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DEPARTMENT OF ECONOMICS
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**PROSPECTS, OUTREACH AND SUSTAINABILITY OF MICROFINANCE IN
ETHIOPIA
(CASE STUDY OF DIRE MICROFINANCE INSTITUTION)**

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DECLARATION

This is to certify that this thesis entitled “Prospects, Outreach and Sustainability of Microfinance (Case Study of Dire Microfinance Institution)” submitted in partial fulfillment of the requirements for the award of the degree of MSc. in Economics to the College of Business and Economics, Mekelle University, through the Department of Economics, done by Mr. Yonas Abera, Id. No. FBE/PR0092/00 is an authentic work carried out by him under my guidance. The matter embodied in this project work has not been submitted earlier for award of any degree or diploma to the best of my knowledge and belief.

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ABSTRACT

It is recognized that microfinance emerged to serve societies who do not have access to formal financial services due to lack of collateral. This encouraged different stakeholders of development (government, non-government, scholars, etc) to think of establishing Micro Finance that serves the poorest of the poor. It is believed that, this access has enabled to empower the poorer section of the society. However, the current situations created suspicions towards the achievement of the objectives it emerged for. Hence, this study was undertaken to evaluate performance of microfinance in terms of achievement of depth of outreach and self sustainability, and to figure out the tradeoff between its depth of outreach and self sustainability. In addition, its economic valuability to different groups of the society (with different economic statuses) was considered as another line that enables to assess its performance. This study, therefore, was carried out taking Dire Microfinance Institution (DMFI) in Ethiopia as a case study area.

While conducting this study, both qualitative and quantitative approaches of analysis were used. Percentages, bar graphs and pie charts were used as tools of analysis to analyze the degree of outreach and sustainability of the institution. The tradeoff between outreach and sustainability of the institution was estimated using simple (Pearson's) correlation coefficient. In addition, OLS regression model of econometrics was used to figure out the economic impact of the institution across its different types of clients.

Consequently, the stated simple statistical techniques (percentages, bar graphs and pie charts) to find out the degree of outreach and sustainability show that there is a tendency of shifting target from the poor to the non poor ones, over time; and they also reveal that the trend of operational self sustainability of the institution is below 40% and remaining stagnant for the first four years of operation of the institution, when all of its clients were poorer. However, its operational self sustainability started to improve dynamically when non poorer clients were being involved in the institution. Moreover, the outcome of the simple correlation method indicates that there is negative tradeoff between depth of outreach and operational profitability of the institution, taking only poorer clients of the institution as a point of analysis.

Finally, output of the econometric estimation indicates that the institution is much valuable to the poorer than its non poor clients. To estimate this, OLS regressions were undertaken separately and specifically to show the significance in economic impact of participation in DMFI by the different groups of the society.

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ABBREVIATIONS

ACSI:	Amhara Credit and Saving Institution
AEMFI:	Association of Ethiopian Microfinance Institutions
BRI:	Bank Rakyat of Indonesia
CARD:	Center for Agriculture and Rural Development
CGAP:	Consultant Group to Assist the Poor
DECSI:	Dedebit Credit and Saving Institution
MFI:	Microfinance Institutions
MU:	Mekelle University
OCSSCO:	Oromia Credit and Saving Share Company
OMI:	Omo Microfinance Institution

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CHAPTER ONE

INTRODUCTION

1.1. Background of the Study

In every where around the world, it is common to observe some rich people and a lot of poor people who can not fulfill the minimum requirement of basic needs for their survival. Despite the score of modernization and advancement that have been registered in the world, the percentage of people living below poverty line is still huge. Such a condition is pervasive especially in least developed countries like Ethiopia (Todaro, 2000).

This problem has motivated various scholars to devise various ideas and come up with divergent views. Finally, a consensus has been reached by all development economists. All believe that any improvement without consideration of the lives of the huge proportion of the poor is meaningless progress. For the matter of this, fair distribution of resources and poverty alleviation has become the most important development agenda. Accordingly, different mechanisms and policy measures have been introduced, among which the establishment of Microfinance Institutions is the one which is believed to create access of financial services to the poor (MU, International Work Shop, 2001).

Establishment of Microfinance Institutions (MFIs) that provides access to credit is regarded as a means of tackling the financial constraint of the poor. Because, one of the major problems poor people in the rural and urban areas face is lack of capital. Formal banking procedures often marginalize poor borrowers because poor borrowers want financial services in tiny amount which are exposed to high risks through the eyes of the formal banking system. Moreover, these borrowers are too poor to offer collateral (MU, International Workshop, 2001).

Thus, microfinance can provide a range of benefits that poor households highly value. Access to credit is deemed to help the poor to smooth cash flows and avoid periods where access to food, clothing, shelter or education is lost. Credit can make it easier to manage shocks like sickness of wage earner, theft, or natural disasters. Especially, poor women participants in microfinance programs often reveal important self empowerment (www.microfinancegateway.org, 2010).

In Ethiopia, delivery of financial services to the poor is a very recent development. Micro credit programs were introduced as components of NGO operations in the 1980s. Since then the government of Ethiopia opened commercial banking sector to private banks, and in 1996, microfinance institutions (MFIs) were created to serve populations with no access to financial services. One successful outcome of these institutions is the liberalization of financial sector and, thus among other things, the creation of legal frame work allowing for the emergence, establishment and operation of MFIs to serve poor Ethiopians (proclamation number 40/1996). Following the proclamation, several credit programs that were operated by NGOs or government departments were established and transformed into licensed MFIs (AEMFI, 2006).

Dire Microfinance Institution is one of those MFIs that were established as per the proclamation number 40/1996 in Dire Dawa city. It was supposed to create access of financial services to a large number of poor low income group and unemployed residents of the city who were not able to have access to the financial services provided by formal banks due to perceived risk and lack of collateral (DMFI, 2006).

No matter the effort to achieve the objective of the institution, it is difficult to realize what is desired unless special care is taken regarding the perceived trade-off between depth of outreach and sustainability. This study was carried out to look at the performance of the institution from depth of outreach and financial sustainability angles, and the difference in its prospects to the poor and the non-poor ones.

1.2. Statements of the Problem

Several studies noted different causes for poverty in developing country. Similarly, in Ethiopia poverty is pervasive and some argued one of the causes of poverty in developing

economies (like Ethiopia) is that the poor do not have access to credit for the purpose of working capital as well as investment for their small business (Jean-Luc, 2006, cited in K. Befekadu, 2007). Thus, Microfinance was discovered as an area of priority in the fight against poverty, according to the Micro credit summit of February 1997 in Washington (Seibel and Kumar, 1998). To this end, many developing economies have been providing credit to the poor through microfinance schemes (Meyer 2002, as cited in Befekadu, 2007).

However, it is mostly argued that most MFIs could not sustain for long with out the back funding of donors, federal government, regional government or others as they serve the poorest segment of the society (Befekadu, 2007). This is because total costs and uncertainties increase as MFIs try to reach to these poorest people. In other words, one of the fundamental questions of self sustainability is whether services can be delivered at a cost that is affordable to clients or not (E. Rhyne, 1998). Hence, it is likely that MFIs can not reach the poor in sufficient numbers as long as they are not self reliant. This implies that the question of sustainability may shift the target of clients (poorest of the poor) or may reduce the expected extent of depth of outreach.

For instance, empirical evidence of MFIs in Peru and Bangladesh showed that it was realized that their clients were not the poorest they had been thought to target (Zeller M. and Julia J., 2006). In addition, a study by J. Kimos and T. Arun, 2009 shows that the microfinance institution of Sinapi Aba Trust (SAT) in Ghana reaches disproportionately a smaller percentage of very poor people (J. Kimos and T. Arun, 2009).

In Ethiopia, micro credit has been one of the most prominent instruments in the development programs and strategies used by the Ethiopian government and its development partners. Over the past 40 years, millions Birrs have been provided in the form of credit to support agricultural production, increase agricultural productivity and create employment in urban and Semi urban areas. However, financing the poor, particularly the rural poor, during Derg and pre-Derg has been characterized by poor loan repayment rates and unsustainable subsidies (AEMFI, 2008).

Over the last decade (1997-2007), the MFIs of Ethiopia have been exerting commendable efforts in the provision of sustainable financial services to the poor. Despite the continued hard work and effort of microfinance providers, government, donors, and development partners to increase outreach in financial services, there is still a huge amount of unmet demand for such services in

both urban and rural areas of the country (AEMFI, 2008). In such situation, care has to be given about the ability of the institutions to reach the expected extent of poorest clients, given the possible trade of between depth of outreach and self sustainability of the institutions.

On the other hand, there are also evidences that reveal direct relation ship between outreach and sustainability. For instance, a study by H. Seibel, 1999 indicates that a Grameen replicator in the Philippines, the Center for Agriculture and Rural Development (CARD) was able to raise its outreach of poor female clients in significant amount and its operational self-sufficiency ratio has also increased (H. Seibel, 1999). Microfinance programs have also demonstrated that even the poor households can save in substantial quantities so that self sustenance of microfinance institutions can be ensured (J. Morduch, 2000). Success stories are being written around the world, from Jakarta to Dhaka to Nairobi to La Paz (J. Morduch, 2000). The study that was conducted by Befekadu in 2007 regarding the industry's breadth of outreach in Ethiopia (in the period between 2003 and 2007) also showed that it is positively related to the industry's sustainability (Befekadu, 2007).

Whatever the case may be, one can be suspicious with regard to the relationship between the depth of outreach and financial self sustainability. Therefore, this study was inclined to show the relation ship between the depth of outreach and sustainability of MFIs in Ethiopia, taking case study of DMFI.

