Working Paper on

The Role of Financial Intermediation on Welfare Status of Rural Farm Households in Ethiopia

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ABSTRACT

This paper looks at the role of improving access to financial services on rural farm households' socio-economic status in Ethiopia using a national survey data collected from 1559 households for the end-evaluation of Rural Financial Intermediation Program II (RUFIP-II) project. In order to assess the role of access to credit on rural farm households' socio-economic status, the study employs both descriptive and econometric regression analysis methods. While the descriptive method employs a range of descriptive statistics to show the change in the status of beneficiary households (vis-à-vis comparison households) during the project period, the econometric analysis used a quasi-experimental method, namely Propensity Score Matching method.

The study result shows that improved access to finance contributes to the country's efforts to reduce poverty. This is achieved by extending the outreach of the rural financial institutions and increase in the size and amounts of loan. The average loan size is found to have increased by four times during the period of the program. The main findings of the evaluation study have mirrored that households' accessibility to rural credits could liberate the user population from poverty through building of household assets and improved incomes, increased savings, better food security status, improved market participation and capacity to deal with the vagaries of climate change through use of improved crop varieties tolerant of extreme climate conditions. However, the result shows that credit user households were more likely to be large sized, owners of large areas of cultivated land, and either young or at their old ages in their lifeline. Thus, policy measures that aim to reduce poverty and alleviate food insecurity should consider the poorer households with land and labor shortages who remain to be credit constrained (they are still left out) as they were not accessing credits that might have allowed them to increase productivity and eventually attain food security.

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ACKNOWLEDGEMENT

1. INTRODUCTION

A vast majority (82%) of the Ethiopian population live in rural areas, and mostly (75%) employed in the agricultural sector (Scmidt and Bekele, 2016). However, a significant portion of the population live under poverty that is caused by low productivity and/or poor access to productive assets or inputs. Improving farmers' access to affordable financial services, which is underdeveloped but growing gradually, is very important in both fronts – in terms of raising farmers' productivity as well as their access to crucial productive assets, like irrigation pumps and oxen, which provide draft power for their farming operations, among others.

Despite a wide range of positive outcomes that can emanate from access to finance, rural communities are often deprived of adequate financial services restraining them to exploit their full potential (Besley, 1994; Zeller and Sharma, 1998). As in many other developing countries, the problem is severe in Ethiopia, mainly associated with two reasons. Despite some recent progress, most of the conventional banks are still concentrated in urban areas, while more than 75% of the population is rural. And whenever available, formal financial institutions, such as commercial banks, have avoided or failed to offer desirable and sustainable financial services in rural areas. This is mainly due to prohibitively high transaction cost and weak property right systems that limit contract enforcement mechanisms for lending/borrowing and information asymmetry between market participants, emanating from low level of financial literacy (Hoff and Stiglitz, 1990; Besley, 1994). In addition, the formal banking sector systematically excludes the rural poor due to the higher screening, monitoring, and enforcement costs of providing a small loan. Moreover, most poor have few or no assets that can be secured by a bank as collateral (Solomon et al., 2019).

In view of such formidable constraints, financial intermediation through non-bank entities, such as microfinance institutions (MFIs), saving and credit cooperatives/associations, and credit unions emerged as a viable way to provide financial services and address financial needs in rural areas of most developing countries (Okoye et al., 2019). Similar to most developing countries, rural financial markets in Ethiopia remained underdeveloped though there are notable improvements over time. There is still a huge demand-supply gap in the delivery of rural financial services. With the launching of the nation-wide Rural Financial Intermediation Program (RUFIP) in 2003, Ethiopia's rural financial sector, however, saw notable improvement. The program supported MFIs and Rural Saving and Credit Cooperatives (RUSACCOs), which are vital in providing financial services to rural households.

The RUFIP has so far been implemented in two phases – RUFIP I (2003-2010) and RUFIP II (2012-2019). The overall objective of the program is providing poor rural households with sustainable access to a range of financial services through a nationwide network of about 30 MFIs and 5,500 RUSACCOs (and 100 Unions of RUSACCOs). Specifically, the project targeted to extend access to a range of financial services for about six million mainly poor rural households in Ethiopia by 2019, increasing savings, credit and risk mitigation services to the rural poor, enhancing the institutional capacities of MFIs and RUSACCO by bridging their liquidity gap through a credit fund, and improving the policy environment. It also aims to nurture innovations and good practices that would broaden choices and intensify the market for financial services, which includes improving regulation and supervision of MFIs and RUSACCOs and providing credit fund to the rural financial institutions.

The financial services provided to poor rural households under RUFIPII include loans, savings, microinsurance and money transfer[1]. Since the implementation of RUFIP II is completed recently, it is necessary to evaluate its achievements as well as the challenges faced, and lessons learned from implementation of the program in order to inform similar investment programs in the future. The objective of this study is thus to examine how the RUFIP II affect the socio-economic status of rural households in Ethiopia measured in terms of income, asset ownership, agricultural productivity, food security and women empowerment[2]. This study will add to the literature on the role of financial development in rural Ethiopia.

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[1] In addition to these direct services to the rural households, the RUFIP II program has four main components, including: (i) institutional development in the microfinance and cooperative sub-sectors, including knowledge management; (ii) improved regulation and supervision of MFIs and RUSACCOs; (iii) credit funds to bridge the liquidity gaps for MFIs and RUSACCOs; and (iv) program coordination and management.

[2] This study did not focus on other important components of the RUFIP-II program.

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2. THEORETICAL FRAMEWORK OF THE STUDY

The most serious challenge in evaluating any intervention or program is obtaining a credible estimate of the counterfactual: what would have happened to program beneficiaries (credit user households in the case of the present study) if they didn't take part in the program? Without a credible answer to this question, it would not be possible to determine whether the provision of credits actually influenced beneficiary outcomes or is merely associated with successes (or failures) that would have occurred anyway.

One feasible solution to this problem is to estimate the counterfactual outcome based on a group of credit user and non-user households and calculate the impact of the intervention as the difference in mean outcomes between groups. It is implied here that, the groups (credit user and credit non-user) must be identical except for the fact that one of them received the treatment (through MFI or RUSACCO credit programs). Thus, the main concern should be on how to find a proper comparison group. In this study, those households who did not participate in MFI loans and/or any other formal institutions were randomly selected and included as a comparison group in the absence of a baseline data. Figure 1 illustrates the basic tenets of the impact measurement that has been adhered to in this impact evaluation study.

