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Influence of Micro-Finance Services on Farm Households Income: *The Case of Oromia Credit and Saving Share Company-Kuyu Branch, Ethiopia*¹

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Abstract

The paper analyzes the influence of microfinance services in improving economic performance of farm households using data collected from 100 randomly selected households. Descriptive analysis of the changes in income level between the baseline and survey year was made whereas binary logit model was used to analyze the determinant of incremental income.

The results revealed the existence of improvement in the household income of the clientele. Microfinance service related variables such as proper utilization of the disbursed loan, average loan size, appropriateness of loan disbursement schedule, and access to required amount of loan were found to be significant factors influencing the incremental income of the clientele. Other determining factors include land holding, shortage of draught animals, and distance to market.

The policy implications of the results tend to emphasize on the importance of supervision of loan service, improved loan schedules, proper identification of feasible business plan, income diversification of the clientele, and strengthening market access.

Keywords: Determinants, micro-finance, clientele, credit, logit model, Ethiopia

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1. Introduction

Similar to the other sub-Saharan African countries, the socio-economic situation of Ethiopia is characterized by low growth of income, inadequate social services, high population growth, economic inefficiency, and high unemployment rate, etc. resulting in severe poverty. As a result, diseases, malnutrition, and illiteracy are wide spread affecting more seriously women and children (Tsehay and Mengistu, 2002). Poverty also severely affects investment, which further leads to vicious poverty cycle due to lack of investment capital.

As poverty is a multidimensional problem, its solutions are multifaceted. In the Agricultural Development Led Industrialization (*ADLI*) strategy of Ethiopia, rural finance has been considered as an important tool for agricultural development and food security. Moreover, the Ethiopian Sustainable Poverty Reduction Strategy (*SPRSP*, 2002) underlines the importance of micro-finance institutions in poverty reduction and sustainable development. From the assessment of the Grameen Bank and even the experiences of some Micro-finance Institutions (*MFIs*) of Ethiopia, one can identify a number of best bet practices as well as challenges in the sector (Belay, 2001). Even though it cannot be a panacea – universal-remedy for poverty and related development challenges, micro finance is an important tool in the poverty eradication program. It can play an important role in facilitating the realization of rural development, and empowering the poor through provision of financial means to increase income and access to social services thereby creating confidence and self-esteem (Wolday, 2002). Micro-finance institutions provide suitable financial and other services using innovative methodologies and systems at low cost to meet the needs of low income sections of the population and act as intermediaries in a genuine sense (Wolday, 2000).

Oromia Credit and Saving Share Company (*OCSSC*), which was established in 1997, is one of the 21 licensed *MFIs* in the country with 70 branches and 50,815 clienteles and loan outstanding of about 43.4 million (*OCSSCOAR*, 2002). The company operates in 190 districts in Oromia and About 99% of the clientele of the company are from rural areas.

2. Statements of the Problem

The major objective of the OCSSC is improving the living conditions of rural households through mobilization of saving and provision of credit. Hence, it is expected that the income of clientele households would increase. Some anecdotal observations⁵ on the ground, however, show that there are mixed influences of credit provisions on the incremental income of the clienteles. USAID (1995) revealed that financial schemes of institutions that do not follow sound, sustainable financial principles and facilitate real economic growth might cause more harm than good. A similar study by Pischke et al. (1966) recommended that NGOs offering credit and other financial services should be subjected to national standards and adoption of appropriate standards.

Limited access by rural farm households to financial services is widely recognized in Ethiopia. According to the Microsoft Project Document of UNDP (1999), the economically active but poor in Ethiopia who can potentially access financial services are about 6 million out of which about 8.3% have gained access to the licensed microfinance institutions. Scaling up of the financial services provided by microfinance institutions requires identification of supportive features that are acceptable to the clienteles. Accordingly, it is imperative to analyze the influences of microfinance parameters and other factors affecting the household income in order to provide empirical evidences on the extent of influence of microfinance services. The major question to be answered is whether variables associated with microfinance service significantly contribute to incremental household income or not.

This study was, therefore, designed with the objectives of analyzing the influence of micro-finance services on the incremental income of the target households and identify instruments of microfinance services such as loan size, loan scheduling, utilization, etc. that would affect the performance of microfinance services.