Moreover, the researcher is interested to figure out the importance and viability of microfinance to the poor. Theoretically, microfinance institutions provide loans with very small size compared to those provided by other formal banks; and it is the poor who require and can appropriate loans of such sizes (K. Befedadu, 2007). An empirical study conducted by A. Islam (2008) in Bangladesh supports this argument. This study indicates that the poorest benefit most from participation in microfinance.

Taking these theoretical and empirical justifications for the establishment of microfinance in to account, the researcher wanted to find out the difference in economic impact of MFIs; and he verified this by considering DMFI and its implication on its different groups of clients.

1.3. Hypothesis of the study

To undertake this study, two major hypotheses were set. These can be described as follows:

- a) It is expected that there is high degree of trade off between depth of outreach and sustainability of microfinance.
- b) It is the poor that benefits more from the provision of financial services by MFIs for the fact it does not require huge amount of capital as collateral and loans with small size are appropriate and likely to change the lives of the poor than the non poor ones.

1.4. Objectives of the Study

The general objective of this study is to assess the performance and viability of MFIs to the poor, taking case study of DMFI. Specifically, the attempt will be

1. To identify the degree of depth of outreach and degree of sustainability of DMFI.
2. To show the relation ship between depth of outreach and self sustainability of DMFI.
3. To assess the difference in the economic impact of the presence of the institution on the lives of the poor and on the non-poor ones.
4. To identify the possible factors that can create hindrance on the achievement of the desired objective of the institution and the nation as a whole, and to recommend on the mechanisms to eliminate or reduce the identified problems.

1.5. Significance of the Study

Most studies conducted in the area of microfinance in Ethiopia focus simply on the impact of the services provided by the institutions that is empowering the clients and improving their standard of living. Of all studies conducted, only little was carried out about the relationship between depth of outreach and sustainability of microfinance and its consequences. In fact, even those studies that verify the trade off between outreach and sustainability did not consider the depth of outreach as a specific point of analysis. In addition, there are only few studies that tried to show the difference in impact of the institutions on the poor and on the non poor separately.

Specifically, I dare to say that nothing was carried out regarding these aspects about Dire Microfinance Institution.

Therefore, the researcher has tried to examine the tradeoff between outreach and sustainability taking various categories. Main focuses were examining outreach and sustainability of DMFI and figuring out the impact of DMFI on different groups of clients so as to widen analytical issues in such aspects of microfinance in Dire Dawa and for the nation as a whole. On the top of this, the study may help different stake holders to identify the possible prospects of the institution. Moreover, this study can be taken as a review for further researches for the issues in question.

1.6. Scope and Limitations of the Study

This study is limited to the operation of DMFI and aspects of its possible clients surrounding the city. The measurement of the economic impact of the institution didn't take into account those clients living in the rural area of the region due to lack of enough money and time to work with. This financial and time constraint also led the researcher to reach only (a sample size of) 110 respondent which would have been better to incorporate large size. Moreover, only per capita household consumption was taken as an indicator of the change in the lives of the clients of the institution.

With regard to the study of sustainability of the institution, only operational sustainability was considered as a result of lack of full information regarding financial sustainability of the institution. To measure operational sustainability, only operational profitability of the institution was taken into account. While conducting this study, the recentness of the establishment of the institution forced the researcher to take only few years (6 years) of observations.

1.7. Organization of the Study

The study will be introduced in the first chapter. The second chapter deals with review of theoretical as well as empirical related literatures. In the third chapter, brief discussions regarding methodology of the study were made. Then, chapter four was allocated to the analysis of degree

of outreach and sustainability as well as their trade-off was presented. This chapter also includes the analysis of comparison of the institution's economic impact on the poor and non-poor participants. Finally, the last chapter was concerned with conclusions and recommendations.

CHAPTER TWO

REVIEW OF THE LITERATURE

2.1. Justifications for the Existence of MFIs and Counter Arguments

This chapter discusses some of the theoretical and analytical concepts related to micro finance and issues of this study. The researcher has tried to analyze some of the previous studies made in different parts of the world; consequently, they are summarized into simple and abstract form. The intuition is to indicate some of the theoretical and practical evidences that may help us in deriving a conceptual framework to analyze the issues of this study.

According to most economists' view such as Yunus M. (1994), J. Murdugh (2000), H. Seibel (1999), lack of access to financial services is a major constraint limiting the accumulation of assets by the poor and development of indigenous enterprises. Thus, improving access to financial services is an important development tool, because it helps increasing employment and income and consumption of the poor, which would in the final analysis, reduces poverty (AEMFI, 2009). Here, the term poverty refers to absolute poverty which is defined as poverty that looks at the minimum income required for physical survival (<http://dictionary.babylon.com/>, Jan. 1, 2010).

The idea of microfinance has emerged as a hope for improving the access of financial services for the poor in low income countries. It promises to combat poverty through development of the institutional capacity of financial systems which find ways to cost effectively lend money for poor households. Microfinance institutions that follow the principles of good banking will also be those that alleviate the most poverty. Regularly, poor households are typically excluded from the formal banking system for lack of collateral, but the microfinance movement exploits new contractual structures and organizational forms that reduce the riskiness and costs of making small, uncollateralized loans (Morduch J., 2000).

Microfinance programs had demonstrated that even poor households can save in substantial quantities to repay loans as well as to enhance investments (Morduch J., 2000). By eventually eschewing subsidies and achieving financial sustainability, microfinance institutions will be able to grow without the constraints imposed by donor budgets (Morduch J., 2000).

A key tenet is that poor households demand access to credit, not “cheap”¹ credit. Thus, programs can charge high interest rates without compromising outreach. Hence, if the argument is right, much poverty alleviation can be achieved at no cost to governments and donors or even at a small profit (Morduch J., 2000).

Generally, Microfinance is believed to be a means to change the lives of the poor. As it is stated in (AEMFI, 2008), comprehensive impact studies conducted where microfinance services are available have demonstrated that:

- Microfinance helps very poor households to meet basic needs and protect them against risk.
- The use of financial services by low income households is associated with improvements in household welfare and enterprise stability and growth.
- By supporting women’s participation in economic activities, microfinance helps to empower women, thus promoting gender equity and improving household wellbeing (AEMFI, 2008).

However, according to the perception of the researcher, the effectiveness of the MFIs to achieve the desired goals depends on their ability to tackle several challenges encountered during their operation. Among which, the researcher expects that, ability of the institutions to stay very long is the crucial one. In other words, self sustainability of MFIs is obviously very important for a well functioning financial system.

¹cheap” credit refers to a loan with very small interest rate (Morduch J., 2000: P617)

2.2. Sustainability of Microfinance Institutions

Effective, long term provisions of the financial services by microfinance institutions are realized only if the institutions are able to stay long. Particularly, financial sustainability of the institutions is taken into account to ensure the long term provision of these services (Robinson, 2001, cited in Mubareck S. 2005). In other words, microfinance should be able to pay for itself if it is to reach very large number of poor clients (www, cgap.org, Nov, 2010).

The focus on financial sustainability is attributed to its conformity to the perspective that only independent financially sustainable microfinance institutions will be able to attain the wide outreach necessary to achieve the highest level of impact on their target population, based on a globally affordable model, that doesn't depend on long term support either from donors or the government (J. Adongo and C. Storck, 2005).

Issues related to this are discussed by various writers. For instance (H. Seibel, 1998, p₁) has stated the following statement:

“The biggest obstacle in the development of Grameen type microfinance institutions was found to be donor support: a powerful incentive to substitute external resources for domestic and local savings. This has undermined the institution's viability and sustainability. As long as they are not self reliant, they do not reach the poor in sufficient numbers”.

2.2.1. Definitions of Sustainability

There are different ways of defining sustainability of MFIs. According to Shanidur R. Khandker, (1995: P.36) sustainability is defined as: *“the ability of the program to continuously carry out activities and services in pursuit of its objective”*. (As cited in J. Adongo and C. Storck, 2005: P11), CGAP defines it as: *“Relying on commercially priced and internally generated funds rather than on donors for growth. It includes coverage of financial as well as operating expenses.*

According to Otero and Rehyne (1994) and Havers (1996: P. 145), there are various level of self sufficiency in microfinance institutions, and is evaluated based on the degree to which the

institutions depend on the grants and soft loans to cover their various cost items. The level of self sufficiency can be summarized using table 2.1 as follows:

Table 2.1 Levels of self sufficiency in credit program

	Amount of subsidy	Source and types of funds for on-lending	State of revolving fund	Operating expense paid by
Level 1. Traditional highly subsidized program	High	Grants or soft loans from donor agencies	Values erodes rapidly through delinquency and inflation	Continuing grants
Level 2. As level 1 but better managed	Some	Borrowed at concessional but near market rate from donor agencies	Slow erosion of funds	Partly by interest income, partly by grants
Level 3. Approaching sustainability	Approaching zero	Borrowed at concessional but near market rate from donor agencies	Fund stable in real terms	Interest income
Level 4. True sustainability	Zero	Raised at commercial rates from formal financial institutions and client saving	Fund stable in real terms	Interest income

Source: (Havers 1996, P.145)

2.2.2. Measurement of Financial Sustainability

Measurement of financial sustainability of microfinance institutions is crucial to regulate the financial constraint of the institutions. Accordingly, there are different methods to measure the financial sustainability of the institutions. According to (Havers, 1996: P146), the most commonly used methods of measuring financial sustainability are:

- a) Sustainability index: which is expressed as a percent of total cost covered by income in a given period, and
- b) Subsidy dependency index: This focuses on the degree to which the program relies on external support for its operation (Havers, 1996).

The sustainability index focuses on the amount of cost covered by revenue, and doesn't show how much the program is dependent on external fund, where as subsidy dependence index shows the extent of self sufficiency or dependency of the program (Yaron, 1994: p.57).

According to Yaron, (1994: p.57), financial self sustainability is achieved when return of equity, net of any subsidy received equals or exceeds the opportunity cost of the equity fund. Subsidy dependency is the inverse of self sustainability.

