

Impact of Amhara Credit and Saving Institution on Asset Holdings of Households: The Case of Woldiadistrict, North Wollo Zone, Ethiopia

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Abstract

In this study impact of Amhara Credit and Saving Institution on asset holdings of households in Woldia District of Amhara Region was evaluated. Cross-sectional survey data collected from 200 households were used for the study. The survey respondents were drawn from both program and non-program participants in the area of Woldia district. The data were analyzed using descriptive and econometric analysis. Applying a propensity score matching technique, the study found that the program has increased participating households' physical asset holdings by 44.02% compared to non-participant households and livestock asset holdings by 4.17% as compared to non participant households. However, the impact of the program was not uniform across the participating households. The estimated results revealed that households who are female-headed, who had large cultivated land size, had access to extension services and had better education level were more likely to gain more from the program, *ceteris paribus*. On the other hand age of household head, distance from the credit source, distance from the nearest market, dependency ratio and respondents perception to group collateral are affect negatively to gain more from the program. In this work the results are discussed in detail and their implications are drawn for intervention based on the findings. The local government should increase extension services, improve land productivity, increase adult learning in the woreda, locate credit centers in each kebeles and facilitate individual borrowing mechanisms. In general, more research may be required to be carried out to assess the impact of microfinance services at macro level to examine the welfare improvement potential of microfinance which is the major concern of the policy makers in the country.

Keywords: Amhara Credit and Saving Institution Program, Asset, Impact, logit model Propensity Score Matching, Ethiopia.

1. INTRODUCTION

In Ethiopia, urban and rural centers which are characterized by lack of adequate employment opportunities, inadequate income, social and political instability etc, are the government's priority intervention areas in the poverty reduction.

In cognizant of these problems, the government of Ethiopia launched a different strategies to reduce poverty which are Agricultural Development Led Industrialization (ADLI) in 1993, Accelerated and Sustainable Development Program (PASDEP) and Growth and Transformation Plan (GTP) that sets out agriculture as a primary stimulus to generate increased output, employment and income for the people, and as the spring board for the development of the other sectors of the economy (World Bank, 2013). All of the strategies documents emphasize, among other things, microfinance as a good entry point in achieving development objectives as well as curbing the dangerous trend in poverty and meeting the Millennium Development Goals (Gobezie, 2008).

The main objective of almost all microfinance institutions in Ethiopia is to deliver financial services to the poor. Microfinance became one of the important tools of reaching the poor who had very limited access to the formal financial sector. The provision of financial services to the poor has increased through microfinance institutions in a short period of time in Ethiopia (Wolday, 2003). However, Ethiopian microfinance institutions are faced with many problems.

The effect of microfinance in Ethiopia is a subject worthy of serious examination for a number of reasons. Since the inception of MFIs in Ethiopia their activities have grown significantly from time to time. According to Association of Ethiopia Microfinance Institutions Network (AEMFI, 2010) there are about 30 regulated MFIs in Ethiopia. These MFIs together served over 2.4 million clients. Once the activities of ACSI MFIs have started to operate, there is then the need to assess its impact on treatment household asset. The relationship between microfinance and its ability to improve asset is still in question and this study tries to provide further empirical evidence on improving asset of participating household.

However, different scholars have been in increasing doubt whether the desired results have been achieved (Hulme *et al*, 2000). The doubts called for impact assessment studies, and as a result, a number of such researches have been conducted in Ethiopia where the majority of the society is poor and MF programs are being carried out. The objectives of most of these studies were to assess the impacts of having access to MF services on incomes and their sources, standards of living, better health and children's education as well as better self-image and decision making power as a direct result of the loans. These studies, however, reported mixed results

like little positive changes in alleviating poverty, accumulation of increased working capital by the poor, increased investment in fixed assets, self-employment, and more incomes, and increased debt liability (Abebe *et al.*, 2006).

MF impact assessment studies have been undertaken at different levels such as individual, household, institutional and community levels in Ethiopia. For instance, the conventional evaluation of performance of microfinance institutions (MFIs) with emphasis on financial sustainability and outreach give overriding emphasis to financial criteria. This conventional wisdom states that clients will automatically follow if the services of MFIs are available, and high rates of repayment and repeated borrowing can be taken as proxies of client satisfaction and are indicators of positive valued service (Cohen and Sebstad, 1999). This approach suggests that financial performance indicators are sufficient to show whether or not the MFIs are doing a good job, arguing that if clients are willing to pay for service, it can, then, be assumed that they are happy to pay for the services because they are doing them good. This point of view states that market is the indicator of the impact.