3. Microfinance Services in Ethiopia

Provision of financial services could be made through saving and credit functions. Both functions could be provided from informal and formal financial markets. Micro-

⁵ *The major author worked for the company and had informal discussions with the clienteles regarding the benefits of the loan disbursed.*

finance institutions are among the formal financial institutions targeting the poor both in urban and rural areas. Micro finance institutions started operations in the country following the issuance of Proclamation No. 40/96, which regulates the businesses of micro finance in the country. The National Bank of Ethiopia, that is the licensing authority, has since then been issuing a number of guidelines that underpin the operation of micro finance institutions in the country. The major target groups of most of the MFIs operating in urban areas are women while the lion's share of the target groups are men in rural areas. These institutions have been trying to enlarge their client and area outreach for the last almost five years (Tsehay and Mengistu, 2002).

Even though few MFIs are being involved in managing the pension fund of Social Security Authority and money transfer, the provision of credit and saving products are the two most important financial products/services delivered by all MFIs in Ethiopia (Wolday, 2002). Loan products of MFIs in the country can be divided into two general categories: viz. agricultural loans and micro-business loans. The agricultural loans are loans for agricultural inputs, livestock production, bee-keeping, etc. The loans are usually term loans; the principal and interest are paid at the end of the loan term, which varies from one week to one year for all MFIs in the country.

Micro-business loans are loans for petty trade, handicraft, and other services, which are repaid weekly, bi-weekly, or monthly on a regular basis. The micro-business loans do have lower risks to MFIs portfolio management and loan loss as compared to agricultural loans, and they diversify household income. Saving is a precondition for investment and consumption smoothing and as a result, it can be an effective instrument to overcome economic shocks. The saving products include center savings, compulsory group savings, individual voluntary savings, and institutional voluntary savings.

Owing to small loan sizes and short loan period, which are major features of informal credit in both rural and urban areas of Ethiopia, the demand for products of MFI has been growing. According to Wolday (2000), delivery of microfinance services has been considered as one of the policy instruments to enable rural and urban poor increase output and productivity, induce technology adoption, improve input supply, increase incomes, reduce poverty and attain food security.

Microfinance institutions have a surmountable outcome and impacted individual households thereby raising their income level elsewhere and in Ethiopia. The Grameen bank in Asia is a case in point. In Ethiopia, few studies have established a relationship between microfinance institutions and household income. Samson

(2002) has indicated that Busa Gonfa Share Company of MFI operating around Modjo areas could increase household income through its lending scheme. However, only 30% of the households in the study area were able to access the service one of the reasons being resource constraint.

Grameen bank based lending methodology, which includes "center", group and individual structures, has been employed. "Center" savings are fixed amount of savings (at least one Birr) by each member per month at center level while group saving is a certain portion of the required loan (10% for OCSSCO) that is deducted and saved with the institution. Individual saving (which can be of compulsory and voluntary) is the amount (minimum of Birr two per member per month), saved by the clientele with the company. Other organizations, associations, and any body having legal entity with company make institutional saving.

The Oromia Credit and Saving Share Company (OCSSCO) was established in 1997, evolving from Oromia Rural Credit and Saving Scheme Development Project. The project had almost the same mandate as that of OCSSCO today, and commenced its operation in four districts/branches in four Oromia zones in February 1996. The branches were Kuyu of North Showa zone, Sinana-Dinsho of Bale zone, Hetosa of Arsi zone, and Shashamene of East Showa zone. This study was conducted in Kuyu branch of the company to assess the influence of the micro-finance services of the company on household economic situation between the year of establishment (1996) and the survey year (2002).

4. Conceptual Framework

Rural incomes fluctuate from season to season in response to weather shocks and related agricultural activities. Due to the risks affecting income levels and consumption, poor rural households in developing countries demand access to financial services to help stabilize income and consumption, and alleviate food insecurity (Zeller, et al., 1997).

Since farm households earn income from different sources, it is important to aggregate the income from different sources and include the different factors responsible for income generation in the incremental income model described in section 5.2, with major focus on the features of microfinance services. The major source of income is crop and livestock production the level of which is affected by

