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Analysing the Impact of Credit on Rural Households' Income in the Case of Cheliya District, West Shoa Zone, Oromia National Regional State, Ethiopia

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Abstract

Microfinance is one of the most powerful tools that contribute to the livelihoods of many people through provision of financial and supporting services to the poor. In light of the problems and the research gaps identified, this study seeks to address and generate information on the impact of microfinance services on rural households' total annual income. The study was conducted in Cheliya District, Oromia Regional State. A total of 188 sample households were selected through stratified and simple random sampling techniques and interviewed using a structured questionnaire to elicit data pertaining participation in microfinance services and income as well during the year 2017. A propensity score matching model was used to estimate the impact of the microfinance on the rural clients' income. Accordingly, the outcome of the propensity score matching estimation indicated that the mean yearly income of participants was greater than that of non-participants. The rosenbaum bounds test also implies that the estimated impact result was not affected by unobserved characteristics. Based on finding result it is suggested that the microfinance institutions and other concerning bodies should work more on increasing rural households' participation in microfinance services to improve the income of participant households in the area.

Keywords: Microfinance; Impact; Income; Cheliya; Ethiopia

Introduction

Access to credit can help rural poor economy through increasing the ability of households to meet their financial needs such as the purchase and use of improved agricultural inputs which are not available from the farm. Further, access to rural credit may increase the households' ability to adopt modern agricultural technologies that increase the income of the small farm holders and breaks poverty cycle [1].

In developing countries microfinance, like Ethiopia, microfinance institutions have been emerged as a financial institution with an aim of providing small sized financial service to the poor who were in need of financial services but lack of access to formal commercial banks. The microfinance institutions services include; provision of small size of loans, saving, insurance services, money transfer and other relevant services to the target poor people who were excluded by conventional commercial banks due to lack of collateral requirements [2].

In Ethiopia, many microfinance institutions have been introduced and have been working in order to solve the credit access problems of the poor specially to those participating in the small business. Nowadays, the government plan to provide credit through establishing microcredit institution in different part of the country [3]. Moreover, the microfinance services are considered as an intervention instruments that government and non-government sectors are using to enable low income groups of both rural and urban communities to improve their lives through increasing income, increase their productivity levels, enhance the ability of providing quality inputs to the market, reducing poverty and ensuring food security [4,5].

Similarly, microfinance improves agricultural productivity by adopting productivity enhancing methods and inputs thus increasing yields per hectare. Therefore, financial resources used for investment purposes increase production and income for the household and positively contributing to the local economy [6].

Currently, there are three microfinance institutions operating in Cheliya district. These are Oromia credit and saving Share Company, Wasasa and Eshet Micro Finance Institutions. Among these institutions, the Oromia Credit and Saving Share Company is the major provider of agricultural credit and saving service for the rural population in the study area [7]. Though Microfinance institutions are decisive way outs from poverty particularly for both rural and urban poor society, yet a large number of the rural people did not access to financial services in Ethiopia [8].

Empirical Studies

Many studies in different disciplines used different approaches to assess impact. George used PSM in order to assess the effect of microfinance among smallholder farmers in Africa [9]. The main objective here was to assess whether households with credit are better off compared to those without. Results revealed that participation in microfinance credit improves household productive incomes by a range of between USA $200 to USA$ 260 in a single production period. Laura and Gloria, impact assessment on conditional cash transfer programs using propensity score matching method in Colombia, Mexico, and Nicaragua showed that the program is an effective means for promoting human capital accumulation among poor households [10]. In particular, they indicated clearly that the program is successes

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in increasing school enrolment rates, improving preventive health care, and raising household consumption.

Fitsum and Holden indicated that households' participation in microfinance services has brought positive change in per capita consumption expenditure but not statistically significant [11]. The impact on off-farm income and children's education was statistically significant positive change. However, livestock holding is negatively correlated with participation in the microfinance.

The study that was under taken by Asmelash showed that the total annual income of both rural and urban borrowers was increased than non-borrower households in the study area [12]. His finding result also implies that Dedebit Credit and Saving Institute has positive impact on income diversification, possessing better house, increasing asset and improving ability to pay educational and medical expense of participant than non-participant households. Likewise, Feleke analysed the impact of microfinance services on the income of urban households in Digaf Microfinance institution in Gullele sub city [13]. The study concluded that treatment households show higher income improvement than control clients.