Figure 2.1Figure 0.1Figure 1: The essence of impact evaluation
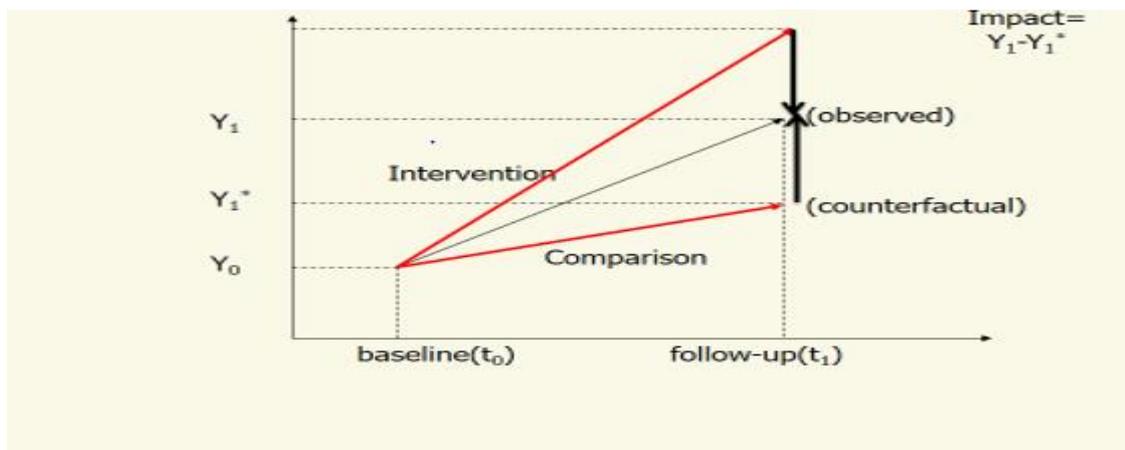
3. DATA AND METHODOLOGY

3.1. The data

This is study is based on primary data collected from five regions in Ethiopia, namely Oromia, Amhara, SNNPR, Tigray, and Benishangul Gumuz. A cross-sectional data has been collected from a total of 1559 households (780 treatment and 779 comparison households) selected using a multi-stage stratified random sampling technique. Stratification was done based on type of financial institution providing the service (MFI or RUSACCO), size of the institutions in the case of MFIs (small, medium and large), and subsector of the RUSACCOs (primary and union). For selecting treatment and comparison groups for this study, "clients" and "non-clients" of MFIs and RUSACCOs in each sample *Kebele/Woreda* were identified and then grouped as "beneficiaries" and "non-beneficiaries", respectively, of the financial services provided by sample MFIs and RUSACCOs supported by RUFIP II. The stratification approach for allocation of the sample households for the MFIs and RUSACOS was done separately based on estimated number of clients/members of the two financial institutions. Accordingly, 70% of the sample was allocated to MFIs and the remaining 30% to RUSACCOs. Based on this proportional allocation method, the sample size allocated for MFIs was 546 households and for RUSACCO was 234 households where the total sample in each case is divided equally between treatment and comparison groups.

The dataset for the econometric analysis is a bit different as a total of 78 sampled households, of which 50 treatment and 28 comparison households, were dropped from inclusion into the analysis. The main reason being those 78 households have reported that they have accessed loans from other formal institutions, on top of the MFI and or RUSACCO sources, by either of the head of household or spouse or any other member of the household. Consequently, a total of 1481 households (723 treated and 758 comparison) were retained and entered into the binary logistic regression and treatment effects (Propensity Score Matching) models. Notably, however, households who have accessed credits from informal institutions were not dropped from the analysis. They are retained because most of the funds secured by these households come from *'Iqqub'* which is arguably more of a forced rotational saving method considered as one source of credit.

In terms of the data collection instrument, a multi-modular structured questionnaire was used to collect quantitative data from selected households of both beneficiaries and non-beneficiaries of the   program.

3.2. Methodology

The study employs both descriptive and econometric regression analysis methods. While the descriptive method employs a range of descriptive statistics to show the change in the status of beneficiary households (vis-à-vis comparison households) during the project period, the econometric analysis used a quasi-experimental method, namely propensity score matching, to learn the impact of the project on the four outcome variables: household income, asset ownership, agricultural   productivity,   food   security,   and   women   empowerment.

3.2.1. Model Specification

For the binary treatment case, where we estimate the probability of accessing credit versus not accessing credit, logistic regression is commonly used (Luo et al., 2012). Following this argument, a binary logistic regression model is used to estimate propensity scores for each sample household to match users and non-users of rural credits based on the observed characteristics.

Following Pindyck and Rubinfeld (1981), the cumulative logistic probability function is specified as follows:

$$(P_i = 1) = F(Z_i) = F(\alpha + \sum \beta_i X_i) = \frac{1}{1+e^{-zi}} \tag{1}$$

Where P_i is the probability that the household would use credit either from MFIs or RUSACCOs, X_i is set of covariates that determine household's credit use, α and β_i are parameters to be estimated.

Once the propensity scores were estimated, the study evaluated the impact of access to credit on households' welfare using the Propensity Score Matching (PSM) method. Following Smith and Todd (2005), let Y_1 be a household's outcome if s/he participates in RUFIP II and let Y_0 be an individual's outcome if s/he does not participate. The impact of credit is the difference in the outcome caused by using credit. Mathematically, the impact of access to credit (treatment) for an individual i, denoted by δ_i, is defined as the difference between the potential outcome in case of treatment and the potential outcome in the absence of treatment (see also Figure 1 above):

$$\delta_i = Y_{1i} - Y_{0i} \tag{2}$$

In general, an evaluation seeks to estimate the mean impact of the credit program, obtained by averaging the impact across all the individuals in the population. This parameter is known as Average Treatment Effect or ATE:

$$ATE = E(\delta) = E(Y1 - Y0) \tag{3}$$

where E(.) represents the average (or expected value).

Another quantity of interest and often reported by evaluators is the Average Treatment Effect on the Treated, or ATT, which measures the impact of the program on those individuals who participated in the credit program:

$$ATT = E\,(Y1 - Y0 \,|D = 1) \tag{4}$$

Finally, the Average Treatment Effect on the Untreated (ATU) measures the impact that the program would have had on those who did not participate in the credit program:

$$ATU = E\,(Y1 - Y0 \,|D = 0) \tag{5}$$

The real problem in operationalization is that all these parameters are not observable, since they depend on the counterfactual outcomes. For instance, using the fact that the average of a difference is the difference of the averages, the ATT can be rewritten as:

$$ATT = E\,(Y1|D = 1) - E\,(Y0|D = 1) \tag{6}$$

The second term, $E\,(Y_0|D = 1)$, is the average outcome that the treated individuals would have obtained in the absence of treatment, which is not observed. However, we do observe the term, $E(Y_0|D=0)$ that is, the value of Y_0 for the untreated individuals.

Thus, we can compute:

$$\Delta = E\,(Y_1|D = 1) - E\,(Y_0|D = 0) \tag{7}$$

Now, adding and subtracting the term: $E\,(Y_0|D = 1)$

$$\Delta = E\,(Y_1|D = 1) - E\,(Y_0|D = 1) + E\,(Y_0|\,D = 1) - E(Y_0|D = 0)$$
$$\Delta = ATT + E\,(Y_0|D = 1) - E\,(Y_0|D = 0) \tag{8}$$
$$\Delta = ATT + SB$$

The second term, SB, is the selection bias: the difference between the counterfactual for treated individuals and the observed outcome for the untreated individuals. If this term is equal to 0, then

the ATT can be estimated by the difference between the mean observed outcomes for treated and untreated or credit users and non-users:

$$\widehat{ATE} = E(Y \,|D = 1) - E(Y \,|D = 0) \tag{9}$$

However, in many cases the selection bias term is not equal to 0. In this case, the difference in means will be a biased estimator of the ATT. Then, the main goal of an evaluation would be to ensure that the selection bias is equal to 0 in order to correctly estimate the parameter of interest.