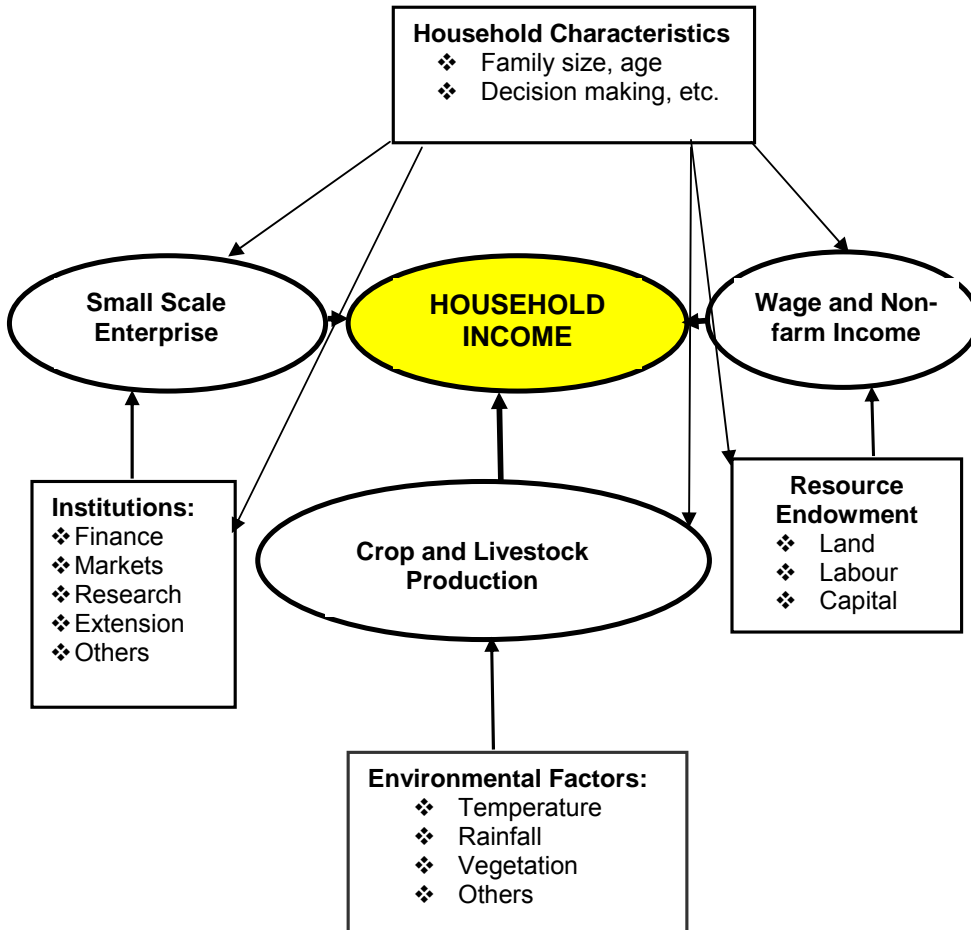
environmental factors such as soil, rainfall and temperature. The amount of production is also a function of the different factors of input such as land, labour and capital. Moreover, the decision-making and management skill of the household affects the factor combination and enterprise selection, thereby affecting the level of agricultural production and income. The level of output and the price of inputs and cost of production, which are determined through institutional factors and market forces, determine the income from agricultural production.

Another source of income is wage income which is affected by institutional factors such as labour market, labour mobility, wage policy, etc. Institutional factors play key roles in terms of finance, markets and research and extension services, which affect innovation and use of technologies, both in production and business sectors with ultimate impact on the utilization of credit received from microfinance institutions.

Another key factor determining the household income is micro-business or small scale enterprises which provide alternative or complementary job opportunities for both women and men in the rural and urban areas. The role of micro-finance institutions is considerable in creating access to financial services to enable income generation activities by engaging in small scale enterprises and use of production technologies to increase household income.

The extent to which microfinance services affect the income changes and improvements in the livelihoods of the clientele is determined by the company policies such as loan size, loan purposes, repayment schedules and other parameters. In this study, key variables illustrated in Figure 1 were included in the econometric model of incremental household income to determine the extent to which the microfinance services and associated policies contribute to the increase in household income.

Figure 1: Schematic Representation of Factors Affecting Household Income



Source: Own sketch

5. Methodology

5.1 Data

The data used in this paper were collected from farm households who have been clienteles of the OCSSCO for five subsequent years. In order to analyze the changes in the income of the clienteles, two types of data were collected and analyzed. Firstly, primary data were collected from 100 randomly selected from 2197 clienteles of the OCSSCO-Kuyu branch during the year 2002. Structured questionnaire consisting of variables relevant for attaining the objectives of the study were used for data collection.

Moreover, the baseline data that was collected by OCSSCO-Kuyu branch at the very beginning of client-ship of the two parties in the year 1996 were collected from the files of the sample households at the branch office of the company. The major data included in baseline survey were annual income, family size, total land holding, total livestock holding, land use pattern, housing condition, health, access to financial services, farm household characteristics such as sex of the head, age and education level, etc. The data sets are consistent with the data requirement of the study.

5.2 Analytical Model

In this study, both descriptive and econometric analyses were conducted. The descriptive statistics was used to evaluate the significances of changes in some key parameters between the year of first intervention and the study period. Accordingly, frequency distribution, mean, minimum, and maximum values of some important variables were computed to compare the changes in relevant parameters over the five years.