Firafis in his study revealed that loan repayment performance of the borrowers and the screening technique which the institution follows to ration loan to its clients were found to be sound. Moreover, the result of the finding showed that credit scheme has contributed positively in terms of improving the incomes, access to education, access to health facilities and nutritional status of the borrowers [14]. The study by Melese indicated the positive impact of the microfinance on the improvement of household income, consumption, employment opportunities, saving, access to education and medical facilities of program participants [3]. Further, the result of the study indicated that the OCSSCO's micro financing scheme has had positive effect on improving the living standards of its clients using the outcome variables such as income, nutritional status, access to education, medical facilities, saving and employment opportunities [7].

On the other hand, the study done by Taye indicate that the micro financing program has a positive effect on women's economic empowerment as measured by the increased involvement of women in household decision making [15]. Moreover, analysis result indicated that access to Microfinance has encouraged the economic empowerment of women in terms of improving their business activities and the status of women at family and country level. Similarly, the study under taken by Yilkal on impact of microcredit programs on female headed households in Jimma Zone showed that more educated households, large land holders and higher income earners participation in microcredit program was low [16]. The study concluded that as a result of microfinance program participation, the annual expenditure of female headed households was increased.

Even though there have been many studies conducted concerning the impact of microfinance at the country level, a high proportion of them have been focusing on contributions to children's education, improving health outcomes for women and children, poverty reduction and empowering women by participation in microfinance services. Moreover, these studies have compared microfinance beneficiaries against non-beneficiaries on outcome variables of interest using descriptive statistics and observable characteristics without addressing the key methodological issues such as selectivity bias and sensitivity analysis. Further, these studies didn't address impact of microfinance on income in rural areas where majority of the people rural households based subsistence farming system.

Importantly, in Cheliya district where this study was conducted, some studies have been conducted related to microfinance institutions in the area. For example, studied on the financial and operational performance of microfinance institutions by using simple descriptive analysis [17]. Moreover, this study focused on factors affecting financial performance of microfinance institutions in the study area. However, the study did not say anything about the effect of microfinance services on rural households' income in the study area.

Another study conducted by Birhanu on the role of microfinance institutions in reduction of unemployment in the study area [4]. This study particular focused on youths' participation in microfinance services by analyzing factors affecting youths' participation in microfinance institutions. His finding result showed that microfinance institutions reduced unemployment by providing loan and saving service. However, this study did not show the impact of microfinance credit on its clients' income. Moreover, in Cheliya district study, there was no observed evidence that shows whether the incomes of rural households those participated in microfinance services were improved or not. This motivated the researcher to conduct a study on the impact of microfinance credit on rural households' income in case of Cheliya District, West Shoa Zone, Oromia National Regional State, Ethiopia.

Research Methods

Description of the study area

From below Figure 1 the study was conducted at Chelliya District, West Shewa Zone, Oromia National Regional State. The capital of the District, Gedo town is located at 175 km West of Addis Ababa on the main road to Nekemte. The District has 20 *kebeles* of which 18 are rural and 2 urbans. The boundaries of the district adjoin MidaKegn District in the north, Jibat and Dano District in the south, Liban Jawi District in the east and Ilu Gelan and Jimma Rare District in the west. The total population of the District was estimated to be 104,448 of which 52,481 are males and 51,967 are females. Among these, about 89,523 are living in the rural areas and about 14,925 are urban residents [18].

Types, sources and methods of data collection

This study was conducted based on cross-sectional data obtained from both primary and secondary sources. Primary data was collected through face-to-face personal *interviews* using structured questionnaire. Focus group discussion and key informants' interview were also conducted to collect sufficient information and to capture relevant data of beneficiaries. The focus group discussion was conducted with clients of microfinance institutions. A total of five focus group discussions involving 7 to 10 members in each group were used. Key informants were also contacted with the staff members of microfinance institutions so as to get information about how the institution was operating in the area and about the opinion of the people towards the program intervention. On the other hand, secondary data was collected from secondary sources such as review of books, journal articles, unpublished study documents and other official reports of relevant quality, and internet sources.