3.2.2. Definition of Variables

The matching strategy builds on the Conditional Independence Assumption (CIA), requiring that the outcome variable(s) must be independent of treatment, conditional on the propensity score. Hence, implementing matching requires choosing a set of variables X (pre-intervention variables) that credibly satisfy this condition. Thus, only variables that influence simultaneously the participation decision and the outcome variable should be included. To ensure this, variables should either be fixed over time (time invariant) or measured before participation. So, care is taken to guarantee that the variables used for prediction of propensity scores have not been influenced by the anticipation of participation. The outcome variables and covariates included in this evaluation study are discussed hereunder.

a) *Outcome variables:* The outcome variables are those which show the welfare status of the households or indicators. This evaluation study considered the following outcome variables to assess the impact of access to credit on the welfare of rural households. They are: i) household income and asset ownership, ii) food security and agricultural productivity; iii) women's empowerment.

b) *Covariates:* The following pre-intervention variables are included in the estimation of probability scores.
- Demographic characteristics of the household (sex of household head, age of household head in linear, quadratic and cubic forms, age/birth cohorts),
- Socioeconomic variables (educational status of household head, own landholding size),
- Institutional (market access measured as distance from market center),
- Location: whether the household is located in Amhara, Benishangul-Gumuz, Oromia, SNNP or Tigray region.

Reasons for considering age squared, age cubed, and birth cohorts are the following. In many studies, age is expected to show a non-linear relationship to the dependent variable. This is normally modelled by adding age squared and age cubed to the model. The basic intention here is so as to generate a quadratic and sigmoid or S-shaped curve. By doing so, an attempt is made to capture how the decision of household heads to access and use financial services is affected as their age progresses. A birth cohort is considered in this study as a group of individuals born during a given calendar time period within a specified geographical region. The aim is to capture events of interest occurring to an individual during his or her lifetime (the Imperial regime, Dergue, and EPRDF regime cohorts). These intergenerational differences are believed to influence the perceptions, attitudes, risk taking behavior, the work culture and the decision-making process of the individuals.

4. RESULTS OF THE STUDY

The study results are presented in three sections where the first two sections discuss results from the descriptive analysis where farmers' access to financial services and the impact this has brought on their socio-economic status, with data for the discussion on the descriptive results is presented in Annex Table. The third section presents and discusses results from the econometric regression analysis.

4.1. Household Access to Financial Services

Microfinance institutions (MFIs) in Ethiopia are reliable source of financial services to rural households both in terms of credit and saving products. They typically work alongside government organizations and also have ties with larger global organizations. The RUFIP is a typical example of such arrangements that, beyond the target group (beneficiary communities and households), include a range of stakeholders that comprise rural financial institutions (MFIs and RUSACCOs) and a number of programs implementing agencies (DBE, NBE, AMEFI, FCA, RCPBs, etc.). Notwithstanding the potential problems in terms of sustainability, such arrangements enhance the quantity and quality of financial services to beneficiary households.

The household survey data results show that on average, three loans were taken by members of both MFI and RUSACCO sample households over the six years RUFIPII period. This means that on the average two loans were borrowed every two years (considering the reference period of six years corresponding to RUFIPII period). The average loan size is about 44,348 Birr[3], which is very huge compared to the usual microloan size in Ethiopia where most loans fall below 10,000 Birr.

In terms of women participation, close to 56% of the loans went to female beneficiaries, which is high compared to the 45.6% women share in the national MFIs' loan (Solomon et al., 2019). Though this is partly related to the RUFIP II target that women should account for 50% of the clients, providing loan to women has also an advantage in terms of low probability of default, which, in turn, implies high financial sustainability for the MFIs. Similarly, lending to women is considered as high outreach to the poor (as women are expected to have a disproportionately large share in the poor segment of the community), indicating the potential social motives of most MFI loans. Based on 10 years' data from AEMFI, a study by NBE (2018) even indicates that MFIs with higher proportion of women clients are likely to have higher donated equities in their capital structures and appeared to focus on social motives rather than commercial purposes, allowing them to overlook any inefficiency in operations during the study period (NBE, 2018).

This disproportionately large proportion of women as clients of MFIs, however, did not prevail in the other important indicators of borrowers' credit portfolios. The average loan size and saving amount among female borrowers were 23,162 Br. and 3,159 Br., which are only 48.2% and 30.6% of their male counterparts, respectively. Lack of opportunities to invest or fear of high risk of default could be the reasons for female borrowers to take small loans if they took it willingly. On the other hand, women's preference of small loan could also be associated with external barriers like poor access to productive assets like adult labor, knowledge or capacity deficiencies to work with large money, and low confidence of the lenders/(MFIs) in women clients. Some traditional customs of communities could also discourage women to engage in some activities that are considered to belong to of men. The project, therefore, should work to enhance the capacity of

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[3] This loan size, however, varies between 28,392 Br in the case of MFI and to 81,581 Br. in RUSACCO's which are member-based organizations where data shows that the distribution of loan is skewed, indicating the concentration of loan in the hands of a few individuals.

women to use and/or access large credit money, along with their effort of enhancing credit access to women.

In terms of loan use, majority of sample households used the loan for investment on farm and non-farm enterprises but most of it was directed to farming activities, such as buying oxen or other livestock and farming inputs. The next most frequent use of loan was as capital for trading and other non-farm businesses.

When it comes to savings, results indicate that the majority of the sample households(about 97%) have compulsory saving accounts, while only 3% have voluntary saving. The average savings under compulsory and voluntary savings were 5,013 and 5,602 Br., respectively.

4.2. Results from the Descriptive Analysis

This section provides results of the descriptive statistics on selected variables to acquaint readers with the welfare, socio-economic, demographic, and institutional characteristics of the sample households.

The effect of participation in the RUFIP project is measured in terms of the following six variables: agricultural production and productivity, food security, asset ownership (in terms of household durable assets, livestock ownership and land), income and poverty, and women empowerment and environmental effect in terms of soil and water conservation activities, tree planting and modern livestock management practices.

While the above six variables were found important to learn the potential effect of the RUFIP-II project on participant farm households, another important feature of the project design is that it included "treatment" and "comparison" groups for sample households drawn both from the MFI (Micro-Finance Institutions) and RUSACCO (Rural Saving and Credit Associations) which act as financial intermediaries between RUFIP-II and beneficiaries of the project, and farm households in the study areas.

- Assets Ownership and Changes

Household assets are important indicators of household wealth as well as impact of projects like RUFIP II on beneficiary households. In this study, assets are measured in terms of household durable assets, livestock, and land. Descriptive results on assets ownership by sample households (presented in Annex Table 1) are discussed as follows.

The result indicates the relatively better position of farmers having access to financial services in almost all of these variables. Survey data indicates that sample households in the treatment group (beneficiary households) are better-off when compared to their fellow households in the comparison group. The average farmer in the treatment group, for instance, owns household and farm assets (excluding livestock and farmland) worth 12,017 Birr during the survey year, which is 56% higher than that of the average farmer in the comparison group. While these differences are found statistically significant, assets of farm households (in the treatment and comparison groups) have grown at different rates over the project period.

Survey result indicates that the value of household durable assets (in nominal terms) for treatment and comparison groups grew on average by 24% and 16% per annum, respectively. In real terms (i.e. considering average inflation rate during the project period), these growth rates decline to 15%

and 7%[4]. As the gap in the average ownership of assets expands in favour of farmers in the treatment group, this improvement could be attributed to the RUFIP II project which enables farmers to have better assets.