In line of these problems, some of the studies focus on few numbers of MFI with in very small areas and produce hard-to-generalize and to draw statistical conclusion on a wider perspective on the impact of MFIs on asset, income and expenditures of their clients. More importantly, in the Amhara Region, particularly North Wollo zone, Woldia district where this study was conducted, studies are insufficient and particularly no study has been conducted to assess the impact of ACSI intervention on the asset of the member households simultaneously. Thus, the aim of this study is to draw out the linkages with ACSI and increment in the asset holdings existing relevant concepts and also to fill the gap. To this end, this study strives to provide empirical evidences on impacts of ACSI service on the assets of the households in the respective study areas using counterfactual data.

1.2. Objectives of the Study

The general objective of this study is to assess the asset impact of Micro finance institution in North Wollo Zone, Woldia district.

Specific objectives of the study are:

- To identify factors that determines participation of households in microfinance
- To measure the impact of amhara credit and saving institution (ACSI) on asset holdings of household

2. LITERATURE REVIEW

Impact of microfinance examines two sets of indicators– economic and social indicators at different levels. Economic indicators are normally measurements for microfinance impact as assets holdings. Social indicators are used to measure the impact of microfinance which became popular in the early 1980s as educational status, access to expenditure on health services, nutritional levels, anthropometric measures and contraceptive use (Hulme, 2000). Despite the variation in the methods used and the results of studies conducted in various countries, the main impact of microfinance are on change in income, expenditure, assets, educational status, and expenditure on health as well as gender empowerment.

Microfinance is a form of financial development that has primarily focused on alleviating poverty through providing financial services to the poor. Most people think of microfinance as being about micro-credit i.e. lending small amounts of money to the poor. Microfinance is not only this, but it has also a broader perspective which also includes insurance, transactional services, and importantly, savings (Barr, 2005).

Different definitions have been given to impact assessment by different organizations and scholars. But the commonly used definition of impact assessment as it is given by Rover and Dixon (2007), is that it is a process of systematic and objective identification of the short and long-term effects–positive and negative, direct or indirect effect of intervention on economic, social, institutional and environmental dimensions. . Such effects may be anticipated or unanticipated, and positive or negative, at the level of the individual, household or the organization caused by on-going or completed development activities such as a project or program.

3. METHODOLOGY

The study was conducted in North Wollo zone, Woldia district. Woldia is found at distance of 520km from Addis Ababa and 360 km from the regional capital Bahir Dare. Woldia district has a total population of 56413, of whom 28067(49.75%) are men and 329,183(50.25%) women; with an area of 81.13 square kilometer (Woldia Town Administration, 2013).

The main crops grown in the study area are cereals (maize, sorghum, *teff* and wheat), pulses (peas and bean), fruits (banana, papaya, orange and mango) , and rice is new technology introduced in the area. The main livestock species reared in the zone are cattle, sheep, goats and poultry (WoldiaTown Administration, 2013).

3.1 Sampling Technique and Sample Size

A three stage sampling technique/procedure was adopted to generate a primary data in the district. In the fourth stage, 100 beneficiaries and 100 non beneficiaries were sampled from each stratum randomly and proportionately to obtain a total of 200 representative samples. The sample size is determined by looking different researches which took 200 and around 200 samples households by personal judgment to conduct impact assessment (Haftomat *et al*, 2011, Endale Difa, 2000, Yibeltal Fentie, 2008).

Table 1 Sample kebeles and sample respondents

No	sample kebel	Participant HHs in ACSI only			Non participant HHs			Total samples
		Total No of participants	sample	%	total No of Non participants	sample	%	
1	GollaMechare	105	32	32	1150	32	32	65
2	Jeneto Ber	122	37	37	1200	32	32	67
3	Aden Gure	103	31	31	1300	36	36	68
	Total	330	100	100	3650	100	100	200

3.2. Methods of Data Analysis

The data were analyzed using both descriptive and inferential statistical tools and econometric model. Descriptive statistics used to describe the socio-economic and demographic characteristics of the beneficiaries. Propensity score matching (PSM) used in this study. Since Propensity score matching method is a commonly used non-experimental approach and the method helps to control pre-intervention difference on the covariates in order to minimize the selection bias of the sample beneficiaries.