Sampling technique and sample size

From Table 1 Cheliya District was selected purposively because of insufficient studies on the impact of microfinance service on rural households' income in the study area. For this study, both simple random and stratified probability sampling techniques were employed to select sample of respondent households. First, among eighteen rural *Kebeles* of the district, six rural *kebeles* were selected, using

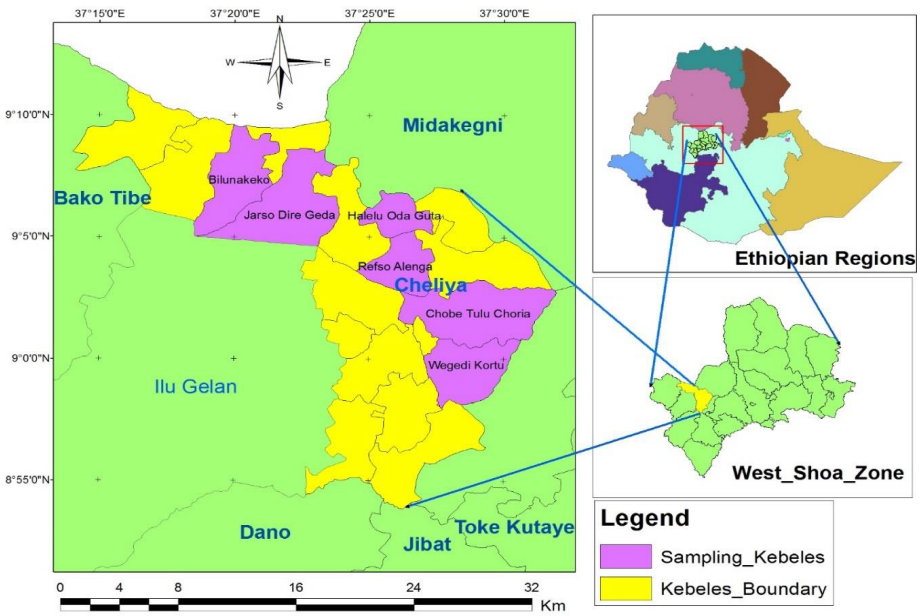

Figure 1: Map of the Cheliya district [18].

Rural Kebeles	Participant		Non-participant		Total
	Households	N	Households	N	N
Jarso Dire Geda	353	27	887	27	54
Bilofi Keku	320	24	497	15	39
Halelu OdaGuta	150	12	361	11	22
Refso Alenga	200	15	364	11	26
Chobi Tulu Cori	97	7	641	20	28
Wegidi Kortu	120	9	342	10	19
Total	1240	94	3092	94	188
Source: Own construction.					

Table 1: Distribution of sample households in *Kebeles*.

simple random sampling technique through lottery method. Then, households in the sample *kebeles* were stratified into participants and non-participants. Finally, the sample size of the household heads for this study was determined by applying Kothari (2004) sample size determination formula

$$n = \frac{Z^2 pqN}{e^2(N-1) + Z^2 pq}$$

Where: n=sample size; N=total population (4332); Z=95% confidence interval under normal curve (1.96); e=acceptable error term (0.05) and P and q are estimates of the proportion of population to be sampled (P=0.5 and p + q=1). Seven percent (7%) of error term (e=0.07) was used to take representative and cost effective data for this study. Accordingly, the sample size for the study was determined as below:

$$n = \frac{(1.96)^2\, 0.5*0.5*4332}{(0.07)^2(4332-1) + (1.96)^2 * 0.5*0.5} \approx 188$$

Based on this formula the total sample size was 188 sample household heads. Finally, from a total of 188 sample households, 94 participants and 94 non-participants were selected to get good matching in the propensity score matching estimation. Households' distribution and sample size presented as follows.

Methods of data analysis

This study employed Propensity Score Matching model to analyse the impact of microfinance on the income of Rural Households. Propensity score matching (PSM) is a non-parametric method that is widely used in the impact evaluation of different interventions [19,20]. In order to estimate the average treatment effect on treated (ATT) by using propensity score matching method the following steps such as estimation of the propensity scores, choosing a matching algorithm, checking on common support region, testing the matching balance and sensitivity analysis were employed. The effect microfinance credit participation on the income of rural households was explained as:

$$\tau_i = Y_i(D_i=1) - Y_i(D_i=0)$$

Where τ_i is effect because of participation in microfinance credit, Y_i is the outcome (the impact of participation in microfinance on the on rural households income) and D_i is whether rural household i was participate in microfinance or not. However, $Y_i(D_i=1)$ and $Y_i(D_i=0)$ cannot be occurred simultaneously for the same individual at the same time. Based on this the position household in the treatment either $Y_i(D_i=1)$ or $Y_i(D_i=0)$ is unobserved outcome. Hence, analysing individual treatment effect τ_i is difficult. Therefore, estimating the average treatment effects of the population than the individual person was very important. Among the average treatment effect, average

treatment effect on treated (ATT) was one of the most commonly used in impact assessment and it was described as:

τ_ATT=E(τ/D=1)=E[Y(1)/D=1]-E[Y(0)/D=1].