Similarly, households in the treatment group own larger farmlands. The average farmer in the treatment group owns 1.40 ha, which is 17.6% higher than his/her counterpart from the comparison group. This difference is statistically significant.

The survey result indicates that 77% of households (or any member in their household) own mobile phones, which, on average, was reported to value 1,199 Birr. As shown in Table 3.10 the disparity between the treatment and comparison group in terms of mobile phone ownership is marginal. Similarly, among the 298 households who own a television set, 64% and 36% are from the treatment and comparison groups, respectively.

In terms of livestock ownership, the average farmer in the treatment group owned 2.91 TLU in 2018/19 which is 20% higher than what he/she had owned at the beginning of the project in 2013/14. Similarly, ownership of livestock has grown by about 15% from 2.07 TLU in 2013/14 to 2.39 TLU in 2018/19[5].

Ownership of oxen, which indicates farmers' improved access to source of power for ploughing, has also increased over time. The proportion of farmers with no ox declined from 15.5% to just 4.9% during the project period, as those with one and two or more oxen increased from 19% and 33% to 24% and 39%, respectively, over the project period (see Annex Table 1). The trend in oxen ownership, however, is not peculiar to farmers in the treatment group. Farmers in the comparison group have also improved their ownership of oxen as those with no ox declined from 11.7% to 4.7%, while those with one and two or more oxen increased from 13% to 17%, and 28% to 31% during the project period.

- Agricultural Activities

The survey result shows that about 87% and 78% of farmers in the treatment and the comparison groups were engaged in farming, indicating that crop farming is the major source of livelihood for farmers in the study areas. In general, a total of 1625 hectares of land was cultivated and about 24837.78 quintals of crops were harvested during the *Meher* season in the study areas. Of these, cereals account for the largest share both in terms of cultivated land and annual crop yield. More specifically, cereals represented about 71% of the total cultivated land and about 72% of the total annual crop production during the same season.

The average cultivated land during a *Meher* season for a typical household in treatment and comparison groups is about 1.28 and 1.18 hectares, respectively. A mean difference test between treated and comparison households shows statistically significant difference in size of cultivated land between the two groups. More specifically, on average, a household that has access to credit cultivates 0.16 more hectares of land than the average household in the comparison group. Substantial portion of surveyed farmers purchased agricultural inputs and employed hired labor for their farming operations. On average, 70% and 52% of the farmers in the treatment group utilized purchased inputs and labor and spent on average about 4,812 Br, which is about 18% higher than the average cash expenditure by the average farmer in the comparison group.

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[4] The National Bank of Ethiopia 2017/18 report indicates that the average national inflation rate for the 2013/14 – 2017/18 periods was 9.2%.

[5] One TLU is about one ox/cow, and 8.4 sheep/goats.

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On average, a farm household in the treatment group harvested crops worth 28,314 Br which, again, exceeds the value of crop harvested by the average farmer in the comparison group by about 18%. In terms of participation in the output market, the survey result indicates that about 30% and 33% of crops (in value terms) produced by treatment and comparison households, respectively, were sold in the market. In other words, close to 70% of the crops produced were consumed at home.

A substantial portion of surveyed farmers were also engaged in livestock production and marketing activities, indicating that a mixed-farming system that combines crop and livestock activities is common in the study areas. During the survey year, about 71% of the sampled farmers who got credit bought livestock while 45% of them sold live animals. The corresponding figures for farmers in the comparison group were just 37% and 32%, respectively, indicating the positive role access to credit played in livestock related activities. Similarly, sampled farm households were engaged in renting-out animals (either for farming or transport) and sold livestock products. The result indicates that farmers in the treatment group generated about 3,127 Br from these activities, while their counterparts in the comparison group generated only1,910 Br from the same activities.

- Non-Farm Activities, Enterprises, and Income

Most of the sample farm households have one or more members who are engaged in one or more supplementary income generating activities. Survey result indicates that, on average, 55% of the sample households had one or more member who participated in one or more of these non-farm activities.

Excluding remittances households could get from relatives working in other areas (within country or abroad), the average sample households earned 1,887 Birr from non-farm income sources in any average month (during the survey year). There is, however, a significant difference between households in the treatment and comparison groups. The average household in the treatment group generates 2,127 Birr/month, which is 29% more than the average non-farm income of his/her counterpart in the comparison group.

Households in treatment group are in general more active both in terms of their participation and degree of participation in non-farm activities. The difference, however, becomes significant and notable in some types of non-farm activities, like trade and hotel-keeping, which are relatively more lucrative and also demand reasonable amount of working capital, which indicates the role of the rural credit system made available for these group of households.

- Income

Farmers in the study areas derive their income from crop and livestock farming and trade, non-farm activities, and remittances. Products and services produced and sold in cash as well as products produced but consumed by the producers themselves on farm. Considering all these sources, the average sample household in the treatment group earned Birr 71,526 during the survey year, an amount that exceeds the average income of average household in the control group by 30%[6].

Farmers in the treatment group surpass their counterparts in the control group in all of the three income sources. But the disparity associated with income from non-farm sources and livestock activities is by far the largest and contributed over two thirds to the total income disparity between the two groups.

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[6] Remittances survey farmers received during the survey year are not considered in this estimation.

- Poverty and Food Security

Since 2000, when Ethiopia had one of the highest poverty rates in the world, households have experienced a decade of remarkable progress in well-being and the country has seen a 33 percent reduction in the share of the population living in poverty (In general, poverty in Ethiopia fell from 44 percent in 2000 to 30 percent in 2011 (World Bank Group, 2015)). In 2015, poverty rate at $1.9 a day for Ethiopia was reported at 27.3 % (NPC, 2017).

Table 3.21 summarizes the percentage of sample households that live below food and absolute poverty lines that is computed based on the official poverty lines indicated in Table 3.20. The head count index for absolute poverty (the share of the population who cannot afford to buy the threshold level of a basic basket of goods, both food and non-food) for all sample groups is close to 8%. On the other hand, the food poverty level is about 2%, indicating that only 2% of the sample households cannot generate sufficient income to meet their basic food consumption requirement. The above statistics indicate that poverty level among sample households is about a third of the level at the national level.

Compared to farmers in the comparison group, poverty levels in the treatment group are in general lower although the disparity is relatively low: 6.8% of households in the treatment group fall below the absolute poverty line compared to 8.9% of households in the comparison group. Similarly, only 1.4% of households in the treatment group and 2.6 % in the comparison group fall below the food poverty line.

- Food Security

Food security is measured in two ways that include households' perception of their own food security and based on their food consumption score (FCS) which classify households into three groups based on their food consumption over the preceding seven days prior to the survey.

Majority (i.e. about 86%) of the sample households in the study areas have reported that they had not faced any food shortage during the last 12 months preceding the study. Of the total (215), households that had faced food shortage, 63% are those that do not have access to finance - either micro-finance institutions (MFIs) or rural saving and credit associations (RUSACCOs). This could be taken as a preliminary result supporting the claim that improved access to rural finance has a positive impact on households' food security.