2.2.3. Determinants of Sustainability

It is expected that there are a number of factors affecting sustainability of a given microfinance institution. It is important to identify the major determinants of sustainability of microfinance to contribute towards domestic institution building for financial capacity widening and deepening in locally contributed organizations and funds (J. Adongo and C. Storck, 2005). Particularly to the now emerging financial institutions like that of DMFI, assessing its sustainability can help to make some more adjustment mechanisms so as to make the MFI more successful and helpful to serve the society in a better manner.

Regularly, different authors tried to ascertain the sustainability of MFI in different way. According to J. Adongo and C. Storck (2005: P13 - 24), the major possible determinants of sustainability of MFIs are:

- i. The approach (level) of support by supporting institutions
- ii. Forms of Incorporation (Business ownership)
- iii. Flexibility of repayment
- iv. The provision of start-up capital by donors
- v. The provision of collateral and ways of provision of the loan
- vi. The amount of saving mobilized by MFIs
- vii. The amount of loans
- viii. Per capita income of the area where the MFI is located

It is theoretically expected that MFIs supported by a body with hands off approach (relatively with lesser support) will have a positive (negative) relationship to financial unsustainability (sustainability), while those supported by a body with a closer support will be negatively related to financial unsustainability. This is because; the ones with closer support have relatively greater

possibility to reduce the problems resulting in diminishing financial sustainability, with the help of the closer support (J. Adongo and C. Storck, 2005).

With regard to forms of incorporation (forms of ownership of the institutions), those that can separate themselves from provision of “non-financial services”² can improve the level of their financial sustainability. In contrast, those such as Multipurpose Co-operative Providing Microfinance adversely affect the level of financial self-sustainability. It is expected that those that are providing multipurpose services face additional operational costs beyond the cost of provision of financial services (J. Adongo and C. Storck, 2005).

The other important determinant of sustainability, as it is stated above, is the flexibility of repayment schedule. This is theoretically expected to influence financial sustainability to the extent that it affects the effective interest (not adjusted to inflation) which in turn has an effect on the “break-even”³ interest rate. To the extent that a more frequent repayment schedule generates a higher effective interest rate, a weekly payment schedule should have negatively (positively) associated with financial unsustainability (sustainability). This theoretical expectation highlights the trade – off between aiming to provide more flexible microfinance credit products for customer satisfaction while reducing costs of frequent collection and reducing risk when designing microfinance products from an institutional perspective (J. Adongo and C. Storck, 2005).

With regard to the effect of donor’s provision of start-up equity on the sustainability of microfinance, J. Adongo and C. Storck, (2005) claim that this can boost the probability that MFIs will be financially sustainable. A study made by these authors (for selected microfinance institutions in Namibia in 2005) shows that the more start up equity a microfinance institution has, the better its financial sustainability will be.

Aspects that maintains the financial sustainability of MFIs varies from author to author. Of all, group lending is theoretically expected to positively influence financial sustainability for microfinance institutions because the peer pressure that group members exert on each other

² “Non financial services” refers to other areas of poverty alleviation toolkit, such as the provision of health, nutrition, training, etc. (J. Adongo and C. Storck, 2005, P.17)

³ Non financial services” refers to other areas of poverty alleviation toolkit, such as the provision of health, nutrition, training, etc. (J. Adongo and C. Storck, 2005, P.17)

should lead to lower default rates on the number of loans disbursed. However, the findings by J. Adongo and C. Storck, (2005) shows that this may not be the case unless group lending strategies are complemented by the adoption of credit and risk management tools.

Moreover, both of these authors went on describing the factor that influences financial sustainability. To these, the amount of savings mobilized is expected to influence the financial sustainability of microfinance institutions, to the extent that they increase interest expense and cost of the microfinance institutions, or to the extent that they provide credit information that can be used to assess the eligibility of a borrower and reduce the costs of the lending process for the microfinance institution. These effects work in opposite directions. If the benefit of savings in reducing the cost of the lending process outweighs the cost of interest expenses, savings are negatively (positively) related to financial unsustainable (sustainability). The opposite holds, otherwise (ibid).

The amount of loans disbursed is theoretically expected to be negatively (positively) related to financial unsustainability (sustainability) because it reduces per unit cost of the lending. The intention is that the higher the amount of the loans to be disbursed, the lower will be the transaction, for a given amount of money. Hence, the cost of loan disbursement will be lower (J. Adongo and C. Storck, 2005).

Per capita income of a location reflects the welfare and socio-economic profile of its residents. The more the per capita income of clients of a microfinance institution, the higher will be the probability that it is financially sustainable. According to this theoretical perspective, per capita income is expected to be negatively related to the financial unsustainability of microfinance institutions (ibid).

In addition to the view and findings of these authors, there are a number of arguments related to sustainability of microfinance. A significant amount of literature on microfinance has placed much emphasis on the sources of funds as major determinant of sustainability (Otero and Rhyne, 1992; Otero and Rhyne, 1994; Christen, 1997; Buckley, 1997; Robinson, 2001; Christen and Drake, 2002; Fernando, 2004; Chu, 2006; Ledgerwood and White, 2006). As cited in J. Okumu (2007: P.61), Buckley (1997: P1081), for example, argues that extensive sustainability and outreach reportedly achieved by MFIs is due to donor funding, while Rhyne and Otero (1992)

argue that extensive outreach by the MFIs can be achieved and sustained through savings mobilization and access to commercial loans.

In Asia and Latin America, the success of MFIs in terms of sustainability and outreach is attributed mainly to savings mobilization and access to commercial loans. BRI in Indonesia, for example, is reported to be funding a greater part of its loan portfolio using savings from low-income people. BancoSol in Bolivia is reported to be relying heavily on commercial loans to fund its loan portfolio (Robinson, 2001a, cited in J. Okumu, 2007).

White and Campion (2002: P.28) reported that between 1998 and 2000, in Peru, Mibanco increased its clients from 32,000 to 58, 000 and its loan portfolio from US\$14 million to US\$40 following its transformation and access to savings for intermediation.

2.3. Outreach of Microfinance Institutions

2.3.1. Definitions

While discussing about the sustainability and outreach of microfinance, it is important to define what outreach mean. According to (Yaron, 1997: P.91), Outreach is “a hybrid measure that assesses the extent to which a MFI has succeeded in reaching its target clients and the degree to which the MFI has met the clients demand for financial services. To this author, indicators of outreach are: The depth (types of clients reached and level of poverty) and breadth of outreach (number of clients served).

However, in one of the reports of AEMFI, outreach is measured in terms of the number of active clients (with outstanding loan), loan size, number of savings, percentage of loans to clientele below poverty line, percentage of female clients, range of financial and non-financial services offered to the poor, the level of transaction costs levied on the poor and the extent of client satisfaction with respect to financial services (AEMFI, 2007).

2.3.2. Growth of Outreach of MFIs

Growth of outreach of MFIs refers to improvement in ability of the institutions to reach large number of clients and to make sound impact on poverty reduction (AEMFI, occasional paper, No. 18, 2007: P.18). Growth of outreach of MFIs involves:

- i. A permanent increase in size, scale, and complexity in activities and the various results being achieved by MFIs overtime. This includes increases in number of clients, outstanding loan portfolio and turnover, size of savings etc.
- ii. The changes in character of the finance providers. This would mean the transformation of the institution (graduation of a financial provider to become a regulated financial organization), improving and upgrading the capacity of an institution and obtaining improved levels of sustainability (AEMFI, 2007).

Growth of outreach is desirable as it would reduce poverty and attain its operational and financial sustainability of MFIs. Although growth of outreach has risks (unless planned and managed very well), it has also positive implications for financial institutions. In general, growth in outreach,

- enables the MFIs to reach large number of clients and it is the key to make sound impact on reducing poverty,
- reduces average operating cost of MFIs by reducing/ eliminating losses, and not by increasing lending interest rates,
- improves operational and financial sustainability,
- helps MFIs to satisfy their clients' need through various services,
- gives better image of MFIs to attract loanable funds from banks for their expansion, and
- increases the borrowers' willingness to repay (AEMFI, 2007: P. 14).

Growth in outreach is one of the prime objectives of MFIs. However, unless it is well organized and planned, rapid growth may have negative implications such as:

- ✚ increase in loan arrears due to rapid growth in new borrowers, who are more risky than well-established borrowers and difficulties in credit monitoring,
- ✚ mismatch between organizational and skill capacity and rapid expansion,
- ✚ decline in portfolio quality, and

- ✚ incompatibility between the objective of reaching the poorest and increasing the number of clients (AEMFI, 2007: P. 15).

2.3.3. Empirical Review of Outreach of MFIs

Most innovative MFIs in the world such as Grameen Bank, BancoSol and Bank Rakyat (in Ethiopia, ACSI and DECSI) are successful in reaching large number of poor clients (J. Morduch, 2000 and AEMFI, 2007). Grameen Bank for instance, covers 56 out of 64 districts making it the largest credit program in the country with annual growth rate of 34% (Sarah, 1997). It gives service to more than 2 million people, of which 98% are women. However, it is indicated that the poorest of these women have been excluded from getting the services through the process of group formation. This is because group members select each other on the basis of the potential of each member for making timely repayment and savings (Rogaly, 1996). If a woman is very poor and has no asset that indicates her potential to repay the loan, she is likely to be excluded (Johnson and Rogaly, 1997).

In Ethiopia, in the last 12 years, MFIs have shown a remarkable progress in terms of outreach. However, the twenty six MFIs meet only less than 20% of the demand for financial services of the active poor. This indicates that there is significant unmet potential demand for microfinance services in Ethiopia (AEMFI, 2008).