Here the outcome variable of participant households, E[Y(1)/D=1] is observed. However, the out variable of participant households had they not participated, E[Y(0)/D=1] is not observed. Hence, substituting the outcome (total annual income of participant households had they not participated) E[Y(0)/D=1], for outcome (total annual income of non-participant households) is impossible in non-experimental impact assessment. If substitute, it implies that variables that determine rural households' participation decision in microfinance credit also determine the total annual income of rural households. This means that, the total annual income of households from participant and non-participant would differ even in absence participation, this leading to a self-selection bias.

By deducting $E(Y_0/D=0$ from the left and the right side of the equation we can specify the average treatment effect on treated as follow:

E[Y(1)/D=1]=E[Y(0)/D=1]-E[Y(0)/D=0]=τ_ATT+ E[Y(0)/D=1]-E[Y(0)/D=0].

In this case, the terms in the left side are observables and the average treatment effect on treated can determined if and only if E[Y(0)/D=1]-E[Y(0)/D=0] zero. This occurs when there is self-selection bias. In order to resolve the selection matter in non-experimental impact studies the following two assumptions are required.

Conditional independence assumption: It indicates the outcomes are independent of treatment and conditional on (X_i). This assumption shows that the selection is only depend on observable characteristics that affect both participation decision of households and the outcome variables simultaneously [21].

Common support: Is refers to the area in which both participant and non-participant households have propensity score values in common. In other words, it is the area which contains the minimum and maximum propensity score of participant and non-participant groups, respectively. Those observations whose propensity scores is smaller than the minimum and larger than the maximum prosperity score value are discarded from the treatment and control groups [21].

That is 0<P(D=1)/X<1.

Given these two assumptions, the propensity score matching algorithm to estimate ATT can be described as:

$$\tau_{ATT}^{PSM} = E_{P(X)/D=1}\{E[Y(1)/D=1, P(X)] - E[Y(0)/D=0, P(X)]\}$$

Where, P(X) is the propensity score calculated from covariate X. Equation is explained as; the PSM estimators is the difference between mean of outcomes over common support region.

Variable Definition and Hypothesis

Outcome variable

The outcome variable taken for this study was the total annual income generated from crop production, livestock production, off-farm and non- farm activities in 2017.

Total annual income (TAINCM): It is a continuous and an outcome variable measured in ETB. From Table 2 It consists of annual agricultural cash income from sales of (grains, seed, fruit, livestock and their products), off-farm income and non-farm income. Off-farm income refers to the income generated from agricultural activities which take place outside the households own farm. This activity includes local daily wage labour at village level or the neighboring work at another person's farm, firewood and charcoal selling and other off-farm activities.

Non-farm income refers to income from activities outside the agricultural sector. It includes handicraft activities (weaving, spinning, carpentry, house mudding, poet making), petty trade (grain trade, fruits and vegetables trade), selling of local drinks, trading of small ruminants and cattle, and remittance transfers within and across nations [22].

Household's income was positively related to participation in microfinance services indicating that the probability of improvement in income increases with the increase in microfinance participation [13]. Thus, this variable was expected to have positive relationship with participation in microfinance services.

Variables	Definition	Type	Measurement	Expected sign
Dependent variable	Participation in Mf service	Dummy	"1" for participants and 0 otherwise	
AGEHH	Age of Household Head	Continuous	Year	+
SEXHH	Sex of Household Head	Dummy	1=male; 0=female	+
EDLHH	Education level of Household Head	Categorical	Level of education or year of schooling	+
CULS	Cultivated land size	Continuous	Hectare	+
FMSZ	Family size	Discrete	Number of family	+
LVSTOKH	Livestock owned	Continuous	Tropical livestock unit (TLU)	+ / -
OCCPHH	Occupation	Categorical	1=farmer, 2=Petty trader, 3=causal labourer, 4=employed and 5=hand crafter	-
DPCR	Dependent ratio	Continuous	Ratio of number of dependent family to active labour force of the family	-
FEXC	Frequency of extension contact	Continuous	Number of visit per year	+
DISMFIs	Distance from MFIS	Continuous	Hour	-
HPGL	Household perception of group lending	Dummy	"1" for those perceived group formation as Constraint and "0"otherwise	-
ACSNWK	Access to social	Dummy	"1" for those have access to social network(radio, mobile phone and "0" otherwise	+
	Outcome Variable			
TAINCM	Annual income	Continuous	Birr	
Source: Own construction.				