On the other hand, classification of households based on their food consumption score (FCS) shows that about 6% of the sample households are found to be food insecure while 31% of them are on the borderline. The classification shows that high percentage of households, about 58%, are food secure. Again, households that have access to rural credit and saving services have better FCS. The proportion of households with poor food security profile is 4.4% among households having access to rural financial services, while it is almost 85% more among households who do not have access to financial services. Similarly, about 60% of the households that have access to finance have acceptable food security profile while the figure is about 68% for households that lack access to rural finance.

- Sustainable Management of Natural Resources (NRM)

Sustainable management of natural resources is a major area of policy concern and intervention of the Ethiopian government and its development partners, like IFAD, which financed the RUFIP II program.

In this study, sustainable NRM is measured in terms of soil and water conservation activities (SWC) like soil and stone bunds, bench terrace, check dam and cut-off drain, tree planting, and improved environmentally friendly livestock management activities, like zero grazing, hay production/purchase and fodder production.

Survey result indicates that farmers with access to rural financial services have been better in all of these three indicators. They have planted more trees, engaged more in SWC activities, and practiced improved livestock management practices more frequently.

The difference between farmers with financial services and those without, however, is statistically insignificant in all cases, except for livestock management practices.

- Women: Participation and Empowerment

The survey result also indicates the positive impact of rural financial services on women – both in terms of their participation and empowerment that help them to create new avenue to engage in real or independent economic activities.

In terms of participation, on average about 56% of women from the sample households have taken loans, while 51% of them have savings account (largely compulsory saving account), though both their loan and saving size is significantly lower than their male counterparts. As results from the econometric analysis, which are discussed below show, sex of household heads is not significantly influencing households' decision to access credit, so the relatively high access or participation of women especially in the MFI's credit system might be associated with deliberate decision of the MFIs rather than any differences in women's and men's values (for credits) *per se*.

Women empowerment is defined in this study as creating a circumstance which helps them to do and accomplish what they cannot otherwise. Accordingly, against the 56% participation in formal credit services, only 6% of them had taken loan from formal institutions prior to the RUFIP II project. On the other hand, 45% of women creditors invested the loan for their start-up largely in livestock and non-farm business activities. On the other hand, 56% of women beneficiaries had independent non-farm income earning activity/business before receiving loan, so they invested their loan for expansion of their existing small business activities.

In general, the great majority of women believe that their lives have changed significantly and positively due to their access to financial services in various ways, ranging from increased participation in economic activities and creating independent income sources, to improved decision-making power in some important household affairs.

4.3. Results from Econometric Analysis

4.3.1. Determinants of Participation in the Rural Credit Schemes

After running the necessary diagnostic tests (multicollinearity and heteroscedasticity), binary logistic regression model was employed to estimate coefficients and propensity scores to match credit user and non-user households on the observed characteristics. The dependent variable is binary 1 for households who have access to credit either from Micro Finance Institution (MFI) or Rural Saving and Credit Cooperative (RUSACCO) and 0, otherwise. Stata/SE software package version 14.2 is used to estimate the models. Model results are summarized and presented below in Table 1.

Figure 4.1: The binary logistic regression model estimation results

Variable	Coefficient	Std. Err.	Z
Location (categorical)	-0.05600	0.04482	-1.25
Distance from marketplace (km)	0.0058	0.00689	0.84
Household size (number)	0.1362***	0.03308	4.12
Sex of household head (1 = Male)	-0.1422	0.15316	-0.93
Age of household head (years)	0.3749***	0.12676	2.96
Educational status of household head (years of schooling)	0.01856	0.01420	1.31
Age of household head squared	-0.00706***	0.00247	-2.86
Age of household head cubed	0.00004**	0.00002	2.52
Age/birth cohort 2 (dummy; 1 if born after 1974 and before 1991)	0.10054	0.23901	-0.42
Age/birth cohort 3 (dummy, 1 if born before 1974)	0.07184	0.39305	0.18
Area of own cultivated land (hectares)	0.17683***	0.04952	3.57
Constant	-6.4151***	2.06161	-3.11

Number of obs. = 1,481
LR chi^2(10) = 111.97   Log likelihood = -970.1516
Prob > chi^2 = 0.0000   Pseudo R^2 = 0.0546

Note: ***, ** indicate significance at less than 1 and 5 percent probability levels, respectively.
Source: Computed based on the survey data.

The logistic regression results portrayed the relative importance of the various demographic and socioeconomic factors that determine whether households decide to access credit. It is revealed that household size, age of household head (linear, quadratic), and area of own cultivated land (excluding rented-in and sharecropped-in land) are statistically significant in determining access to credit, at a probability level of less than 1 percent. The cubic form of age of household head appears to be statistically significant at a probability level of less than 5 percent. Existence of a positive effect of age and a negative effect of age squared means that as people get older the effect of age is lessoned by a probability level that is close to 1 percent. Yet, presence of a positive effect of age cubed means having lived for many years leads to an increased and sustained use of credits by a fractional probability of less than 1 percent. The above results clearly show that rural households' decision to participate in the MFI and RUSACCO financing options are framed and mediated by the above listed important variables.

To be specific, the likelihood that a rural household head participates in the rural credit scheme is higher for large households and those owning larger areas of own cultivated land. The computed coefficient implies that a unitary increase in the area of cultivated land and household size will increase the probability of accessing and using the rural credit programs by about 18 and 14 percent, in that order. The possible explanation is that households with large family size and owning large areas of cultivated land are more likely to look for credit. But why?

The age variable indicates that the likelihood that the head of household opts for credit use is high at early ages and sustained at later stages of their lives as well, while the likelihood becomes smaller for the middle-aged groups. Overall, it seems that small sized households, owners of a relatively small area of cultivated land and middle-aged household heads were less likely to make use of rural credit schemes.

In contrast, living and operating on farms situated in different geographical locations (regional differences across various states), distance from market centers which can also be a proxy for proximity to provision of financial and other agricultural services, sex of household heads (not only differences in women's and men's lives *per se*, but includes those which lead to social and economic inequity in opportunities and other dimensions of livelihoods), educational status that is often associated with an information seeking behavior and informed decision making, and

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intergenerational differences (birth or age cohorts) are not significantly influencing households' decision to access credit.

4.3.2. Distribution of Predicted Probabilities for Treatment and Households

After the probability scores for treated and comparison households are estimated, the common support region must be mapped using propensity score distribution of credit user and non-user sample households. Accordingly, the Kernel Density estimates are made for both groups and the distributions are plotted in Figure 2. This figure portrays that there is an overlap in the range of propensity scores across treatment and comparison groups (the "area of common support"). This means that, for all values of characteristics X, there are treated and non-treated households, the treated households' curve being slightly skewed to the right. Close inspection and assessment of the plot further shows that the distribution of treatment and comparison propensity scores is balanced in terms of measured covariates, implying that mean propensity score is equivalent in both treatment and comparison groups.