Currently, some of the MFIs are at the start-up stage where their clients are less than 5000 and require sound support to build their capacity so that they can increase their client base. There are also emerging MFIs with clients between 5000 and 20000, where their emphasis is on consolidating their activities to improve the quality of “portfolio”⁴, performance and increase outreach. There are also MFIs that deliver financial services to 20000 to 50000 clients. These are MFIs that are growing and with the right support, they could become mature and sustainable MFIs. Mature sustainable MFIs, in the Ethiopian context would typically have more than 50000 clients. Four of the largest MFIs in Ethiopia (ACSI, DECSI, OCSSCO and OMI) are in this category (AEMFI, 2007).

⁴“Portfolio” refers to the amount of loan dispersed to the clients (AEMFI, 2008, occasional paper, No. 18, 2007: P.16)

2.4. The Relationship between Outreach and Sustainability of MFIs

2.4.1. Theoretical Review

Outreach of MFIs can influence their sustainability either positively or adversely. Theoretically, sustainability of MFIs is expected to be affected positively as outreach of MFIs increases, other things remaining constant. The expansion in scale of operation resulting from the increase in outreach has the tendency to reduce per unit cost of MFIs which in turn has the possibility to keep sustainability stronger. In addition, as it was explained before, the increase in outreach gives better images of MFIs to attract loanable fund from banks for their expansion and increases the borrowers' ability to repay. However, this is probably the case in terms of the relationship between breadth of outreach and sustainability (AEMFI, 2007).

In contrast to the “breadth of outreach”⁵, depth of outreach (increment in number of poorest clients) can have complex situations which may adversely affect the level of sustainability of MFIs. It is mostly argued that self sustainability of MFIs seems to be adversely affected as they provide financial services to the poorest segment of the society (Befekadu K., 2007). The effort to increase the provision of financial services to the poor in LDCs is likely to face the following problems:

- Microfinance clients, particularly in the rural areas, are located in dispersed areas due to low population densities, which increase transaction costs of MFIs.
- Microfinance clients often demand relatively small loans and saving accounts, which again increases the per-unit transaction costs of financial institutions.
- Getting information that provides an accurate assessment of willingness and capacity of borrowers to repay often takes time and money.
- The existence of marketing risk, seasonality and absence of formal insurance mechanisms to mitigate risks.
- Poor clients have little acceptable collateral, either due to lack of assets or unclear property rights for the assets they possess.
- Poor communication systems and physical infrastructure increase transaction costs (AEMFI, 2008).

⁵ Breadth of outreach”, in this case, implies a means to reduce the average operating costs of MFIs

2.4.2. Views of the Sustainability/Poverty Camp

It became clear that the poverty/sustainability debate is ultimately about whether to subsidize interest rates. Those who let go of sustainability in the name of reaching the poor are saying, in effect, that the poor cannot fully pay for their borrowing. According to the poverty camp, there is suspicion whether demand for loan products of MFIs by the poor is altered for the ongoing (market) interest rate. However, little or no documentation of microfinance reports that shows increasing interest rates has significantly altered client demand for their loan products (E. Rhyne, *Microbanking Bulletin*, 1998)

The sustainability group argues that donors and governments are unlikely to continue subsidizing microfinance indefinitely and are not generous to do so, on a major scale. Hence, they believe that the only way to assure access by the poor to financial services is to ensure that the private finds it profitable to provide such services. Only the private sector has plenty of resources and will stick with a money making activity even if it is not in fashion (E. Rhyne, *Microbanking Bulletin*, 1998).

Buried in the question of whether poverty outreach and sustainability are complementary or not, there are complex attitudes about the value of assisting various types of people (E. Rhyne, *Microbanking Bulletin*, 1998). These attitudes suggest that it is more valuable to assist a poorer person than a less poor person. Those in the poverty camp feel strongly that it is important to reach the poorest possible people. Many in the sustainability camp are more interested in opening access to the full spectrum of the poor who lack access to financial services, although most do include the poorest in that spectrum (E. Rhyne, *Microbanking Bulletin*, 1998).

Such an idea may have problem of neglecting poorer clients. For instance, empirical study in Ghana by J. Adjei and T. Arun (2009) indicates that microfinance institutions reach disproportionately a smaller percentage of very poor people.

The mathematician would approach this problem by assigning weights to individuals, with larger weights going to poorer people. In this way, a program might get one point for serving a moderately poor person, two for a very poor person, and three for a severely poor person. In such a system, a program serving a great number of moderately poor people would earn more points than one serving a few severely poor people, though the scale of weights could be shifted to

produce the reverse outcome. In fact, the focus of many people in the sustainability camp on scale of outreach, as opposed to depth of outreach, reveals a weighting system in which the difference in weights between the two ends of the spectrum is not great (E. Rhyne, Microbanking Bulletin, 1998).

People in the sustainability camp have tended to dismiss the moral and political elements, because they come from a more economic and quantitative tradition. Part of the reason for the high weight on the poorest is, of course, straight forwardly moral and humanitarian. Thus, those in the poverty camp fear that unless they focus exclusively on the poorest and women, the benefits of microfinance will be hijacked by the slightly better off, particularly men (E. Rhyne, Microbanking Bulletin, 1998).

With regard to this, (E. Rhyne, Microbanking Bulletin, 1998) states:

“Unfortunately, however, the field has made little progress on the empirical front. We still know very little about the poverty level of clients in various microfinance programs, and we still rely on loan size as the only readily available proxy for client poverty level” (E. Rhyne, Microbanking Bulletin, 1998).

2.4.3. Optimality of Outreach and Sustainability

The issue of the difference in sustainability of MFIs resulting from the difference in types of outreach may take us to the imagination of optimality of depth of outreach. If it is true that sustainability of MFIs improves with an increase in outreach involving non-poor (richer) clients, and it diminishes as more number of poorest clients is involved, one may think of the optimality of number of poorest clients to be served by the institutions for a given level of sustainability (E. Rhyne, Microbanking Bulletin, 1998).

In relation to this, the researcher wants to forward his message that the relationship between depth of outreach and degree of sustainability of MFIs in Ethiopia should be clearly known. Consequently, emphasis has to be given to the estimation of optimal level of depth of outreach, at a given level of degree of sustainability of each institution, so as to compromise the two seemingly opposite elements (depth of outreach and sustainability of the institutions).

According to (E. Rhyne, 1998: P.6), if microfinance were simply a mathematics problem (having objective function and constraint), it would be a problem of dual maximization. One objective (depth of outreach or sustainability) or the other must be treated as constraint (depth of outreach or sustainability), while the other (one of the two) is maximized. The mathematician derived a curve that traces the trade-off between the objectives. At every point on the curve, more of A means less of B. The choice of the best point on the curve depends on how much one values A versus B. However, inside the curve, both A and B can be increased until the curve is reached. In economics, this curve would be called the production possibility frontier.

Thus, in microfinance we need to know how close we are to the frontier. If we are near it, then there is a direct trade-off between reaching the poor and sustainability. If not, it should be possible to increase both outreach and sustainability (ibid). This implies that there is a possibility to increase both the poor and non-poor clients.

Generally, the key essence of microfinance is to provide a means to help the poor who lack collateral to access financial capital. Hence, it is illogical to exclude the poor from the use of services provided by MFIs for the reason that they are expected to diminish sustainability of the institutions and at the same time it would be violating the main objective of MFIs, which is illogical. Therefore, different mechanisms have to be set to increase depth of outreach keeping the strength of sustainability. Increasing the number of non-poor clients side with the poor is likely to keep the strength of sustainability provided that sustainability improves with the involvement of more number of non poor (richer) clients. Therefore, it is possible to think about the optimality of depth of outreach for a given level of sustainability constrained by number of non poor (richer) clients (E. Rhyne, Microbanking Bulletin, 1998). While doing this, it implies that improving the economic wellbeing of the poorest section of the society, which is equivalent to addressing the development needs of micro and macro economic problems.

2.5. The Impact of Microfinance and Its Feature across Different Groups

Improving economic well-being of the poor is the main objective of microfinance programs. However, different development practitioners argue that most MFIs are not achieving the desired objective they are established for. It seems ambiguous to deal with the effectiveness of the operations of MFIs (A. Islam, 2008).

Different identification strategies have yielded different conclusion. The best known impact evaluation study of microfinance by Pitt and Khandker (1998) finds that access to microfinance significantly increases consumption and reduces poverty. However, Morduch (1998) using Pitt and Khandker's data set , but with different methodology, finds that access to microfinance has insignificant, or even negative, effect on the household welfare. More recently, Madajewiz (2003), using the same data set but again with different methodology, finds results similar to those obtained by Morduch (1998).

Using panel data from Bangladesh, khandker (2005) finds a significantly weaker effect of microfinance participation than found in earlier cross-sectional studies (undertaken by the same author). In the case of Thailand, Coleman (1999) finds that the average program impact is insignificant on physical assets, savings, and expenditure on education and health care.

No matter these arguments, Kaboski and Townsend (2005) find institutions with good policies can promote asset growth, consumption smoothing and decrease the reliance on money lenders in Thailand. Karlan and Zinman (2008) examine the impact of expanding access to consumer credit using data from a field experiment in South Africa. Their results indicate significant and positive effects on income, food consumption, and job retention.

It is recognized that MFIs serve different groups of the society with different economic status. Accordingly, the impact of microfinance may vary across different groups. A study conducted by A. Islam (2008) indicates that the poorest of the poor benefit most from participating in microfinance. The impacts are lower, or sometimes even negative, for those households marginal to the participation decision. The effects of participation are, in general, stronger for male borrowers.

CHAPTER THREE

METHODOLOGY OF THE STUDY

3.1. Description of the Study Area

Dire Dawa is one of the largest cities of Ethiopia which is composed of both rural and urban dwellers. According to the “new system of administration”⁶, the urban area is classified into 9 kebelles, and the rural areas into 17 kebelles. Since it is one of the largest cities of the country within the system, there are a number of formal and informal financial institutions, which are becoming part of the life system of the society. Of these financial systems, formal financial institutions serve only small segment of the society who are capable of providing physical collateral (not the poorest section of the society). This implies that large proportion of the people of the city who are poor and unemployed that lack physical collateral to access the formal financial institutions were not having the opportunity to be served by these formal institutions.