Table 2: Summary of hypothesis of explanatory variables included in the model.

Results and Discussion

Matching estimate of propensity score

This section discusses the result of propensity score matching in detail. A logit model was estimated using all explanatory variables to estimate the propensity scores. Next, the best matching estimator that fit the data was chosen. Then, depend on the propensity scores estimated and matching estimator selected, matching between treatment and control groups was carried out to measure the effect of the credit on the average total annual income of rural households.

Matching participant and comparison households

The propensity score for each participant and non-participant groups was estimated to identify a common support region for the two groups. As indicated in Table 3, the computed propensity scores vary between 0.0503 and 0.9920 (mea=0.6722) for participant households and between 0.0175 and 0.9116 (mean=0.3278) for non-participant households. Based on the minimum and maximum criterion, the common support region was lie between 0.0503 and 0.9116. In other words, with estimated propensity scores less than 0.0503 and greater than 0.9116 would not be taken for matching purpose.

As shown in Table 4, out of the total sample households (188), 22 households (17 treated and 5 control households) were discarded from the analysis. Thus, in the analysis 166 sample households those who have common support region were included and the rest 22 households were excluded from the analysis.

Selecting matching estimators

Selecting the best matching estimator was determined through various criteria like equal means test Alternative matching estimators were tried in matching the treatment and control households in the common support region. Final choice of a matching estimator was guided by different criteria such as equal means test, pseudo-R2 and matched sample size. Balancing test was performed to know whether there is stastistically significant difference in the mean values of covariates for participant and non-participant households and preferred when there is no significant mean difference [23]. Matched estimators like nearest neighbor, caliper and kernel with different band width were tested.

From the above mentioned type matching estimators, a matching estimator that balances all explanatory variables, contains pseudo-R2 value and has large matched sample size is the best estimator for impact analysis [24]. Thus, kernel matching estimator with a band width of 0.25 was selected for the matching analysis as the best estimator since it resulted in a relatively low pseudo-R2, best balancing test-all covariates were insignificant after matching, and it also contains large matched sample size as compared to other matching estimators as indicated in Table 5.

Testing the balance of propensity score and covariates

After the best matching estimator was selected the next activity is examining the balancing of propensity score After choosing the best performing matching estimator the next step is to check the balancing

Group	Observation	Mean	Std. Dev	Minimum	Maximum
Total households	188	0.5	0.2926	0.0175	0.9920
Treated households	94	0.6722	0.2518	0.0503	0.9920
Control households	94	0.3278	0.2210	0.0175	0.9116
Source: Computed from survey data.					

Table 3: Summary of estimated propensity scores.

Treatment	Off support	On support	Total
Treated households	17	77	94
Control household	5	89	94
Total households	22	166	188
Source: Computed from survey data.			

Table 4: Common support region and treatment.

Matching estimator	Performance criteria		Matched sample size
	Balancing test	Pseudo-R^2	
Nearest neighbor matching			
NN (1)	7	0.115	166
NN (2)	8	0.071	166
NN (3)	11	0.069	166
NN (4)	12	0.049	166
NN (5)	12	0.037	166
Caliper			
0.01	12	0.053	104
0.1	7	0.115	166
0.25	7	0.115	166
0.5	7	0.115	166
Kernel matching			
Band width (0.01)	12	0.031	104
Band width (0.1)	12	0.046	166
Band width (0.25)	12	0.031	166
Band width (0.5)	11	0.074	166
Source: Computed from survey data.			

Table 5: Performance measures of matching estimators.

of propensity score and explanatory variables using various techniques by employing the chosen matching estimator. As indicated in Table 6, the balancing test of covariates which tests the significance in mean difference between all covariates before and after matching was used for the matching purpose. Thus, balancing test was estimated by taking different testing techniques like the deduction in standardized bias between unmatched and matched individuals and equality of means was checked by using t-test and chi-square test for joint significance for the covariates.