Figure 4.2: Density estimates for treated and comparison households before matching
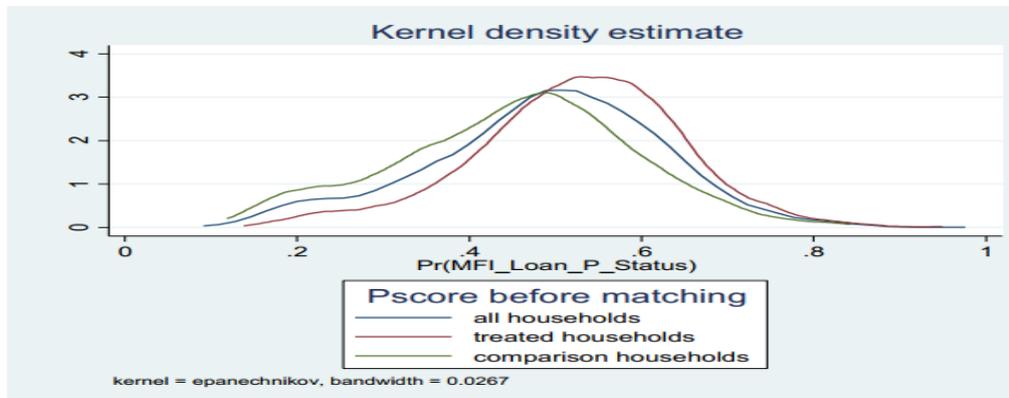
4.3.3. Impact of Credit Access on Rural Households' Welfare

Choosing and reporting the primary treatment effect of interest is a point of contention among researchers and evaluators. Having this in mind, estimations of both Average Treatment Effect (ATE) and Average Treatment Effect on the Treated (ATT) were carried out in the present study. This was done by implementing a one-to-one Nearest Neighbor (nn1:1) matching after the pre-intervention differences were controlled. (The estimation results of ATE and ATT are reported in Tables 2a and 2b, respectively). However, for ease of exposition and in view of the evaluation objectives, most of the interpretations and discussions of obtained results in this section of the report focus on parameter estimates of the ATT (considering the average treatment effect of interest is the ATT depicted in Table 2b); whilst extending the ideas for the interpretation of estimated parameters of ATE is often straightforward and can be done in a similar manner. In fact, the key evaluation question (of a policy nature) that we are trying to address is "How would credit access impacts the welfare of participants in the program?", which could be easily addressed through understating results under the average treatment effect on the treated or ATT.

Table 4.1: Estimations of the Average Treatment Effect (ATE) in the PopulationNote: ***, ** and *

Outcome Variable	Coefficient	AI Robust Std. Err.	Z
1. Household Income and Assets			
Value of assets owned (Birr)	2146.903**	846.2523	2.54
Total area of cultivated land (ha)	0.0583883	0.0609585	0.96
Total amount of saving (Birr)	5933.687**	238.122	2.48
Income from off/non-farm activities (Birr)	9100.93***	2385.775	3.81
Livestock holding (TLU)	-0.125368	0.1729737	-0.72
On-farm income (Birr)	2367.22***	707.8343	3.34
Transfers (Birr)	-437.2289	304.4631	-1.44
2. Human, Social Capital and Empowerment			
Micro-insurance scheme-credit life insurance (dummy)	0.63673***	0.0230965	27.57
Mean educational level of household members (schooling years)	0.1668166	0.1252895	1.33
Having land holding certificate (dummy)	-0.05000	0.0430947	-1.16
3. Food Security and Agricultural Productivity			
Food Consumption Score (index)	3.12998**	1.209232	2.59
Teff productivity (quintal /ha)	0.0187767	0.3686282	0.05
Wheat productivity (quintal /ha)	0.3720654	0.516595	0.72
Barley productivity (quintal /ha)	-0.0447339	0.3835314	-0.12
Maize productivity (quintal/ha)	2.0074****	0.7273585	2.76
Sorghum productivity (quintal/ha)	0.0718439	0.4810244	0.15

Treatment-effects estimation	Number of obs. =	1,481	
Estimator: propensity-score matching	Matches: requested =	1	
Outcome model: matching	Min =	1	
Treatment model: logit	Max =	2	

indicate significance at less than 1, 5 and 10 percent probability levels, respectively.

 Source: Computed based on the survey data.

After running the model-fitness tests and checking robustness of results, the following interpretations are provided with respect to each outcome variable falling under different categories of welfare outcomes (household income and asset, human and social capital, and food security and agricultural productivity). Broadly speaking, results provide supportive evidence of statistically significant effect of access to credit on the welfare of the sampled beneficiary households. Findings of this evaluation study are also in congruence with the well-established notion among the academia, researchers and the community of practitioners that access to credit is one of the main drivers required to accelerate growth and improve welfare in the developing world. Remarkably, strong welfare effects of access to credit services are observed through various categories of outcome variables, with an exception of outcome variables that are related to natural resources and environment. Average treatment effects on the treated (Table 2b) individuals that show clear and significant causal impacts of access to credits on various outcome variables are presented and discussed below.

Table 4.2: Estimations of the Average Treatment Effect on the Treated (ATT)

Outcome Variable	Coefficient	AI Robust Std. Err.	Z
1. Household Income and Assets			
Value of assets (Birr)	2080.9**	1045.284	1.99
Total area of cultivated land (ha)	-0.0084161	0.0823399	-0.10
Total amount of saving (Birr)	5446.751**	2420.118	2.25
Income from off/non-farm activities (Birr)	7180.501***	2409.011	2.98
Livestock holding (TLU)	-0.2492808	0.2468987	-1.01
On-farm income (Birr)	2648.625***	740.9193	3.57
Transfers (Birr)	-750.6916	468.1503	-1.60
2. Human, Social Capital and Empowerment			
Micro-insurance scheme- credit life insurance (dummy)	0.633471***	0.0174499	36.30
Mean educational level of household members (schooling years)	0.586158	0.1459929	0.40
Having land holding certificate (dummy)	-0.029316	0.0537349	-0.55
3. Food Security and Agricultural Productivity			
Food Consumption Score (index)	2.830567**	1.30504	2.17
Teff productivity (quintal /ha)	-0.0133565	0.4699823	-0.03
Wheat productivity (quintal /ha)	0.6424487	0.6031711	1.07
Barley productivity (quintal /ha)	-0.365787	0.4928575	-0.74
Maize productivity (quintal /ha)	2.309641***	0.8512427	2.71
Sorghum productivity (quintal/ha)	0.0440989	0.594665	0.07
Treatment-effects estimation		Number of obs. =	1,481
Estimator: propensity-score matching		Matches: requested =	1
Outcome model: matching		Min =	1
Treatment model: logit		Max =	2

Note: ***, **, * indicate significance at less than 1, 5 and 10 percent probability levels, respectively.
Source: Computed based on the survey data.

Outcomes related to household income and assets: Results show that access to and use of credit resulted in an improved asset building, better saving levels, higher off/non-farm and on-farm income levels. Access to credit seems to have supported on-farm and off/nonfarm income-generating activities in the study areas, contributing towards improvement in food security status and poverty reduction. The computed coefficients can be interpreted as follows:

For example, a positive coefficient of 2080.90 Birr for the value of assets means that credit user households who received credits from the rural financial institutions will, on average, build their assets by around 2080.90 Birr more per year than their counterparts who did not obtain credits. Similarly, a negative coefficient of -750.69 that corresponds to income transfers implies that income transfers that used to be secured by credit user households in the forms of PSNP/HFA or remittances or other forms will decline by around 750.69 Birr less per year than their counterparts' who did not access credits. All other coefficients of statistically significant variables under ATE and ATT can be interpreted in a similar manner.