Contribution of MFIs services to poverty alleviation is determined by institutional factors such as loan purposes, loan term, loan size, land size, intensity of off-farm economic activities, marketing services, etc. Variation in the contribution of MFIs services to incremental incomes of the target groups may be due to any or all of these factors, which also vary spatially and temporally. In order to analyze the influences of these factors and identify the relative importance of these variables, a binary model was used. Accordingly, a logit distribution model was defined following Liao (1994), Gujarati (1988) and Aldrich and Nelson (1984):

$$P_i = \frac{1}{(1 + e^{-Z_i})} = \frac{e^{Z_i}}{(1 + e^{Z_i})} \quad (1)$$

Where P_i is a probability that the income of i^{th} farmer is improved.

e^{Z_i} : stands for the irrational number e to the power of Z_i

Z_i : is a function of N -explanatory variables which is also expressed as:

$$Z_i = \beta_0 + \beta_1 X_{1i} + \beta_2 X_{2i} + \dots + \beta_n X_{ni} \quad (2)$$

Where X_1, X_2, \dots, X_n = Explanatory variables

β_0 - is the intercept

$\beta_1, \beta_2, \dots, \beta_n$ are the logit parameters (slopes) of the equation in the model.

The slopes tell how the Log-odds in favor of improved income changes as independent variables change. The unobservable stimulus index Z_i assumes any values and is actually a linear function of factors influencing improvement in income. The Z_i ranges from $-\infty$ to $+\infty$, P_i ranges between 0 and 1 and that P_i is non-linearly related to the explanatory variables. P_i is non-linear in X_{ji} and in the β 's as well.

It can be shown that $\frac{P_i}{1 - P_i}$ is simply the odds ratio in favor of improvement in income level. It is the ratio of the probability that the farmer would have increased income to the probability that he/she would not have improved income. Finally, taking the natural log of odds ratio can be written as:

$$L_i = \ln\left(\frac{P_i}{1 - P_i}\right) = \ln\left(e^{\beta_0 + \sum_{j=1}^n \beta_j X_{ji}}\right) = Z_i = \beta_0 + \sum_{j=1}^n \beta_j X_{ji} \quad (3)$$

Where L_i is log of the odds ratio in favor of increased income, which is not only linear in X_{ji} but also linear in the parameters. This model can be estimated using the iterative maximum likelihood estimation procedure.

5.2.1 Definition of Variables and Hypothesis

Dependent variable

The incremental income of the clientele of the company was defined as binary dependent variable, where a dichotomous variable takes 1 for those with increased income and 0 otherwise. The incremental income was defined taking two points in time, i.e. the survey year and the baseline year. The base year is the year in which the clientele joined the company, i.e. year 1996, whereas the survey year is the year of data collection, i.e. year 2002.

Explanatory variables

In this paper, the explanatory variables included in the econometric model could be categorized into socioeconomic and institutional factors, which are hypothesized to have influences on the household income of the clientele. Based on the review of literature and actual conditions of the study area, the following explanatory variables were expected to explain the probability of having increased income situation (Belay and Belay, 1998, Asfaw, et al., 1997; Zeller, et al., 2001).

1. Appropriateness of loan disbursement time (discrete variable). In the world of banking in general, and micro finance services in particular, loan by its nature is both time and purpose sensitive. The clientele of the company would be more benefited if loan processing is made in accordance with these conventional views. Therefore, appropriate loan disbursement schedule is expected to have direct influence on the financial performance of clientele. The variable is discrete assuming a value of 1 if the clientele indicates appropriateness of loan disbursement and 0 otherwise.

2. Appropriateness of loan term (discrete variable). Loan term is a schedule, which fixes duration of the loan and specific date of loan repayment, which is governed by the lending institution with agreement of the borrower. In most cases loan term is a function of loan size and loan purpose. Accordingly, the lending institution and the borrowers attempt to convince one another to set terms of the loan. Missing this concept will lead to setting repayment schedule for a given purpose quite before or after its maturity, which in turn leads to loan default. Therefore, appropriate loan terms can have positive effect on the success of loan purposes, improving the economic condition of the clienteles. In this paper, this variable is discrete assuming a value of 1 if the clientele indicates appropriate loan term and 0 otherwise.

3. Average loan size of the client (continuous variable). Loan size depends on the purpose of the loan. In the study area, where capital is scarce as compared to labour and land, larger loan size is needed to acquire productive factors of production and engage in micro-business activities. Hence, the magnitude of loan the clientele received over the last five years is expected to have direct relationship with the improvement in income of the household.