The mean standard bias before and after matching conducted was shown in Table 6 with total bias reduction obtained from the matching process. The standardized bias difference in covariates before matching is lie between 2% and 86.1% in absolute value. However, after matching the remaining standardized difference for all covariates was lie between 0.3% and 17.5% in absolute value, which is less than the critical level of 20% as explained by Rosenbaum and Rubin (1985). Similarly, t-values in the same Table 6 shows that before matching from the selected explanatory variables, six variables displayed statistically significant differences but after matching all variables were balanced.

In order to have the same distribution in explanatory variables Xi after matching, the pseodo-R2 should be low and the likelihood ratio should be insignificant. This result clearly implies that the purpose of matching is to balance the observable characteristics in the treated and control groups. Thus, the result obtained from balancing covariates employed to estimate the effect of microfinance credit participation on rural households' income for those having similar observed characteristics. This allowed us to compare observed outcomes for treated and control groups found in common support region (Table 7).

Estimating average treatment effect on the treated (ATT)

The computed average treatment effect on treated result in Table 8 indicated that microfinance credit has statistically significant effect on

Variable	Unmatched Matched	Mean		Standard Bias %	Reduction Bias %	t-test	p>|t|
		Treated	control				
SEXHH	Unmatched	0.756	0.56	41.0		2.81	0.005***
	Matched	0.71	0.75	-7.9	80.8	-0.51	0.608
AGEHH	Unmatched	43.36	43.82	-5.5		-0.38	0.707
	Matched	43.49	43.582	-1.1	80.6	-0.06	0.949
FMSZ	Unmatched	5.97	6.26	-13.0		-0.89	0.373
	Matched	6.05	6.27	-10.1	22.9	-0.58	0.562
EDLHH	Unmatched	1.98	1.65	43.8		3.00	0.003***
	Matched	1.91	1.77	17.5	59.7	1.06	0.292
OCCPHH	Unmatched	1.17	1.26	-12.3		-0.84	0.400
	Matched	1.16	1.16	-0.3	97.3	-0.03	0.979
CULS	Unmatched	1.35	1.10	36.5		2.51	0.013***
	Matched	1.31	1.177	2.5	43.9	1.28	0.204
LVSTOKH	Unmatched	6.73	4.88	86.1		5.90	0.000***
	Matched	6.12	6.18	-2.9	96.7	-0.19	0.850
DPCR	Unmatched	0.65	0.89	-55.1		-3.77	0.000***
	Matched	0.67	0.71	-10.6	80.8	-0.78	0.436
HPGL	Unmatched	0.01	0.17	-21.9		-1.50	0.134
	Match	0.10	0.12	-3.5	84.1	-0.23	0.816
ACSNWK	Unmatched	1.27	1.29	-4.7		-0.32	0.746
	Matched	1.23	1.22	2.9	37.9	0.19	0.846
DISMFIs	Unmatched	2.33	2.35	-2.0		-0.14	0.889
	Matched	2.27	2.35	-10.4	-409.8	-0.62	0.535
FEXC	Unmatched	8.04	6.43	37.5		2.57	0.011***
	Matched	7.55	7.25	6.9	81.5	0.40	0.693

Note: *** means significance at 1% probability level.
Source: Computed from survey data.

Table 6: Balancing test of covariates.

Sample	Pseudo R^2	LR chi2	p>chi2
Unmatched	0.284	74.05	0.000
Matched	0.031	6.56	0.924

Source: Computed from survey data.

Table 7: Chi-square test for the joint significance of variables.

Variable	Mean		Difference	Std. Err	T-test
	Treated	Control			
Farm income	18,383.77	16,923.56	1,460.22	967.04	1.51
Non-farm income	8,216.06	6,553.87	1,662.19	1664.22	1.00
Total income	21,502.11	19,372.14	2,129.97	373.51	5.7***

Note: *** shows statistical significant at 1% probability level.
Source: Computed from survey data.

Table 8: Average treatment effect of the treated (ATT) estimation result.