Model specification: For the purpose of examining the effect of treatment variable on the outcome variables propensity score matching model is used. In line with PSM, the binary logit is used to examine the probability of

micro credit participation and specified as;
$$P_i = \frac{e^{Z_i}}{1 + e^{Z_i}}$$

Where, P_i - is the probability of participation in the micro credit.

The average treatment effect on treated would be, $ATT = E(Y_{1i} | D = 1) - E(Y_{0i} | D = 0)$

$= E(Y_{1i} - Y_{0i} | D = 1) + E(Y_{0i} | D = 1) - E(Y_{0i} | D = 0)$

The PSM in this study employed four methods of matching techniques, namely, nearest neighbor, kernel, radius, and interval matching.

Both qualitative and quantitative methods of analysis were employed to generate the necessary information to meet the objectives of the study. STATA software was used to analyze the data.

Outcome and dependent variables: The outcome variable in this study is household asset holdings (physical asset and livestock asset) of the sample households.

Table 2: Definition of hypothesized explanatory variables included in the model

Variable	Type	Definition	Expected sign
Dependent			
Client	Dummy	Client of ACSI	1 if client, otherwise 0
Explanatory variable			
SEX	Dummy	Sex of the household head	+/-
EDUHH	Categorical	Education of the HH head	+
FSHH	Continuous	Total members in the HH	+
CLS	Continuous	Land owned and cultivated	+
RPGC	Dummy	Respondents perception on group collateral	-
FXS	Dummy	Extension service	+
AGE	Continuous	Age of HH head	+
ASN	Dummy	Access to social network	+
MSHH	Dummy	Marital status of HH	-
DRHH	Continuous	Age of member[<15 and >64]/ family size	-/+
DCR	Continuous	Distance from credit source	-
DMKT	Continuous	Distance from market	-
OCHH	Categorical	Occupation of HH	-
Outcome variables			
TAHHY	Continuous	Total income of household	Ethiopian birr
HHAH	Continuous	Different asset change into birr	Ethiopian birr
TEXPHH	Continuous	Different expenditure change in to birr	Ethiopian birr

Source: own definition, 2015

4. RESULT AND DISCUSSION

This chapter presents the findings of impact of microfinance on household asset holdings after participating in microfinance services using both descriptive and econometric analyses.

4.1. Descriptive results

Table 3: Descriptive statistics of the sample households characteristics for dummy variables

Variables	HHTP	Treatment		Control		Total		χ^2 – value
		Frequency	%	Frequency	%	Frequency	%	
Sex								
Male		57	57	70	70	127	63.5	3.6458*
Female		43	43	30	30	73	36.5	
Total		100	100	100	100	200	100	
Marital status								
Married		64	64	68	68	132	66	0.3565
Single		36	36	32	32	68	34	
Total		100	100	100	100	200	100	
Educational level								
Literate		22	22	46	46	68	34	24.3949***
Primary (1-4)		35	35	29	29	64	32	
Secondary (5-8)		23	23	15	15	38	19	
High school(9-12)		16	16	8	8	24	12	
Above grade 12		4	4	2	2	6	3	
Total		100	100	100	100	200	100	
Respondents perception to group collateral								
Yes		76	76	86	86	162	81	3.2489**
No		24	24	14	14	38	19	
Total		100	100	100	100	200	100	
Assess to social network								
Yes		90	90	88	88	178	89	0.2043
No		10	10	12	12	22	11	
Total		100	100	100	100	200	100	
Occupation								
Petty trader		17	17	14	14	31	15.5	2.1985
Farmer		76	76	83	83	159	79.5	
Casual laborer		7	7	3	3	10	5	
Total		100	100	100	100	200	100	

Source: own results, 2015

***, ** and * means significant at 1% and 10% probability level respectively

The statistical analysis showed that there was statistically significant difference in the sex of the household head between treatment and control client household heads at 10% of level of probability and being a male household head affects negatively. Educational level of respondents has statistically significant and positive influences on participation in microfinance services at 1% probability level. The sample result showed that respondent's perception towards group lending is statistically significant at 10% probability level and it has negative effect (Table 3).