4. Acquiring required amount of the loan (discrete variable). In principle, borrowers are expected to propose loan size along with loan purpose(s). However, there are cases in which local community representatives or committees together with branch staff(s) determine the loan size, based on production capacity, repayment capacity, social characteristics, etc. of the borrower and his loan purpose(s). Failure to provide the required loan size is expected to have negative repercussion on the loan performance. It is, therefore, hypothesized that provision of the required loan size would have high probability of increasing the income of the clienteles. In this study, the variable assumed a value of 1 if the client received the amount he/she requested and 0 otherwise.

5. Utilization of the loan for the intended purpose (discrete variable). Upon loan processing, all clienteles specify their respective loan purpose(s), for which they use the loan, and they are not allowed to divert the loan to other purposes. But some times, clienteles are found to divert the loan to other purpose(s), may be due to incompatibility of loan size, unexpected circumstances, social problems, etc. This will have an impact on the loan performance. Basically, in addition to their indigenous knowledge, the clienteles are given training on all aspects of micro finance services, feasible loan purposes(s), utilization of the loan, etc. before loan processing by the company. Therefore, utilization of the loan received, for the intended purpose(s) has direct relationship with the improvement in income level. The variable assumes a value of 1 if the loan is used for the intended purpose and 0 otherwise.

6. Shortage of draught animals (discrete variable). Draught animals are one of the components of capital as a factor of production. The availability of this capital enhances the income generating capacity of farmers through increased crop production as well as oxen rental incomes. If the loan disbursed is used for productive purposes, availability of draught power would complement the loan to increase productivity. That means, despite loan acquisition, shortage of draught animals has negative effect on income generating capacity of the farmers. The shortage can be traced from the baseline information of households since the resources at hand are assumed to be available to complement the credit received to

generate income. In the econometric model, the oxen variable assumed a value of 1 if the client had problem of draught oxen at the beginning of the loan period and 0 otherwise.

7. Extension service (discrete variable). Extension services provide technical skill to enable improved crop and livestock management and increase productivity. Coexistence of extension services along with micro finance services has direct influence on the improvement of income of the target groups. The variable is assigned a value of 1 if the client gets extension service and 0 otherwise.

8. Off-farm income (continuous variable). Off-farm activities are economic activities other than agricultural production. These include petty trade, handicrafts and other activities, directly reflecting the small-scale enterprises shown in Figure 1. These economic activities create employment opportunities by absorbing the disguised employment in rural areas through enhancement of diversification of economic activities and reduction of risks. Therefore, engagement in off-farm economic activities is expected to have a direct relationship with improved income of the clientele.

9. Distance to market center (continuous variable). Access to market is crucial for business undertaking. This has critical importance for loan performance. Usually markets are situated at towns, even though there are small markets at village level. Farmers residing closer to markets have more access to information about the lending institutions and requirements for acquiring loan and business information, as compared to those away from the towns. On the other hand, experiences show that those residing near or in towns divert loan from the intended purposes or consume the loan they have received. Moreover, mostly, farmers residing away from market centers /towns are believed to be more genuine and less extravagant. Therefore, the nature of relationship between distance to market and loan performance could depend on the prevailing situation.

10. Family size (continuous variable). Income from agricultural production is a function of labour. Family size, adjusted for dependency, is supposed to have direct relationship with the level of income. Children of less than 14 years and elders of more than 60 years were considered as dependent and do not as such contribute to income generation. Besides family size, gender differential is important in microfinance analysis. Unfortunately, the female households coverage of the microfinance services at the survey period was so limited to consider gender difference in the model.

11. Land holding (continuous variable). Land is also one of the major factors of production. Crop production is entirely dependent on land. Land is also crucial input for mixed farming through supply of grazing land, forages, and other feeds. Therefore, land holdings and improvement in income level are expected to have direct relationship.

5.2.2 Sensitivity Analysis

Significant explanatory variables discussed above would influence the change in income level. But the extent of the influence would not be the same for all the significant variables. The relative effect of a given quantitative explanatory variable on the changes in income level is measured by examining the elasticities, defined as the percentage change in probabilities that would result from a percentage change in the value of these variables. To calculate the elasticity, one needs to select a variable of interest, compute the associated P_i for 'Typical Clientele'. Then vary the X_j of interest by some small amount and re-compute the P_i , then measure the rate of change as $\partial P_i / \partial X_j$. Where ∂X_j and ∂P_i stand for percentage changes in the continuous explanatory variable (X_j) and in the associated probability (P_i), respectively: when dX_j is very small, this rate of change is simply the derivative of P_i with respect to X_j and is expressed as follows (Aldrich and Nelson, 1984; Maddala, 1992):

$$\frac{dP_i}{dX_j} = \frac{e^{\hat{\beta}_j X_j}}{(1 + e^{\hat{\beta}_j X_j})^2} \hat{\beta}_j \quad (4)$$

$$= P_i (1 - P_i) \hat{\beta}_j \quad (5)$$

The impact of each significant qualitative explanatory variable on the probability of improvement in income is calculated by keeping the continuous variables at their mean values and the dummy variables at their most frequent values (0 or 1).

