-poor to overcome poverty is unlikely to be met within the required speed.

The average land size of customers was 0.9 hectare with mode and median of 1 showing that most customers were those who had no sufficient amount of ploughing land. This could make customers to buy consumable goods rather than spending money on assets that can generate extra incomes.

Out of female headed families(24.4%) only 44.8% were profitable when they repaid money and 52.6% of male headed families were profitable implying that female customers were less profitable compared to males. More than half of interviewed customers (62.3%) were unable to read and write. This could make most ACSI clients unable to know how to manage borrowed money properly. In terms of household's economic status, most borrowers (56.1%) were poor, off which only 46.7% of them were profitable showing that the goal of eradicating poverty of poor of poor might not be achieved as required.

Even though economically rich customers were few in number, most of them (55.6%) were profitable that could be the case that rich borrowers spent money for profitable areas not to subsidize their home expenditure. From interviewed individuals, those who spent the money to buy animals were more profitable(61.7%) compared to others who spent money to agricultural inputs and any other. From those who lost property in any case in the loan period, only few of them (19.7%) were profitable which could be expected.

Money spent other than buying animals and agricultural inputs, lost of home property within loan period, being single in marriage, being medium in economic status, and frequency of borrowing significantly affect profitability.

Respondents who bought things other than animals and agricultural products were more probable to lose their previous home property while paying back loan. Those who lost property within loan period were unlikely to get profit with borrowed money compared to who did not lost. A respondent who was single in marriage was more likely to lose home property compared to married respondent. The reason could be when being single only a single idea exists and social and economic burden might be high.

Being medium in economic level was an advantage to be profitable with borrowed money compared to being poor in economy. This might be due to the fact that medium households were eager to get more wealth and properly spent the money. But poor households might spent the money to subsidize their basic needs but not spent money in area that could add value. In addition spending money to buy other things(for food cereal, home construction, to pay previous loan) made customers to lose from their previous property while repaying as compared to those who bought animals. Clients who borrowed money more frequently were profitable than might be someone could be successful with many trials.

Finally the following recommendations were given. Amhara credit and saving institution should consider the following while giving and after giving loan to rural people.

- Special attention should be given on educating or teaching customers until they read and write in collaboration with education office .
- Continuous follow up should be done in what way customers spent their borrowed money and they must be strongly advised to buy animals.
- Poor and unmarried female loan takers are more likely not to be profitable, so special follow up should be given to them to achieve the institutional goal.
- Extra year should be given for those who lost any home property within loan period to pay back their loan .

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