Outcomes related to Human, Social Capital and Empowerment: Under this category, a single variable appears to be significantly impacted by having access to credit. The evaluation found that access to credits resulted in increased purchase of micro-insurance policy (credit life-insurance) that allows households to deal with idiosyncratic and covariate risks. Precisely, the positive coefficient of 0.63 that corresponds to a dummy variable micro-insurance scheme states that a decision to access the rural credit programs will increase the likelihood of using credit life insurance

by 63 percent. The implication is that supply of affordable and client-centered insurance products is positively and significantly related to access to financial services. This financial service product would obviously help the credit user households in the study areas to become more resilient to negative financial and other types of shocks. It would also contribute towards creation and strengthening of sustainable rural livelihoods.

Outcomes related to Food Security and Agricultural Productivity: Results indicate that the food security status of households who received credits from the rural financial institutions will, on average, be improved by 2.83 scores more per year than that of their counterparts who did not obtain credits. Here, there is a strong indication that households that are cash-strapped but possess adequate household and land sizes could benefit from access to credit, and a subsequent attainment of increased productivity could guarantee their food security.

Discussions

The welfare impact of access to microcredit on households has been much debated in the literature. Several studies (Khandker, 2005; Ashaolu, 2011; Quibrai, 2012; Asmamaw, 2014) have shown the positive impact of access to credit on asset accumulation, poverty reduction and households' standards of living. These studies suggest that access to financial services improves households' welfare through two channels. The first is through increased productivity of human and physical capital due to loan. This is based on the traditional augment that loans can temporarily enhance a households' productive capital, both human and physical. Furthermore, access to credit can increase a household's risk-bearing potential, leading to the adoption of more risk but potentially more profitable income generating activities. The second channel access to financial services positively affects households' welfare is through reduction of poverty by decreasing rural households' cost of self-insurance. Stated differently, improved access to credit, savings, and insurance services can induce changes in household assets and liabilities.

On the other hand, some studies (Coleman, 1999; Adams and Pischke, 1992; Islam, 2008; Banerjee et al., 2009) suggest that credit does not have significant impact on physical accumulation of asset and production. According to the authors, the rural poor, mainly women, ended up in a vicious circle of debt as they used up the money they borrowed from formal institutions for consumption and were forced to borrow from money lenders (informal money lenders) at high interest rates to repay the loans they borrowed from formal institutions so as to qualify for more loans. Thus, according to these authors, credit is not an effective tool for helping the poor to enhance their economic condition and that the poor are poor because of other factors (such as lack of access to markets, price shocks, inequitable land distribution) but not because of lack of access to credit.

Albeit the debates on the impact of access to credit on households' welfare, the result of this study shows that access to and use of credit resulted in an improved asset building, better saving levels, higher off/non-farm and on-farm income levels. This is in line with the findings of Asmamaw (2014) and Khadker (2005) in which the authors found access to credit have raised rural households' expenditure and improved their livelihood status. Another similar finding is in the study by Ashaolu et al. (2011) in which household income per hectare was found to be higher for households that are credit users compared non-credit users.

Contrary to the often-reported distress sale of assets among poor rural households, the study shows that improved access to credit service helps asset building of treated households measured in terms of the current value of productive and non-productive capital holding. The increase in the value of assets is also expected to allow households' coping capacity in the face of both internal and external shocks. The positive and significant relationships between access to credit and improved precautionary saving do also have implications for future consumption smoothening and easing of

the liquidity constraints. This is against the arguments of Coleman (1999) who suggests that access to credit is limited only to consumption smoothing of beneficiary households.

Regarding human, social capital and empowerment, the evaluation found that access to credits resulted in increased purchase of micro-insurance policy (credit life-insurance) that allows households to deal with idiosyncratic and covariate risks. Similarly, the study shows that food security status of households who received credits from rural financial institutions has improved compared to households that did not obtain the credit. Among others, this could be associated with the positive impact of credit on farmers' access to high quality seeds and fertilizers which, in turn, enhances their agricultural productivity.

However, in this study, it is found that only productivity of maize per unit area appears to be impacted significantly through accessing rural financial services while there is no significant evidence supporting the same claim for the remaining four strategic food security crops[7]. A relative availability of hybrid and non-hybrid maize variety seeds that is being multiplied and supplied by the public seed enterprise and seed producing primary cooperatives and unions, and availability of other externally supplied maize yield-enhancing technological packages accessed and used by the credit beneficiary households might explain a model result that hints an increase of maize yield by about 2.31 quintals per hectare per year.

A similar finding is that of Zeller et al. (1998) who found that participation in an agricultural credit program raises the use of hybrid maize and households' crop income in Malawi. This implies that the expansion of credit access can have crucial effects on agricultural production and the income of rural farmers. Fengxia et al. (2010) have also found a positive relationship between access to credit and agricultural production in Nicaragua. The authors pointed out that access to credit reduces the pattern of structurally unbalanced growth of agriculture in Nicaragua.

Outreach is important for microfinance institutions in general and their women clients in particular. This study has examined the role of access to credit on women's empowerment, which is measured in terms the scale of participation in the credit scheme and potential role of this in creating new opportunities for women. The results from the descriptive analysis show that the percentages of women that have participated in the credit program has increased over the course of the program. Similarly, the percentages of women that have received loan and invested for the start-up and expansion of the existing business have significantly increased during the implementation period of the program. Though the average microloan size among women borrowers is low, the improved access to credit and investment opportunities could contribute to women's empowerment and enhance gender equality, and promote sustainable livelihoods and better working conditions for women.

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[7] These crops include Teff, wheat, Barley and Sorghum

5. CONCLUSION

This paper looked at the role of access to financial services on the welfare of farm households in Ethiopia. The study used national survey data collected at the end-evaluation of RUFIP-II project, an integrated and a compressive program which supported the entire rural financial sector. The program involves a number of stakeholders from beneficiary communities and households at the grass root level to financial intermediaries (MFIs and RUSSACOs) and other agencies (IFAD, DBE, NBE, AMEFI, FCA, RCPBs, etc.) that are tasked with financing, program implementation, support in capacity building, and policy formulation.

From analysis of this study one can conclude that improved access to finance contributes to the country's efforts to reduce poverty. This is achieved in many ways that include extending outreach size and amounts. The project has improved access to finance among underfinanced segments of the population and increased the microloan size an average borrower could get otherwise (i.e. without the project). The average loan size is more than four times of the average microloan size of MFIs operating in the rural part of the country. This enhances the probability of microloans use in economically productive activities through providing working capital for startup or expansion of non-farm business and investment in agriculture and livestock related activities.

Study results from the econometric analysis showed clear and strong evidence that access to financial services has resulted in meaningful economic and social benefits. The main findings of the evaluation study have mirrored that households' accessibility to rural credits could liberate the user population from poverty through building of household assets and improved incomes, encouraged savings, realized better food security status, improved market participation and capacity to deal with the vagaries of climate change through use of improved crop varieties tolerant of extreme climate conditions, *inter alia*.