Table 4: Descriptivestatistics of the samplehouseholds“characteristics for continues variables

Variables	Treatment HH		Control HH		Total		t-value
	Mean	SD	Mean	SD	Mean	SD	
AGE	37.26	10.147	40.6	11.8398	38.93	11.125	2.142**
Family size	3.69	1.6859	3.9	1.6605	3.795	1.672	0.8874
Dependency ratio	0.79688	0.88522	1.089	0.942416	0.942	0.9429	2.2599**
Cultivated land size	0.973	0.4532	0.657	0.3579	0.815	0.437	-5.4714***
Distance from credit source	5.06	0.7544	5.47	0.91513	5.265	0.8796	3.3814***
Frequency of extension service	6.32	1.8956	5.5	1.235	5.91	1.6478	3.6244***
Distance from market	5.6725	1.59967	6.0625	1.71718	5.86751	1.6668	1.6618**

Source: own results, 2015

*, **and *** means significant at 10% and 5% and 1% probability level respectively.

In table 4 statistical analyses revealed that there is a significant difference in the mean age of the household head between treated clients and control clients at 5 percent probability level of significant. Dependency ratio is statistically significant at 5 percent probability level influencing participation in microfinance. As the sample result revealed that cultivated land size was influencing participating in micro finance institution positively and significant 1 percent probability level. The result showed that there is a significant difference between treatment clients and control clients in distance from the credit source. It was statistically significance at 1% probability level (Table 4). The sample result showed that extension service is statistically significant at 1% probability level .The result of the sample houses showed that there is a significant difference between treatment clients and control clients in distance from the market. It was statistically significance at 5% probability level.

4.2. Effect of microfinance on respondent’s livestock holdings

The sample result showed that the average livestock holding was 2.298TLU with standard deviation of 1.696 for participant households and 1.985 in TLU with the standard deviation of 1.499 non participant households. The t-test also showed that this difference was statistically significant at 10 percent level of probability (t= 1.38). The participant households, as a result of ACSI intervention, have increased their livestock holdings. Thus, the program enables them to protect (increase) their livestock holdings.

4.3. Descriptive results of the outcome variable

Table 5: Mean income, expenditure and assets possession per adult equivalent in birr

Variables	Combined Mean	participant Households	Non-participants Households	Mean Difference	T-test
Physical asset	40763.92	52550.74	28977.10	23573.64	1.8343**
Livestock asset	7677.25	8343.515	7010.985	1332.53	1.3988*

Source: Own estimation result (2010)

***, **, * means significant at 1%, 5% and 10% probability levels, respectively

Amhara credit and saving institution (ACSI) has 5 percent significant effect on physical asset holdings of households and also it has 10 percent significant effect on livestock asset holdings.

4.4. Econometric Results

This part describes the whole process of deriving the impact of microfinance on household asset holdings. It explains the estimation of propensity scores, matching methods, common support region, balancing test and sensitivity analysis. It also explains the treatment effect of the intervention across the participating households.

Table 6 Factors affecting households participation in ACSI program

Variables	Coefficients	Standard errors
Sex of household head	-0.76**	0.41
Age of household head	-0.02	0.02
Education level		
Primary (1-4)	0.84*	0.43
Secondary (5-8)	0.97*	0.54
High school (9-12)	1.27**	0.44
Above 12	1.13	1.22
Family size	0.13	0.14
Dependency ratio	-0.34	0.25
Cultivated land size	1.90***	0.47
Respondents perception on group collateral	-0.40	0.50
Frequency of extension service	0.34***	0.11
Assess to social net work	0.39	0.59
Marital status of household head	0.56	0.47
Distance from credit center	-0.49**	0.21
Distance from market	-0.15	0.11
Occupation of household head	-0.15	0.38
Farmer	-0.59	0.47
Casual laborer	0.55	0.92
	0.22	1.86
Constant		
N	200	
LRchi2 (13)	69.45	
Prob >chi2	0.00	
Log likelihood	-103.9	
Pseudo R ²	0.25	