Cognizant of this problem (lack of access to financial services of the poor), Dire Microfinance Institution was established in May, 2003 after the city’s council administration has commissioned a feasibility study in 2002 by an independent consultant. Consequently, DMFI commenced its operation few months later in March 2004 (DMFI, 2006).

Dire Microfinance Institution is one of the MFIs that were established as per the proclamation number 40/1996 in Dire Dawa city. The institution is and/or was believed to create access of financial services to a large number of poor (low income group) and unemployed residents of the city who were not able to have access to the financial services provided by the formal financial institutions due to perceived risk and/or lack of collateral (DMFI, 2006).

⁶ New system of administration” refers to the change in the number of Kebelles in the city (i.e. which was formerly 25 but now merged to only 9).

DMFI's Vision, Mission and Objectives

DMFI aims to promote the financial viability of the sector through clearly stated and transparent financial frame work. Hence, vision, mission and objectives of the institution are stated as follows (DMFI, 2006).

Vision

Its vision is to become self-sustaining, effective and efficient financial institution and see poverty and unemployment problem of Dire Dawa being alleviated through provision of financial services to low income group especially women and youth.

Mission

Actively participate and contribute towards urban and rural poverty reduction endeavors through provision of effective and efficient financial services to low income segment of the community particularly women and youth.

Objectives

General objective of the institution is to provide micro financial services as per proclamation number 40/1996 to low income women, unemployed youth, farmers and pastoralists. Specifically,

- A. To provide demand, saving and time deposit services to the targeted group of the society.
- B. To provide local money transfer services.
- C. To provide counseling service to its clients.
- D. To promote saving culture in the administration

(DMFI, 2006)

Since its establishment, the overall situation of the operation of the institution shows that the institution had been providing its financial services in group lending system considering members of the group as collateral, from the commencement of its operation in 2003/04 until 2006/07. But, later in 2007/08, it started to provide its financial services in a way of individual lending system and for associations. Of all lending approaches used by DMFI's, the individual lending system is mainly used in order to provide loan to those who are civil servants (employed in various

government institutions). This diversification of the product of the institution may be related to its objective of self sustainability.

No matter the statements of vision, mission and objectives of the institution, it is difficult to realize what is desired unless special care is taken regarding the perceived trade-off between depth of outreach and self sustainability. This study was carried out to look at the performance of the institution from depth of outreach and financial sustainability angles, and the difference in its prospects to the poor and the non-poor ones.

3.2. Methods of Data Collection

This study was undertaken using both primary and secondary data. The secondary data was collected from various institutions such as AEMFI, DMFI, Mekelle University, Addis Ababa University and Internet Explorer. With regard to this secondary data, written documents of the upper mentioned organizations were systematically observed to compile the necessary data related to this study.

The primary data was collected using surveys made on sampled clients of the institution and non clients. Moreover, in order to obtain some crucial information which are accurate, appropriate, and reliable, peer discussions were made with the managers of Dire Microfinance Institution. The survey was made using stratified random sampling and purposive sampling methods. However, due to financial and time constraints, the researcher was obliged to consider only households living in urban area of Dire Dawa. While conducting the survey, the nine kebelles in the city were considered to be the strata from which clients of DMFI were selected randomly and proportionally. From the whole strata 30 clients from group lending and 25 clients from individual lending were selected.

Simultaneously, purposive sampling technique was also used to select non clients without any randomization. The main justification for such enquiry is to select non clients having similar occupation and economic characteristics as the clients, to reduce selection bias. Based on the need for achievement of this goal (to reduce the selection bias), 55 non respondents were selected, of which 30 respondents are with similar occupation and characteristics as the selected

clients under group lending system and 25 non respondents are with similar occupation and characteristics as the selected clients under individual lending system. In order to collect the needed information, enumerators were recruited and the survey had been conducted from Nov. 2, 2009 to Nov. 20, 2009. Finally, the selected respondents were interviewed using questionnaires with the help of enumerators within the specified period of time.

3.3. Methods of Analysis

3.3.1. Outreach of the Institution

The strength and/or weakness of any financial institution are/is measured by the level of its outreach and sustainability. Thus, in this case, the extent of outreach of the institution was measured using simple statistics as percentages, bar graphs and pie charts. The bar graph shows the trend of number of clients and amount of loan dispersed from time to time. Hence, the clients were categorized into group lending, individual lending and association so as to identify the extent of depth of outreach of the institution. Accordingly, the bar graph shows the level of number of poor clients (clients under group lending) and the amount of loan disbursed to the poor to indicate the trend of depth of outreach over time

The pie charts show the extent of depth of outreach from the possible maximum level of outreach, overtime. They indicate the percentages of number of poor clients (clients under group lending) and amount of loan disbursed to the poor from time to time. Where percentage of the number of poor clients and percentage of amount of loan disbursed to them was calculated as follows:

$$\text{Percentage of number of poor clients} = \frac{\text{Number of clients under group lending}}{\text{Total number of clients}} \times 100$$

$$\text{Percentage of loan dispersed to the poor} = \frac{\text{Amount of loan dispersed to group lending}}{\text{Total amount of loan dispersed}} \times 100$$

3.3.2. Sustainability of the Institution

Profitability or the ratio of revenue to expense of the institution was used as the major indicator of sustainability of the institution. In this case, sustainability of the institution was measured using similar statistical techniques such as percentages and bar graphs. Thus, to evaluate the extent of operational self sustainability of the institution, only operational revenues and expenses were used. However, due to lack of full information, its financial self sustainability could not be measured. Thus, the condition has forced the researcher to be limited to the measurement of operational self sustainability of the institution.

The bar graph shows the trend of the extent of the overall operational self sustainability of the institution, which is given as follows.⁷

$$\text{Overall operational self sustainability with respect to all clients} = \frac{\text{Total Revenue}}{\text{Total Expense}} \times 100$$

3.3.3. The Relationship between Outreach and Sustainability

Regularly, operational profitability of the institution and total number of clients (increasing or decreasing trend) were used to show the relationship between outreach and sustainability of the institution. As a tool of analysis to show this relationship, Pearson's correlation coefficient was applied (<http://en.wikipedia.org>, 12 January, 2010).

The correlation coefficient measures the relationship (whether there is direct, opposite or no relationship) between overall profitability of the institution and total number of clients in the first five years of operation (from the start of the operation of the institution in 2003/04 until 2007/08). In addition, this correlation coefficient was applied to measure the specific relationship between profits (return) generated from the poor clients (clients under group lending) and the number of poor clients to show the relationship between depth of outreach and sustainability of the institution (<http://en.wikipedia.org>, 12 January, 2010).

⁷Okumu J. (2007), "*The Microfinance Industry in Uganda: Sustainability, Outreach and Regulation*", Dissertation presented for the degree of Doctor of Philosophy (Economics) at the University of Stellenbosch, December

The relationship between overall outreach and operational sustainability is given by:

$$r = \frac{\sum (N_i - \eta) (\prod i - \pi)}{\sqrt{\sum (N_i - \eta)^2} \sqrt{(\prod i - \pi)^2}}$$

Where: N_i is the number of all clients of the institution in period i

η is average number of clients in the first five years of operation of the institution

$\prod i$ is operational profit of the institution in period i

π is average of operational profit of the institution in the five years of operation

The relationship between depth of outreach and sustainability is given by:

$$r_p = \frac{\sum (N_{pi} - \eta_p) (\prod p_i - \pi_p)}{\sqrt{\sum (N_{pi} - \eta_p)^2} \sqrt{(\prod p_i - \pi_p)^2}}$$

Where: N_{pi} is the number of clients under group lending (the poor) in period i

η_p is average of the number of clients under group lending system in the first five years of operation of the institution

$\prod p_i$ is operational profit generated from the poor in period i

π_p is average of the operational profit generated from clients under group lending in the first five years of operation

3.3.4. Impact of the Institution on Its Clients (the Poor and Non Poor Clients)

While conducting this study a total sample size of 110 were used (55 client and 55 non client). The main reason for involving 55 clients and 55 non clients in the sample is to measure the relative impact of the institution on the poor and non poor clients. 30 sampled clients from group lending system and 30 non clients having similar occupation and characteristics were used to measure the impact of the existence of the institution on the per capita household consumption of clients under group lending (poor clients). This group of individuals was expected to have similar economic status before the involvement of the clients to be participants in DMFI.

Similarly, to estimate the specific economic impact of the institution on the per capita household consumption of clients under individual lending system, 25 clients from individual lending

system and 25 non clients having similar occupation and characteristics were taken. Finally, all of the 110 sampled individuals were integrated to estimate the overall impact of participation in DMFI on the per capita household consumption of all of the sampled clients.

After making such categorization of samples, ordinary least square regression technique of econometrics model was applied as a tool of analysis and was used to measure the impact of the institution on each category of clients. The possible variables that are expected to affect per capita consumption of the households (average work experience, average education, average age, square of average age, number of the household members, average saving of the households in 2008, average number of students within the household, average number of individuals engaged in trade, average number of informally employed individuals, average number of governmentally employed individuals, average number of unemployed individuals, average number of retired individuals, average number of children, average number of individuals engaged in provision of services, average number of working age individuals, average number of workers, source of income from trade, source of income from remittance and salary, source of income from trade and salary, and participation in DMFI) were considered to run the OLS regression.