6. Results and Discussions

6.1 Socioeconomic Changes between Baseline and Survey Years

Descriptive statistics of some key indicators, which might be influenced by improvement in income due to micro-finance service, was analyzed. Apparently MFIs improve household income that can be used to stimulate savings and investment in livestock and oxen holdings, housing, and renting land resources. More savings imply the capacity of the farmer to avail more inputs, which enable him/her to produce more and generate more income. As discussed earlier, oxen provide draught power for cultivation and increased oxen holding contributes to improved wealth and household income.

Better housing condition results in healthy and productive life. Land rented-in contributes to incremental income due to its complementary use with other yield increasing inputs which would not have been used when land is scarce.

In addition to the above quantitative variables that measure impacts of micro finance services on the 'beneficiaries', there might also be other qualitative variables, such as children schooling, nutrition, clothing, etc. Employment generation and human capital formation can also be indicators of impacts of micro-finance services.

Assessment of the impacts of micro-finance services were made by asking the clienteles their perceptions of the impacts on variables listed in Table 1. The results indicate that living condition of 86% of the sample clienteles improved while that of 14% showed no improvement of which 3% of the clienteles had no changes in their living condition and that of 11% deteriorated. Disaggregated analysis shows that the impact of the micro-finance service is highly associated with income generation (70%), asset creation (65%), improved nutrition for the family members (63%) and increased livestock holding (57%) (Table 1).

Table 1: Proportions of Clienteles with Improved Living Conditions

Indicator	Clienteles with Improved Conditions (%)
Children schooling	55.81
Better clothing	13.97
Improved nutrition	62.78
Improved housing condition	22.10
Increased livestock number	57.00
Increased asset	65.11
Improved income level	70.00

Source: Own Computation

In this paper, annual income of the clientele was considered as the most appropriate variable for the assessment of the influence of the micro-finance services. Hence, the improvement in income level was used to categorize the clientele in to those with

improved income and those without improvement (Vasthoff, 1968; Tesfaye, 2001). Household incomes during the base year and survey year were compared. Those with increased household income were defined as "*Improved*" while those with no improvement, i.e. same level of income or worsened income level, were defined as "*Not Improved*".

Table 2 compares the mean level of the continuous economic variables of the clienteles with improved conditions and clienteles the economic conditions of whom were not improved. The comparisons were made at the base year and the survey year, i.e. five years after the commencement of the loan scheme. The economic improvement between the two reference years was statistically significant at 1% level. Income from agricultural production and off-farm income and the asset accumulation were significantly higher after the commencement of the micro-finance services. The difference between the clienteles with "Improved" and "Not Improved" groups in terms of the economic variables listed in Table 2 was insignificant at the initial stage and became significant after the loan scheme was commenced. The factors underlining these differences are further analyzed under section 6.3.

Table 2: Mean Comparison of Some Economic Variables during the Base and Survey Years

	Base year			Survey year			Total		
	<i>Improved</i>	<i>Not Improved</i>	<i>t-values</i>	<i>Improved</i>	<i>Not Improved</i>	<i>t-values</i>	<i>Base year</i>	<i>Survey year</i>	<i>t-values</i>
Agricultural income (Birr)	1800	2119	-1.091	4270	2191	6.714***	1895	3647	-8.916***
Off-farm income (Birr)	114	42	1.656	728	299	2.850***	92	597	5.481***
Oxen owned	2.01	1.89	0.834	2.63	2.33	1.639	1.97	2.51	5.103***
Total livestock holding (TLU)	6.48	5.74	1.003	8.38	6.29	2.348**	6.26	7.75	4.285***

* Significant at 10% level, **Significant at 5% level, ***Significant at 1% level.

6.2 Results of Multicollinearity Test

Existence of income differentials among the clientele calls for identification of factors responsible for the variation in the household's incremental income. Accordingly, econometric analysis of factors affecting the probability of income improvement was made. Before estimating the model, it was necessary to check for the functional relationships between the explanatory variables. If multicollinearity is less than perfect, the regression coefficients, although determinate, possess large standard errors (in relation to the coefficients themselves), which means that the coefficients cannot be estimated with great precision or accuracy (Gujarati, 1995). In this paper, existence of serious multicollinearity was tested using Variance Inflation Factor (VIF) for continuous explanatory variables and contingency coefficient for discrete explanatory variables. Table 3 and 4 display the VIF and the contingency coefficients respectively.