Outcomes	e^{γ}=1	e^{γ}=1.25	e^{γ}=1.5	e^{γ}=1.75	e^{γ}=2	e^{γ}=2.25	e^{γ}=2.5	e^{γ}=2.75	e^{γ}=3
Total income	0.000	0.000	0.000	0.000	0.000	1.1e-15	2.7e-14	3.8e-13	3.3e-12
Source: Computed from survey data.									

Table 9: Sensitivity analysis.

rural households' income. A positive value of average treatment effect on the treated (ATT) indicates that households' annual income has been improved as a result of microfinance credit intervention in the study area. Accordingly, participation in microfinance service has increased a total annual income the of participant households by ETB 2129.7 which is 11% higher than the income of non-participants. Moreover, the mean difference between participants and non-participants in terms of total annual income was significant at 1% significance level.

Sensitivity analysis

Sensitivity analysis is a key assumption for matching based analyses and must be justified. After ATT of the data collected is found, it is necessary to check whether the obtained ATT is effective or not. According to Dehejia, sensitivity analysis is the final diagnostic that must be performed to check the sensitivity of the evaluated treatment effect to unmeasured characteristics which affect both assignment in treatment and the outcome variable [25]. If a given study is not affected by unobserved characteristics, the effect of unobserved variables will be zero. As a result, the participation probability determined only by observed characteristics. But, if there is unobserved bias, even if the two individuals with similar observed characteristics have different chance of receiving the treatment. Based on this concept the sensitivity analysis was conducted.

The result in Table 9 shows that, the effect of microfinance on the rural households' income was not altered even though participant and non-participant households have been allowed to differ in their odds of being treated up to 200% (e^{γ}=3) in terms of unmeasured characteristics. This implies that, for outcome variable computed at different level of critical value of gamma, the p-critical values were statistically significant. We couldn't get the critical value e^{γ} where the estimated ATT is questioned even if we have set e^{γ} largely up to 3 which is larger value as compared to the value to the value set in different literature which is usually 2 (100%). Thus, it can be concluded that impact estimate (ATT) of this study is insensitive to hidden bias.

Summary and Conclusion

Based on the major finding of this study, the following summary and conclusions could be drawn. This study has focused on examining the impact of microfinance on the income of participant households as compared to non-participant households. Simple random and stratified sampling techniques were used to select the respondents in the study area. This study was used cross-sectional data from both primary and secondary sources. Primary data were collected from 188 respondents (participant and non-participant groups) by using structured questionnaire. Secondary data were also extracted from secondary sources such as books, journal articles, unpolished study documents and other governmental and non-governmental offices reports that are found in the study area [26].

Propensity score matching (PSM) was used in this study since propensity score matching method is a commonly used with 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 households. It is used to extract comparable pair of treatment –comparison households in a non-random program setup and in the absence of baseline data.

Matching estimators such as nearest neighbor, radius and kernel were applied that made use of the propensity scores to match comparison households with treated households [27]. From these matching estimators, matching estimator with lowest pseudo value, well balanced covariates and largest sample size was selected. Thus, a kernel estimator with band width of 0.25 was used for propensity score matching analysis in this study. Accordingly, the matching process has shown 22 (17 participants and 5 non-participants) households were discarded from the total sampled household based on common support region determination procedure only 166 households were included in the estimation process.

Therefore, only 166 sample households those prosperity score values found in common support region were used for the matching purpose. The matching also passed through the process of matching quality test such as t-test, reduction in standard bias and chi-square test. As a result, the after matching test showed that all the variation in the covariates mean between treated and control groups in the matching sample has been eliminated. The impact estimation results also showed that there was significant difference in outcome variable between participant and non-participant households, which could be attributable to the participation in microfinance services. The effect of the microfinance on rural households' income was higher for the participants than non-participants and was statistically significant. Moreover, the result of Rosenbaum bounding procedure to check the hidden bias due to unobservable selection shows that the estimated ATT for outcome variable (total annual income) was insensitive indicating its robustness.

Recommendations

The result of this study indicated that participation in microfinance credit service have had a positive and significant impact on the total household annual income. Hence, the microfinance institutions and other concerned body should give attention for rural households in the study area in order to enhance rural households' participation in the area.