Accordingly, regression equation for the poor (for clients under group lending and those non clients having similar occupation and characteristics) is given by:

$$\begin{aligned}
 H_p = & B_0 + B_1X_1 + B_2X_2 + B_3X_3 - B_4X_4 + B_5X_5 - B_6X_6 + B_7X_7 + B_8X_8 + B_9X_9 - \\
 & B_{10}X_{10} - B_{11}X_{11} - B_{12}X_{12} + B_{13}X_{13} + B_{14}X_{14} - B_{15}X_{15} + B_{16}X_{16} + B_{17}X_{17} + B_{18}X_{18} + \\
 & B_{19}X_{19} + B_{20}X_{20} + B_{21}X_{21} + B_{22}X_{22} + B_{23}X_{23p} + \varepsilon \dots\dots\dots (1)
 \end{aligned}$$

Where: H_p is vector of per capita household consumption of the sampled poor

- B_0 is vector of the constant term
- X_1 is vector of average work experience of the household
- X_2 is vector of average years of education of the household
- X_3 is vector of average age of the household
- X_4 is vector of number of household member
- X_5 is vector of previous year (2008) average saving of the household

- X_6 is vector of the ratio of no. of students to number of household members
- X_7 is vector of the ratio of no. of traders to number of household members
- X_8 is vector of the ratio of number of informal employees to no. of hh members
- X_9 is vector of the ratio of number of formal employees to no. of hh members
- X_{10} is vector of the ratio of no. of unemployed (but able to work) to no. of hh m
- X_{11} is vector of the ratio of no. of retired individuals to no. of hh members
- X_{12} is vector of the ratio of no. of children to no. of hh members
- X_{13} is vector of the ratio of no. of individuals engaged in service provision to no. of hh members
- X_{14} is vector of the ratio of no. of working age individuals to no. of hh members
- X_{15} is vector of square of average age of the household
- X_{16} is vector of the ratio of employed individuals to no. of hh members
- X_{17} is vector of source of income dummy from own investment
- X_{18} is vector of source of income dummy from remittance and salary (wage)
- X_{19} is vector of source of income dummy from salary (wage)
- X_{20} is vector of source of income dummy from investment and salary (wage)
- X_{21} is vector of source of income dummy from investment and rent
- X_{22} is vector of source of income dummy from sale of assets and salary (wage)
- X_{23p} is vector of participation dummy in the microfinance by the poor (clients under group lending system)
- ϵ is vector of the error term (residual of the regression result)

Regression equation for the non poor is given by:

$$H_N = B_0 + B_1X_1 + B_2X_2 + B_3X_3 - B_4X_4 + B_5X_5 - B_6X_6 + B_7X_7 + B_8X_8 + B_9X_9 - B_{10}X_{10} - B_{11}X_{11} - B_{12}X_{12} + B_{13}X_{13} + B_{14}X_{14} - B_{15}X_{15} + B_{16}X_{16} + B_{17}X_{17} + B_{18}X_{18} + B_{19}X_{19} + B_{20}X_{20} + B_{21}X_{21} + B_{22}X_{22N} + \mathbf{u} \dots\dots\dots (2)$$

X_{25A} is vector of participation dummy in the microfinance program by all of the sampled clients

ϵ is vector of the error term (residual of the regression result) for all of the sampled individuals

Note: Similarly, the remaining variables are expressed as it is shown in equation 1

Two steps selection model was used to test the presence of selection bias in the OLS regressions results. In addition, different tests (tests of normality, tests of problem of hetroskedasticity and tests of problem of multicollinearity) were undertaken and adjustments were made for the accuracy of the model. Tests and adjustments of the results of the OLS regression were carried out as follows:

A. Tests of sample selection problem

Sample selection problem refers to a situation where non randomization of participation in a program has occurred, which creates bias in the estimation of economic impact of the program on its participants. There may be a situation where individuals with more ability to generate higher level of earning (or with good economic characteristics) to be included in the participation and those with poor ability are excluded from the participation. This may lead us to have inappropriate finding and conclusion, that the program has significant positive impact on the lives of its participants. Or there may be a tendency where the opposite holds and we end up with a finding and conclusion that participation in the program worsens the lives of the participants. The occurrence of these situations is known as problem of sample selection bias.

To avoid this problem (sample selection bias), the researcher has tried to be systematic following the appropriate statistical techniques. This is the reason why clients were sampled using randomization (stratified random sampling method) and the non clients were sampled purposively to get non clients with similar economic characteristics as the clients. There are a number of ways of detecting such type of problem. In this typical study, the model of two steps selection was applied to detect the sample selection bias.

The model uses an instrumental variable which is affecting the likelihood of participation but which does not significantly affect outcome of the indicator of impact (per capita household consumption, in case of this study). In this study, interest to be client of DMFI (interedmfi) was used as an instrumental variable. Interest of individuals to be client of DMFI (interedmfi) is likely to affect the likelihood of participation but not per capita household consumption.

The two step sample selection model has two stages, which is mainly used to detect the sample selection problem. First, a limited dependent model is estimated to measure the likelihood of participation using the specified instrumental variable and all the explanatory variables of the OLS regression. From the result of this limited dependent model, we estimate a parameter showing the distribution of the likelihood of participation (i.e. imr). Then, OLS regression is undertaken using the parameter and all the other explanatory variables to measure the significance of the presence of the selection bias (imr) in affecting the per capita household consumption.

If imr is insignificant to affect per capita household consumption at certain level of significance (5% in this case), it means the distribution of the likelihood of participation has nothing to do with per capita household consumption. This implies there is no sample selection bias; hence, the impact of participation in the program can be clearly identified using OLS regression. However, if the opposite holds true, it implies that the impact of participation cannot be clearly identified using OLS regression.

Having stated this, the two step sample selection model was computed as:

$$P_i = B_0 + B_1 I_i + B_2 X_i + e_i \dots\dots\dots \text{(the first step)}$$

$$H_i = b_0 + b_1 X_i + b_2 L_i + u_i \dots\dots\dots \text{(the second step)}$$

Where: P_i is the likelihood of participation
 B_0 is the constant term of the limited dependent model
 I_i represents interest to be client of DMFI (dummy)
 X_i is the vector of other explanatory variables affecting per capita household consumption
 e_i and u_i are error terms of the limited dependent model and the OLS regression, respectively, and

L_i is the parameter of the distribution of likelihood of participation (imr) in DMFI which is predicted from the first step (from the estimation of the likelihood of participation)

i. Test of sample selection bias in the estimation of impact of DMFI on participants under group lending system

Appendix 1 presents the result of the limited dependent model of likelihood of participation (the first step of the two steps sample selection model) by participants under group lending and non participants but having similar economic characteristics. This model was used to estimate the parameter of the distribution of the likelihood of participation (imr). We predict imr from the result of this limited dependent regression.

From the given table in appendix 1, it is indicated that interest to be client of DMFI (interedmfi) has a coefficient with positive sign, which represents that the possibility of participation in DMFI increases if individuals have interest to be client of the institution.

Appendix 2 shows the result of the OLS regression (the second step) which measures the significance of the effect of distribution of the likelihood of participation on the per capita household consumption. The result of the OLS regression (the second step) shows that t-value and P-value of the parameter imr are -0.52 and 0.608, respectively. This implies that imr has nothing to do with avhhc at 5% of level of significance since $|-0.52|$ is less than the value in t distribution (1.96) and 0.338 is greater than 0.05. Therefore, it is expected that there is no sample selection bias and the impact of participation in DMFI can be clearly identified. Hence, the OLS regression can be used to estimate the impact of participation on the clients under group lending system.

ii. Test of sample selection bias in the estimation of impact of DMFI on participants under individual lending

Using the same procedure as we had in the preceding test of sample selection problem, we have Appendix 3 (the result of the limited dependent model showing the likelihood of participation by the sampled clients and non clients with similar economic characteristics) and Appendix 4 (the result of the OLS regression to show the significance of sample selection bias). As it was

explained in the preceding case, the first step (Appendix 3) was used to estimate the parameter of the distribution of the likelihood of participation.

Appendix 4 shows the measurement of the significance of the parameter of the distribution of the likelihood of participation by the specified group. It shows that t-value and P-value of imr are -0.96 and 0.346, respectively. This indicates that imr is not significant at 5% of level of significance since $|-0.96|$ is less than the value in the distribution (1.96); and 0.346 is greater than 0.05. Thus, there is no sample selection bias implying that the impact of the participation by this group can be clearly identified as what we got before. That is using OLS regression is justifiable to estimate the impact of participation on the per capita household consumption of the participants.

iii. Test of sample selection bias in the estimation of impact of DMFI on all of its participants

Here once again, we use the same procedure to test the presence of the problem of sample selection bias with regard to the result of impact estimation of participation by all clients of the institution. Appendix 5 and Appendix 6 show the result of the limited dependent model (the first step) and the OLS regression model (the second step), respectively, to test the significance of the presence of the problem of sample selection bias. Appendix 5 helps us to find the parameter of the distribution the likelihood of participation by all the sampled individuals.

Appendix 6 indicates that the value of t-test and P-value of imr are -0.71 and 0.489, respectively. Since $|-0.71|$ is less than the value (1.96) in the t-distribution at 5% of level of significance and 0.489 is greater than 0.05, imr (the distribution of the likelihood of participation) has nothing to do with the per capita household consumption, at 5% of level of significance. Hence, the result of the OLS regression can clearly show the economic impact of participation in DMFI.

B. Tests of Normality

i. Tests of Normality of the OLS regression of the estimation of the impact of participation in DMFI on the participants under group lending system

Tests of normality were undertaken for each case of estimation of the impact assessments. Let us begin with the result of test of normality for the estimation of OLS regression in relation to clients under group lending system.

Appendix 7 and Appendix 8 show the result of the test of normality of the OLS regression of impact assessment made on the clients under group lending system including the non clients with similar economic characteristics. According to Appendix 7, the residuals of the OLS regression seem to lie almost on the normal distribution line. Hence, we are likely to expect that the result of the OLS regression to be normally distributed.