Table 3: Tests for Existence of Multicollinearity among Continuous Variables

The Continuous Variables	Collinearity Statistics		
	Tolerance	VIF	R_i^2
Average loan size (Birr)	0.912	1.096	0.088
Total family size of the household (No.)	0.929	1.077	0.071
Total land holding (ha)	0.948	1.055	0.052
Distance to market (Kms)	0.872	1.147	0.128
Off-farm income during the base year (Birr)	0.976	1.024	0.023

Source: Own computation

R_i^2 is the coefficient of multiple determinations when the variable X_j is regressed on the other explanatory variables. A rise in the value of R_j that is an increase in the degree of multicollinearity, does indeed lead to an increase in the variances and the standard errors of the OLS estimators. The R_i^2 and the value of VIF are directly related while the value of VIF is inversely related to tolerance level. A VIF value greater than 10 is used as a signal for the strong multicollinearity between the two considered continuous variables (Gujarati, 1995). The result of the test, therefore, indicates lack of serious multicollinearity problem among the continuous variables.

The values of contingency coefficient, which basically range between 0 and 1 are significantly small (Table 4). Low value of contingency coefficient indicates absence of serious multicollinearity problem between the considered discrete variables.

Table 4: Tests for Existence of Multicollinearity among Discrete Variables

	Loan disbursement time	Loan term	Problem of draught power	Extension service	Loan requested	Utilization of loan
Loan disbursement time	1.000					
Loan term	0.220	1.000				
Problem of draught power	0.1361	0.088	1.000			
Extension service	0.007	0.050	0.066	1.000		
Amount of loan requested	0.054	0.059	0.567	0.105	1.000	
Utilization of loan	0.238	0.247	0.043	0.120	0.059	1.000

Source: Own computation

6.3 Econometric Results

Using the explanatory variables defined above, a logit model was estimated using Maximum Likelihood Estimation procedure, of the SPSS computer software. Equation (3) was used to estimate the logit model. Table 5 shows the parameter estimates and statistical significance of the coefficients.

The econometric result shows that the probability of improved income level due to micro-finance intervention is positive and significant. The model predicts 78% of the cases correctly, which is considered as statistically significant. Among the microfinance service variables, appropriateness of time of loan disbursement, utilization of loan for the intended purposes, and loan size affected the probability of incremental income positively and significantly.

Moreover, the availability of land needed for crop production and distances to market center have positive influences on the probability of increased income, which implies positive loan performance in terms of impacting on the well being of the clientele. These factors are essential for utilization of credit both for production and business undertaking since they serve as complementary factors.

Table 5: Maximum Likelihood Estimates of Logit Function

Variables	Coefficients	Odds ratio	Wald statistics	Sig. level
	2.553	12.85	3.778	0.052*
Appropriateness of loan time	0.902	2.465	1.846	0.174
Appropriateness of loan term	0.004	1.004	5.051	0.025**
Average loan size	-0.466	0.627	0.603	0.437
Shortage of draught power, base year	0.064	1.067	0.013	0.911
Extension service	0.001	1.001	0.926	0.336
Off-farm income	0.279	1.321	0.736	0.391
Provision of loan demanded	0.116	1.123	2.721	0.099*
Distance to market	0.024	1.025	0.036	0.849
Family size	0.638	1.893	5.373	0.020**
Utilization of loan	2.979	19.661	7.906	0.005***
Constant	-11.174	0	11.767	0.001

-2 Log likelihood Ratio = 91.026
 Likelihood Ratio Index (McFadden R²) = 0.7450
 Chi-square (χ²) = 31.147
 Correctly predicted (Count R²) = 78.00%
 *Significant at 10% level, **Significant at 5% level, ***Significant at 1% level

6.4 Marginal Effect Analysis / Sensitivity Analysis

As discussed above, the improvement in income of the sample clientele was attributed to different factors, the statistically significant ones being loan disbursement time, loan size, loan utilization for the intended purposes, proximity to markets and land availability. The contributions or relevance of these significant factors may not be equally important. Ranking of these variables in terms of their relative importance requires defining a ‘typical clientele’ in terms of the most frequent values of the explanatory variables, discrete variables and mean values of the continuous variables, included in the model (Gujarati, 1995), .