References

1. Anyiro CO, Oriaku BN (2011) Access to and Investment of Formal Micro Credit by Small Holder Farmers in Abia State, Nigeria. A Case Study of Absu Micro Finance Bank, Uturu. Agric Econ, pp: 1-9.
2. Tolosa N (2014) Performance of Loan Repayment Determinants in Ethiopia Microfinance: An Analysis. Eurasian J Bus Econ 7-29-49.
3. Melese M (2013) Impacts of Microfinance Institution on the Living Condition of Rural Women: A case study on the Oromia Credit and Save Share Company in ShirkaWoreda, Oromia Region. St. Mary's university, Ethiopia pp:1-81.
4. Belay A (2012) Financial sustainability of Microfinance Institutions (MFIs) in Ethiopia, Indian J Financ, pp: 1-12.
5. Birhanu G (2016) The Role of Microfinance Institutions in Reduction of Unemployment. Unpublished MA Thesis, Wollega University.
6. Ziaul HM (2014) Microcredit, household livelihoods and community capacity: case study from Bangladesh. Pacific University, Asia, pp: 1-223.
7. OCSSCO (Oromia Credit and Saving Share Company) (2017) Annual performance Report. Gedo, Ethiopia.
8. Ebisa D, Getachew N, Fikadu M (2013) Filling the breach: Microfinance. J Bus Econ Manag 1: 010-017.

9. George O (2009) Is micro-finance achieving its goal among smallholder farmers in Africa. Int Conf Agric Econ, pp: 16-22.

10. Laura B, Gloria M (2005) Evaluating the impact of conditional cash transfer programs. The World Bank Research Observer 20: 29-55.

11. Fitsum, Holden (2005) The Impact of Credit on Changes in Welfare of Rural Households: Empirical Evidence from Northern Ethiopia. Norway.

12. Asmelash H (2003) The Impact of Microfinance in Ethiopia: the case of DCSI in Ganta Afeshum Woreda of Eastern Tigray. MA. Thesis, JHIA, Ethiopia.

13. Feleke B (2011) Impact of microfinance services on household income: The Case of Digaf Micro Financing Company. Ethiopia.

14. Firafis D (2016) Impact of Credit Rationing and Repayment Problems in The Case of Ambo Woreda Eshet Microfinance Institution. Int J Afr Asian Stud 4: 51-68.

15. Taye C (2014) The Impact of Microfinance Financial Services on the Economic Empowerment of Women: The Case Study of wisdom Micro Financing Institution. St. Mary's University, Ethiopia pp: 1-69.

16. Yilkal W (2016) Impact of Microcredit Programs on Female Headed Households in Jimma Zone, Ethiopia. Int Journal Sci Res Publ 43: 429-440.

17. Kebu C (2017) Assessment of result oriented performance of microfinance institutions: The Case of Cheliya District West Shoa Zone. BA. Unpublished Thesis, Rift Valley University.

18. Cheliya District Agricultural Office (2017) Annual report. Cheliya, Ethiopia.

19. Heckman J, Ichimura H, Toddi P (1998) Matching as an Econometric Evaluation Estimator. Rev Econ Stud 65: 261-294.

20. Ravallion M 2005 Evaluating anti-poverty programs. Policy research working paper 3625, World Bank, Washington DC pp:1-74.

21. Caliendo M, Kopeinig S (2008). Some practical guidance for the implementation of propensity score matching. p:1588.

22. Yenesew S (2014) Determinants of Livelihood Diversification Strategies: The case of smallholder rural farm households in Debre Elias Woreda, East Gojjam Zone, Ethiopia. 19: 1998-2013.

23. Dehejia RH, Wahba S (2002) Propensity Score matching methods for no experimental causal studies. Rev Econ Stat, 84: 151-161.

24. Tolemariam A (2010) Impact Assessment of Input and Output Market Development Interventions by IPMS Project: The Case of Gomma Woreda, Jimma Zone. Agric Econ, pp: 1-97.

25. Dehejia R (2005) Practical Propensity Score Matching: a reply to Smith and Todd. J Econom 125: 355-364.

26. Addisu A (2016) The Impact of Saving and Credit Program on Socioeconomic Condition of Women in Mida Woremo District, North Shoa Ethiopia: The Case of Addis-Alem Saving and Credit Union Mard Dissertation Project Research (Mrdp-001). Indira Gandhi National Open University.

27. Asmamaw Y (2014) The Role of Microfinance Institutions in the Development of Small and Medium Size Businesses in ETHIOPIA: A Case Study in Amhara Credit and Saving Institutions. J Bus Adm Manag Sci Res 3: 106-120.