Appendix 8 also shows how the residuals of the OLS regression model (in relation to the participants of DMFI and the non participants with similar economic characteristics) is normally distributed using the Kernel density estimate. This figure also indicates that the residuals of the OLS regression are likely to be normally distributed.

ii. Tests of Normality of the OLS regression of the estimation of the impact of participation in DMFI on the participants under individual lending system

Using similar procedure as we have done to the estimation of impact in relation to participants under group lending system, we had two figures to show the normality of the residuals of the OLS regression. Appendix 9 shows that the residuals of the OLS regression seem to lie on the line of the normal distribution. Appendix 10 also shows that the residuals of the OLS regression are likely to be distributed normally as compared to the Kernel density estimate. Hence, we expect that the result of the OLS regression is normally distributed.

iii. Tests of Normality of the OLS regression of the estimation of the impact of participation in DMFI on all of the participants

Tests of normality of the OLS regression of the estimation of the impact of participation in DMFI on all of the participants were undertaken once again using the same procedure as we have seen before. Appendix 11 shows that the residuals of the regression are likely to lie on the line of the normal distribution line. Appendix 12 also shows that the residuals of the regression model are not much far from the normal distribution according to the Kernel density estimate. Therefore, we are likely to expect that the result of the OLS regression to estimate the overall economic impact of the institution on all the sampled participants is normally distributed.

C. Tests of Skedasticity

Once robust is used in a regression, it may not be necessary to test the presence of the problem of heteroskedasticity (the variability of variance of the residuals). Whatever the case may be, a test (imtest) was made to detect the presence of heteroskedasticity.

Test of heteroskedasticity for the result of OLS regression related to participants under group lending system and the non participants with similar characteristics is given on Appendix 13. Result of the test shows absence of heteroskedasticity for the OLS regression as it is confirmed by P-value which is 0.4392 (greater than 0.05). This implies that there is no problem of heteroskedasticity at 5% of level of significance.

Appendix 14 shows the result of test of the presence of heteroskedasticity in the OLS regression of the impact estimate related to participants under individual lending system. The table shows that P-value of heteroskedasticity is 0.4752 which is also greater than 0.05. Hence, there seems to be no heteroskedasticity at 5% of level of significance, the result of OLS regression of the estimate of the impact related to the participants under individual lending system

Appendix 15 shows the result of test of heteroskedasticity in the OLS regression related to the estimate of economic impact of the institution on all of its sampled participants. The table shows that the P-value of heteroskedasticity is 0.9646 which is greater than 0.05. This means there

seems to be no heteroskedasticity in the result of the OLS regression of the estimate of economic impact of DMFI related to all of its sampled participants, at 5% of level of significance.

D. Tests of the presence of Endogeneity

Endogeneity refers to the problem related to the association between the explanatory variables and the residuals. If the explanatory variables are much correlated with the error term (the residual), there will be an estimation error while measuring the significance of the explanatory variables to influence the dependent variable (avhhc). Hence, care has been given to the problem of association between the residuals and the explanatory variables.

Accordingly, test of endogeneity was made to each of the OLS estimate of impact of the institution. This was undertaken using OLS regressions taking the residuals (residhat) as the dependent variable. Then nR^2 of the results of the regressions was used to test the presence of endogeneity.

Where: n is the number of observation of the OLS regression made for estimating the impact.

R^2 is the percentage of the effect of the explanatory variables (together) on the dependent variable (the residual in this case).

Note that nR^2 has a chi-square distribution. Hence we look for the value of the chi-square with degree of freedom n (X^2_n) at certain level of level of significance (5% in this case). If the value of nR^2 is greater than the value of the chi-square in the distribution at 5% of level of significance, we expect that there is problem of endogeneity.

Let's begin with the test of endogeneity in the estimate of impact related to the participation under group lending. Appendix 16 shows the test of endogeneity of the impact related to the participation under group lending system using the regression taking the residual as dependent variable. The table shows that R^2 is equal to zero, which means nR^2 is equal to zero as well. This implies there is no problem of endogeneity in the OLS regression of estimate of the impact related to participation under group lending system.

Appendix 17 also shows the result of the test of endogeneity made on the estimate of impact related to participation under individual lending system. It shows that R^2 is equal to zero.

Therefore, it is likely that there is no problem of endogeneity in the estimate of impact related to the individual lending system.

Similarly, Appendix 18 shows that the R^2 of the result of test of endogeneity made on the estimate of impact on all of the participants is equal to zero. Therefore, there is no problem of endogeneity in the estimation of impact related to all of the participants.

E. Tests of Multicollinearity

The other problem faced by OLS regression model is the association between the explanatory variables which is known as collinearity. If there is high rate of association between the explanatory variables, the standard error of the estimates of the explanatory variables will be inflated and cause problem on the estimation of significance of the explanatory variables to influence the dependent variable (avhhc). This was undertaken using a measurement known as variance inflation factor (vif). Accordingly, the variance inflation factor for each case of the estimation of impact was computed.

Appendix 19 shows the result of the test of multicollinearity using the variance inflation factor for the estimate of impact related to participation under group lending system. The table shows that the mean vif is 4.92 which is lower than 10. This implies, by the rule of thumb (most of the time), there is little problem of multicollinearity. It should be noted that five explanatory variables (avage2, mm4, tysoinc3, tysoinc5 and tysoinc6) which were initially included in the model were dropped due to their higher rate of collinearity.

Appendix 20 also indicates the result of the test of multicollinearity made on the estimate of impact related to participation under individual lending system. The table shows that the value of mean vif is 2.60 which is less than 10. Therefore, by the rule of thumb (most of the time), we expect that there is little problem of multicollinearity. Here again should be noted that 9 explanatory variables (mm3, mm4, mm5, mm12, empratio, age2, tysoinc1, tysoinc3 and tysoinc5) which were initially included in the model were dropped due to higher rate of multicollinearity.

Similarly, Appendix 21 shows the result of the test of the presence of multicollinearity made on the estimate of impact related to all of the participants. Here once again the value of mean vif (2.30) is lower than 10 to indicate that there is little rate of problem of multicollinearity. We should note now again that 12 explanatory variables (mm3, mm4, mm5, mm12, empratio, age2, tysoinc1, tysoinc3, tysoinc5 and tysoinc6, tysonc7 and tysoinc8) were dropped due to higher rate of multicollinearity.

3.4. Conceptual Framework

The key tenet for the existence of microfinance institutions is to provide financial services to the outcaste poor segment of the people who do not have access to loan services due to lack of physical collateral to be pledged for formal financial institutions. In other words, microfinance institutions can be considered as a means for access to working capital to the poor to enhance their capital accumulation and improvement in their level of consumption.

Given this and considering the actual situation of the society, it is crucial to expand these institutions to reach all the outcaste group of the society. Despite the fact that the expansion of these institutions is vital, there are suspicions over the achievement of the desired objective. This suspicion arises from the expectation of increment in cost of transaction and uncertainties as the financial services are provided to those remote outcaste group, where sustainability of the institution is becoming questionable.

This happens when the institution is seeking its sustainability through expansion of its services to the well doing societies (economically strong); where outreach of the institutions may not be in the desired manner. The institutions may shift the target of the financial services, for the sake of strengthening self sustainability of the institutions. Therefore, one may expect trade-off between depth of outreach and self sustainability of the institutions.

No matter the suspicion, there are studies showing positive relationship between outreach and self sustainability of the institutions. For instance, an empirical study undertaken by Befekadu (2007) shows there is direct (positive) relationship between outreach and self sustainability of microfinance institutions in Ethiopia. However, in this study, the type of clients was not

distinguished into poor and non poor. But, it simply shows the relationship between breadth of outreach and self sustainability; not specifically between depth of outreach and self sustainability. This and other similar studies made on sustainability and outreach has motivated the researcher to make further investigation on the issues considering a particular case, DMFI. The main intuition behind this enquiry is to have a clear vision regarding the achievement of expansion of outreach in a desired manner.

The researcher also wants to figure out the importance and viability of microfinance institutions on the poor, specifically (in terms of economic impact). Accordingly, estimations of economic impact of the institution (DMFI) on different groups of clients were undertaken. The specific economic impact of microfinance institutions on the poor cannot be easily identified using a study that measures the overall impact of the institutions on all of their clients. Hence, the main reason to analyze the difference in economic impact of the institution is to avoid a wrong and undesired conclusion made on a specific group using an estimation of economic impact which incorporates all groups at a time. Therefore, special attention should be given to a study showing specific impact of the institutions on each type of group of clients, where the researcher is interested on.

Accordingly, clients of DMFI were separated in to two (clients under group lending and clients under individual lending) based on their economic status. Clients under group lending system are those who are mostly engaged in a very small scale and cottage economic activities and who cannot pledge physical collateral to borrow money from the institution individually. On the other hand, almost all of the clients under individual lending system are government employees having relatively higher level of monthly earnings who can pledge the claim of their future income as physical collateral to borrow money individually from the institution.

Hence, clients under group lending system are expected to be relatively poorer than those clients under individual lending system. The sample survey made on the 30 clients under group lending system and the 25 clients under individual lending shows that average monthly income of the later is much beyond the former ones. Average monthly income of the sampled 30 clients under group lending is about 600 Birrs while average monthly income of the sampled 25 clients is 1500 Birrs.

CHAPTER FOUR

RESULTS, ANALYSES AND DISCUSSION

This chapter was allocated to the analyses of the collected data related to this study. Hence, the collected data were presented according to their respective place and analyzed systematically using different kinds of tools of analyses. The chapter was separated into four sections.

The first section deals with measurement of degree of outreach of the institution in terms of number of clients and the amount of loan disbursement. Clients of the institution were categorized into different groups to find out the level of depth of outreach of the institution. In this section, statistical tools such as percentages, bar graphs and pie charts were used as tool of analysis.