As women constitute over 50% of the borrowers, the project seems to invest among the segment of the population where poverty could probably be high and default is low which could, in turn, contribute to better poverty reduction, and financial sustainability among the financial intermediaries. However, women's role in terms of other important credit portfolio indicators is very low. The average loan size and saving amount among female borrowers, as indicated earlier, is only 48.2% and 30.6%, respectively. These disparities among female and male borrowers, on the other hand, indicates the corresponding disparity either in barriers to access or capacity to absorb relatively large credit amount along the gender lines. The project, therefore, should work on enhancing women borrowers' capacity to use and/or access large loans.

On the other hand, findings from the econometric analysis show that credit user households were more likely to be large sized, owners of large areas of cultivated land, and either young or at their old ages. Policy measures that aim to reduce poverty and alleviate food insecurity should consider that the poorer households with land and labor shortages remain to be credit constrained (still left out) as such households were not found to access and use credits. Thus, the contribution of rural microfinance institutions to the welfare of smallholder households can be limited if credit provisions do not take into account needs of different segments of the rural livelihoods. It seems that accessing credit is risky for those households having less area of land and labor supply constraints – particularly in the face of an ever changing and dynamically evolving external environment.

As discussed in this paper, RUFIP-II primarily offers short-term credit largely for seasonal inputs such as seeds and fertilizer, livestock purchase and working capital for small business; the program rarely offers longer-term credit for purchasing capital equipment. The program outreach is also relatively low both in terms of the number of clients it serves and geographic expansion especially to underserved pastoral areas. Any intervention to address these shortcomings, however, demands a range of supports by diverse stakeholders that include the government, its development partners, and the private sector.

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ANNEX

Table 1: Descriptive Results[8]

	Unit	Treatment group		Comparison group	
HH Asset Ownership					
• Value of HH Durable Assets - 2018/19	Birr	12,017		7,658***	
• Value of HH Durable Assets - 2013/14	Birr	5,402		4,285	
• Mobile	% owned	77%		53%	
• Motorcycle & Bicycle	% owned	6.3%		5.0%	
• Television	% owned	25%		14%**	
• Irrigation pumps	% owned	2.2%		1.7%	
Land					
• Owned	Ha	1.41		1.19**	
• Cultivated	Ha	1.36		1.18***	
Livestock Ownership		2013/14	2018/19	2013/14	2018/19
• TLU/HH	TLU	2.49	2.91***	2.07	2.39***
• NO Ox	% owned	15.5%	4.9%	11.7%	4.7%
• One Ox	% owned	19.2%	23.8%	12.8%	17.2%
• Two Oxen	% owned	32.9%	38.9%	28.4%	30.9%
Crop Farming, Marketing and Commercialization					
• HHs engaged in crop farming	% HHs	86.6%		77.8%	
• HHs purchased agricultural inputs	% HHs	70%		59%	
• HHs hired labor for farming operations	% HHs	52%		46%	
• Average cash expenditure for inputs and labor	Br./HH/Annum	4,813		4,082	
• Gross income (Value of crop produced, VCP)	Br./HH/Annum	28,314		24,012***	
• Net income (VCP less cash expenditure)	Br./HH/Annum	23,501		19,930**	
• HHs sold their crop	% HHs	80.8%		75.6%	
• Value of crop sold	Br./HH/Annum	8,399		8,027***	
• Commercialization (value of crop sold as produced)	%	30%		33%	
Livestock Farming, Marketing and Commercialization					
• HHs sold livestock	% HHs	45%		32%	
• HHs bought livestock	%HHs	71%		36.8%	
• HHs sold livestock products	% HHs	30%		21%	
• Value of Livestock Sold	Br./HH/Annum	12,565		9,301**	
• Value of Livestock Purchased	Br./HH/Annum	10,929		7,154***	
• Value of Sold Livestock Products	Br./HH/Annum	2,602		653**	
• Income from Renting Animals (for farming or transport)	Br./HH/Annum	2,525		1,267	
Non-Farm Activities (NFAs)					
• HHs taking part in NFAs	% HHs	57%		53%	
• Gross income from NFAs	Br./HH/Annum	25,520		19,759**	
• Expenditure for NFAs	Br./HH/Annum	4,432		3,309**	
• Net Income from NFAs	Br./HH/Annum	21,088		16,450***	
Income and Poverty					
• HH Gross Income[9]	Br./HH/Annum	71,526		54,988	
• HH Net Income	Br./HH/Annum	51,352		40.449	
		1.4%		2.6%	

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[8] If year is not indicated, any data in the report refers for the survey year (2018/19).

[9] Any income from government/non-government transfers and remittances are excluded.

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• Food Poverty[10]	% below poverty line	6.8%	8.9%
• Absolute Poverty			

Agricultural Productivity (Yield)			
• Cereals (All)	Qt./Ha	15.7	15.3
o Maize	Qt./Ha	19.4	18.1*
o Teff	Qt./Ha	11.2	10.3*
o Wheat	Qt./Ha	16.4	16.1
o Barely	Qt./Ha	14.9	14.5
• Pulses Aggregate)	Qt./Ha	11.7	11.4
• Oilseeds (Aggregate)	Qt./Ha	7.6	6.3

Modern Farm Inputs Use			
• Input Users			
o Fertilizers	% HHs	17.2%	15,1%
o Improved Seeds	% HHs	10.1%	7.0%
o Pesticides/Herbicides	% HHs	16.4%	11.2%
• Intensity of Input Use			
o Fertilizers	Kg/Ha	223	199
o Improved Seeds	Kg/Ha	37	25***
o Pesticides/Herbicides		5.9	15.8

Food Security			
• HHs reported food security problem	% suffered	23.8%	37.4%
• HHs Food Security Profile based on Food Consumption Score (FCS) range			
o Poor (FSC: 0-21)	%	4.2%	8.0%
o Borderline (FSC: 21.5-35)	%	33.5%	38.1%
o Acceptable (FCS:>35)	%	62.3%	53.9%

Soil and water conservation (SWC) and Natural Resource Management practices of sample households			
• SWC practices			
o HHs practiced SWC practices[11]	%	43.1%	33.7%
o Area of land under SWC practices	Ha	0.9	0.8
o Cash expenditure for SWC practices	Br./HH engaged	110	73
• Tree Planting			
o HHs planted trees	%	37%	30%
o Number of trees planted	No.	7	5
• Livestock feeding and management practices	%	40%	30%***
o Purchased livestock feed	%	11%	0***
o Used loan to buy livestock feed	%	29%	24%
o Practice Zero grazing	%	29%	22%**
o Practiced hay production	%	12%	9%***
o Engaged in fodder production			

Women Participation and Empowerment (data for women			
• Participation			
o % of women taken loan	%	53.5%	
o Average loan size	Br./woman	23,162**	
	% of men borrowers	48.2%	
		3,159**	
o Average saving	Br./woman	30.6%	

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[10] As discussed in the text, poverty is measured based on income-approach.

[11] Soil and water conservation (SWC) practice includes soil bund, bench terrace, stone bund, check dam or cut-off drain. Chi2 test has confirmed a statistically significant difference (at 0.005). All NRPs indicate

• Empowerment	%	47.8%
o % of women taken loan for first time		45%
• Loan Use	%	
o Start-up (i.e. women having no prior independent economic activity)	%	54%
o Expanding existing business activity i.e. women having no prior independent economic activity)		
N	780	779

***, ** and * indicates statistical significant difference at 0.01, 0.05 and 0.10 levels (in the mean difference between the treatment and comparison groups) respectively.