Source :model result, 2015

***, ** and * means significant at the 1%, 5% and 10% probability levels, respectively.

The estimated logistic regression model indicated that program participation was significantly influenced by six of the thirteen explanatory variables used in the propensity score estimation model. These include sex, age, education, cultivated land size, frequency of extension service, and distance from credit center (source). Of these six variables, three had negative signs and the remaining three had positive signs. Age and sex of household head had a negative effect on household ACSI participation and was significant at 10% probability level. Likewise, distance from credit center (source) had negative effect and was significant at 5% probability level. Frequency of extension service and cultivated land size had a strong positive effect on household ACSI participation, and were significant at 1% probability level. On the other hand, education level had a positive effect on households ACSI participation and was statistically significant at 5% probability level (Table 6).

4.5. Matching participant and comparison households

The estimated propensity scores vary between 0.1048 and 0.98 (mean =0.6545) for program or treatment households and between 0.02182and 0.944 (mean = 0.3455) for non program (control) households. The common support region would then lie between 0.1048 and 0.944. In other words, households whose estimated propensity scores are less than 0.1048 and larger than 0.944 are not considered for the matching exercise. As a result of this restriction, 16 households (7 participants and 9 control households) were discarded from the analysis.

4.6. Choice of matching algorithm

A matching estimator which balances all explanatory variables (i.e., results in insignificant mean differences between the two groups), bears a low R² value and results in large matched sample size is preferable. As such, in what follows estimation results and discussion are the direct outcomes of the kernel matching algorithm based on a band width of 0.1. Kernel matching associates the outcome of the treated household with the matched outcome that is given by a kernel-weighted average of all control groups improvement in household's asset holdings. Since the weighted averages of all microfinance interventions in the control group are used to construct the counterfactual outcome, kernel matching has an advantage of lower variance because more information is used (Heckman *et al.*, 1998).

Table 7 Performance of different matching estimator

Matching estimator	Performance criteria		
	Balancing test	Pseudo R ²	Matched sample size
Kernel matching			
Band width 0.01	12	0.047	135
Band width 0.1	13	0.022	184
Band width 0.25	13	0.025	184
Band width 0.5	10	0.055	184
Calipers			
0.01	11	0.075	135
0.1	11	0.071	184
0.25	11	0.071	184
0.5	11	0.071	184
Radius calipers			
0.01	12	0.045	135
0.1	13	0.023	184
0.25	12	0.031	184
0.5	10	0.096	184
Nearest neighbor matching			
NN(1)	11	0.071	135
NN(2)	12	0.047	184
NN(3)	12	0.034	184
NN(4)	12	0.034	184
NN(5)	12	0.031	184

Source: own calculation result, 2015

* Number of explanatory variables with no statistically significant mean differences between the matched groups of program and non-program households.

4.7. Testing the balance of propensity score and covariates

The mean standardized bias before and after matching are shown in the fifth columns of Table 9, while column six reports the total bias reduction obtained by the matching procedure. In the present matching models, the standardized difference in X before matching is in the range of 0.12% and 183% in absolute value. After matching, the remaining standardized difference of X for almost all covariates lies between 0% and 19.1% in absolute value, which is below the critical level of 20% suggested by Rosenbaum and Rubin (1985). In all cases, it is evident that sample differences in the unmatched data significantly exceed those in the samples of matched cases. The process of matching thus creates a high degree of covariate balance between the treatment and control samples that are ready to use in the estimation procedure. Similarly, t-values in Tables show that before matching half of chosen variables exhibited statistically significant differences while after matching all of the covariates are balanced.