After estimating the parameters β_i in Equation (3) and identifying significant variables, it is possible to know the effect of change in any of the significant explanatory variables on the probabilities of observations belonging to either of the two groups i.e. those with improved income and those without. The marginal contributions of the variables for the logit model are given by Equation (5). The relative importance of quantitative variables can be measured by examining elasticity of the variables that would result from a change in the value of the variables. Thus, elasticities were computed for a typical farmer using the significant quantitative explanatory variables.

Then by taking the mean values of continuous variables, and the most frequent values of discrete variables, values of Z_i and P_i , from equation 1, would be 3.893 and 0.98 respectively. Then the elasticities of P_i with respect to x_{ij} (Equation 5) can easily be computed to determine the relative importance of these variables.

For instance, if the average land holding of the farmers increased by 10%, which is equal to 0.268 ha, the probability of income improvement for a "typical clientele" will be about 0.32%. With a further 20% increase in land holding, which is equal to 0.536 ha, the probability of income improvement for a "typical clientele" will be about 0.58%. The procedure holds true for other significant continuous variables in the model. Therefore, a "typical clientele" of the MFI services would have higher probability of increased income provided that these explanatory variables are set in appropriate combinations. Table 6 summarizes changes in probability levels of the significant continuous variables, with their mean values increased by 10%.

Table 6: Relative Importance of Continuous Significant Variables

Variables	P_{i1}	P_{i2}	ΔP_i (%)	Relative Importance
Average loan size	0.980	0.9883	0.85	1st
Land holding	0.980	0.9831	0.32	2nd
Distance to markets	0.980	0.9826	0.27	3rd

Source: Own computation

In assessing the relative importance of proper utilization of the loan as per the agreement made between the two parties, we use the "with" and "without" approach. Considering the existence of all variables in the model, dummy variables will be given the most frequent value of a discrete variable i.e. 1, and the continuous significant variables will assume their mean values. Accordingly, the value of Z_i will be 3.893 and that of P_i is 0.980. The importance of loan utilization for the intended purpose would be observed by assigning a 0 value for this variable while keeping other

variables constant. The result shows that at a 0 value of loan utilization, the new P_i will be 0.714 where Z_i equals 0.914.

A considerable change in probability of improved income is observed due to change in the variable from 0 to 1. Changing the loan utilization variable from 1 to 0 would reduce the probability from 98 % to 71%. This shows that the relative importance of this variable is considerably high. Similarly, it would be possible to identify the relative importance of the remaining significant discrete variables. Table 7 summarizes changes in probability levels of the significant discrete variables using the "with" and "without" approach.

Table 7: Relative Importance of Discrete Significant Variables

Variables	P_{i1}	P_{i2}	ΔP_i (%)	Relative Importance
Utilization of the loan	0.980	0.7138	27.16	1st
Appropriateness of loan disbursement time	0.980	0.7925	19.13	2nd

Source: Own computation

7. Conclusions and Policy Implications

The study confirms the relevance of micro-finance service to improve the economic conditions of the poor by enabling access to rural finance. Among the 100 sample clients of the OCSSCO, Kuyu branch, 86 perceives improvement in their socioeconomic conditions during the five-year client-ship with the MFI. Actual comparison of income during the survey year with the baseline data indicates that improved income level is visible for 70% of the cases. The impact of the micro-finance service is highly observed in terms of increased asset creation, improved nutrition for the family members and household income.

Comparative analysis of the economic variables shows that the income from agriculture and off-farm activities increased over the loan period indicating the opportunities created to increase agricultural productivity and income diversification. The econometrics results indicate that the probability of improved income was affected by the appropriateness of loan disbursement time, loan size, utilization of loan for the intended purposes, proximity to markets and land availability. The policy implications of the results could be the following:

1. Due to seasonality of agricultural production, for which timely procurement of inputs and crop management are crucial, timely provision of rural credit is of paramount importance. Moreover, financial resources needed for small scale enterprises, particularly if needed for purchases of agricultural goods for trading would be affected by time of loan disbursement.
2. Level of capital used determines the economic scale of business transactions. Micro-finance institutions, however, provide small loan size. The econometric result revealed the importance of loan size on economic performance of the clientele. Hence, considering the nature of the loan and other parameters, it would be of paramount importance to increase loan size and work out business plan.
3. The fact that utilization of loan for intended purposes implies improving business skill and innovativeness of the clientele, identifying feasible income generation activities and proper business plan for clients would be essential.
4. Land availability is also one factor that contributed to increased income of the households. In case of use of improved agricultural technologies such as crop farming and dairy production, land plays complementary role to the loan disbursed. Assessment of such alternative complementary factors of production would encourage the farmers to seek credit and improve their socio-economic conditions. Provision of loan for agricultural production to farmers facing land shortage should consider possibilities of land transaction.

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