Table 8 Propensity score and covariate balancing

Variable	Sample	Mean		Standardized Bias %	Reduction Bias %	Test	
		Treated	Control			T	p>t
SEX	Unmatched	0.57	0.7	0.84		1.92**	0.03
	Matched	0.58	0.58	0.00	100	0.00	0.998
AGE	Unmatched	37.26	40.6	183.5		2.14**	0.02
	Matched	37.39	36.13	11.5	91.55	0.82	0.411
EDUHH	Unmatched	2.45	1.91	52.27		-3.5***	0.00
	Matched	2.40	2.25	14.2	72.83	0.95	0.346
FSHH	Unmatched	3.69	3.9	16.24		0.88	0.18
	Matched	3.73	3.73	0.1	99.4	-0.01	0.991
DRHH	Unmatched	0.79	1.08	29.88		2.26**	0.01
	Matched	0.81	0.80	2.0	93.3	0.15	0.877
CLS	Unmatched	0.97	0.66	49.62		-5.47***	0.000
	Matched	0.91	0.96	11.2	75.4	-0.76	0.449
RPGC	Unmatched	0.76	0.86	0.12		-1.81**	0.04
	Matched	0.86	0.86	0.2	66.67	0.01	0.991
FXS	Unmatched	6.32	5.5	73.52		-3.62***	0.00
	Matched	6.24	5.99	11.1	85.23	1.05	0.296
ASN	Unmatched	0.9	0.88	37.68		-0.45	0.33
	Matched	0.89	0.95	10.1	73.2	-1.53	0.128
MSHH	Unmatched	0.64	0.68	3.47		0.59	0.28
	Matched	0.65	0.65	2.0	42.36	-0.14	0.892
DCR	Unmatched	5.06	5.47	44.37		3.38***	0.00
	Matched	5.07	5.11	5.0	88.73	-0.33	0.745
DMKT	Unmatched	5.67	6.06	53.76		1.66*	0.05
	Matched	5.75	5.83	4.9	90.88	-0.35	0.728
OCHH	Unmatched	1.9	1.89	1.5		-0.56	0.44
	Matched	1.88	1.90	4.0	166.66	-0.27	0.791

***, ** and * means significance at 1%, 5% and 10% probability level respectively.

Source: own survey result, 2015

Table 9 Chi-square test for the joint significance of variables

Sample	Pseudo R^2	Mean bias	R Chi^2	p> Chi^2
Unmatched	0.25	42.06	69.45	0.00
Matched	0.022	5.09	5.18	0.96

Source: Own survey result, 2015

All of the above tests suggest that the matching algorithm we have chosen is relatively best with the data we have at hand. Thus, we can proceed to estimate ATT for households.

4.8. Estimation treatment effect on the treated

In order to attain the stated objectives, the following impact indicators of the treatment effect have been performed using the already mentioned PSM model and found that physical asset holdings of household per equivalent is significant at 10% probability level.

Table 10 ATT for outcome variables due to intervention

Outcome variables	Treated	Control	Difference	SE	t-value
Physical asset per adult equivalent	53554.65	29979.97	23574.68	15579.39	1.51*
Livestock per adult equivalent	8297.54	7951.44	346.12	2300.38	0.15

The bootstrapped SE is obtained after 100 replication

* Significant at 10% probability level

Source : Own survey result.2015

4.9. Testing Sensitivity to the Specification

5	phasetperAE	P<0.000	P<0.000	P<0.000	P<0.000	P<0.000	1.1e-16	4.4e-15	7.1e-14	7.2e-13
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Source: Own estimation, 2015

e^{γ} (Gamma)=log odds of differential due to unobserved factors where Wilcoxon significance level for each significant outcome variable is calculated.

The result showed that the inference for the effect of the ACSI interventions is not changing though the participants and non-participant households has been allowed to differ in their odds of being treated up to 100% (2) in terms of unobserved covariates. That means for all outcome variables estimated, at various level of critical value of e^{γ} , the p- critical values are significant which further indicate that we have considered important covariates that affected both participation and outcome variables. We couldn't get the critical value e^{γ} where the estimated ATT is questioned even if we have set largely up to 2, which is the value set in different literatures which is usually .Thus, we can conclude that our impact estimates (ATT) are insensitive to unobserved selection bias and are a pure effect of microfinance interventions by ACSI project.

5. CONCLUSIONS AND RECOMMENDATIONS

In general it can be concluded that, the empirical result reveals that participation on Amhara Credit and Saving Institution services has statistically significant and positive impact on household physical asset holdings per adult equivalent.

In general, government authorities, NGOs, aid agencies and other stakeholders who are concerned with microfinance as a means to poverty reduction should take in to consideration the results of these indicator variables for better promotion of microfinance in general and microcredit in particular and more research may be required to be carried out to assess the impact of microfinance services at macro level to examine the welfare improvement potential of microfinance which is the major concern of the policy makers in the country.

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