The second section is concerned about measurement of operational self sustainability of the institution. Operational profitability of the institution was taken into account to indicate the trend of operational self sustainability of the institution, over time. The same statistical tools (percentages, bar graphs and pie charts) as we have used in the first section were applied as tool of analysis.

The third section shows the relationship between outreach and operational self sustainability of the institution. The number of clients and operational profit of the institution, over time were used to measure the relationship. The relationship was measured in relation to all of the clients of the institution and its clients under group lending system, separately. The relationship in relation to clients under group lending is expected to indicate the trade-off between depth of outreach and operational sustainability of the institution. Pearson's correlation coefficient was used as a tool to analyze the relationships.

Finally, OLS regression estimations were made to show the difference in economic impact of the institution on its economically different groups of clients. This includes the estimation of impact on clients under group lending system, on clients under individual lending system and on all of the clients of the institution. The results of the estimation were interpreted and analyzed using common statistical ways of analyses.

4.1. Outreach of Dire Microfinance Institution

Performance of MFIs is regularly measured using different statistical methods. Of all, the capability of the microfinance institutions in managing to expand the level of their outreach is one of the tools used to evaluate its performance. For the matter of this fact, the extent of outreach of DMFI is presented and analyzed so as to indicate the outreach performance of the institution, from time to time. Table 4.1 presented the trend of number of clients in different categories over time.

Table 4.1 Trend of number of clients of DMFI under group lending, association and individual lending (from 2003/04 – 2008/09)

Year	Total number of clients	Number of clients under		
		Group lending	Individual lending	Association
2003/04	833	833	0	0
2004/05	2417	2417	0	0
2005/06	936	936	0	0
2006/07	2291	2291	0	0
2007/08	7728	6377	1296	55
2008/09	3993	2377	1616	51
Overall trend 2003/04 -2008/09	18198	15231	2912	106

Source: Own compile from DMFI, 2009

From table 4.1, it is clear that for the first four years, there was only group lending system since the commencement of operation of DMFI in 2003/04 till 2006/07. However, the trend implies that there was no sustainable increment in number of clients over time. This could be due to large number of dropouts. This confirms that where the rate of dropouts is higher than the rate of involvement of new clients, there is a fall in number of clients; and the reverse is true, where the extent of dropouts is lower than the rate of involvement of new clients. For a better understanding, the following visual presentation (figure 4.1) is used, which indicates the rise and fall of number of clients overtime.

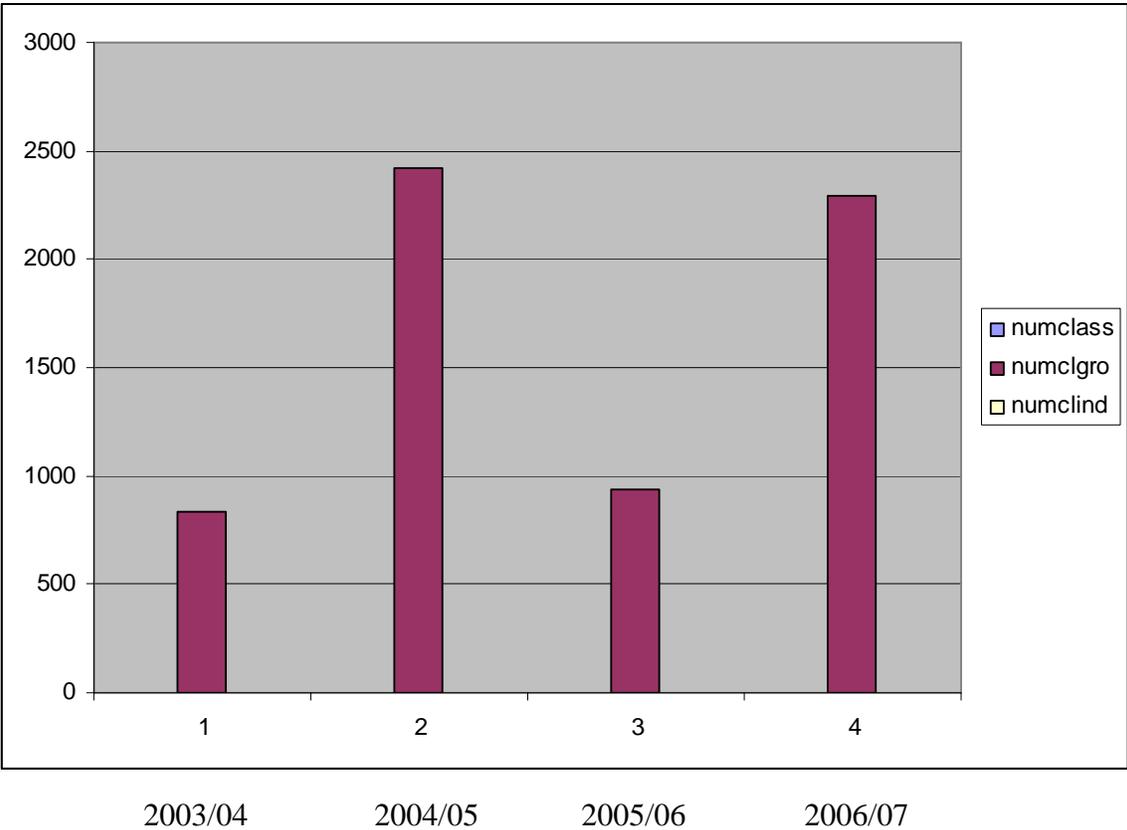


Fig. 4.1 Trend of number of clients of DMFI (From 2003/04 – 2006/07)

The other important issue is to look at the extent of depth of outreach of the institution overtime. This can be explained by the proportion of number of poor clients served by the institution from the whole number of clients, overtime. Thus, for the first four years, all the clients are under group lending which can be expressed as poor. But, for the last two years, there seems a tendency of a shift in target from depth of outreach.

As it is shown from figure 4.2 and 4.3, the proportion of number of clients under group lending fell to 82% and 59% in 2007/08 and 2008/09, respectively while the proportion of clients under individual lending was 17% and 40% in the same respective years. The proportion of number of clients under association is remaining 1% in these last two years of operation. This confirms that the institution is much concerned about its sustainability and it is reducing the proportion of its poor clients.

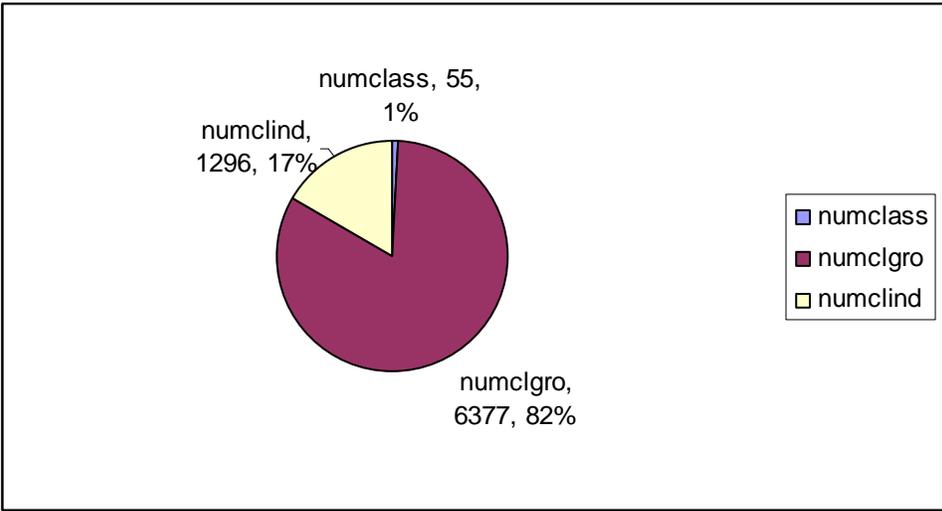


Fig. 4.2 Proportion of number of clients under each category of clients in 2007/08

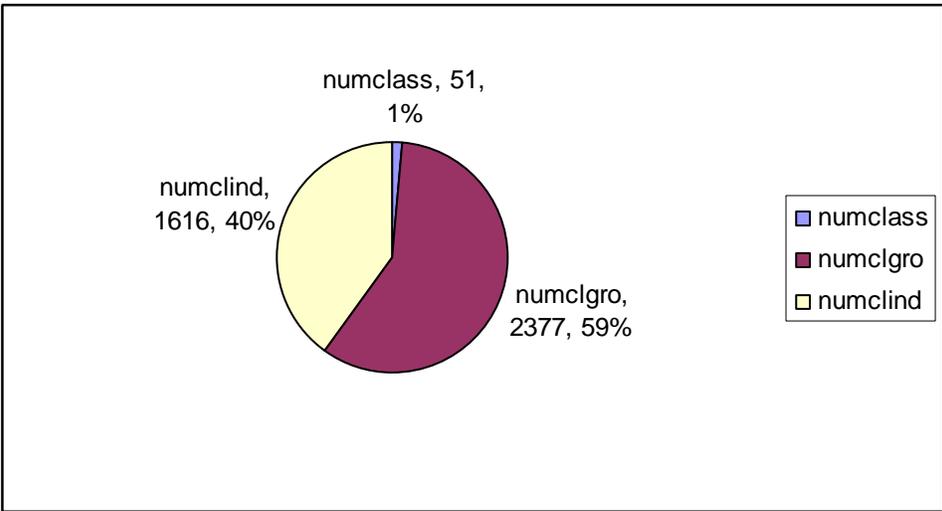


Fig. 4.3 Proportion of number of clients under each category of clients in 2008/09

The shift in target of clients can also be expressed in terms of the proportion of the amount of loan portfolio disbursed to each category of clients. Table 4.2 shows the trend of the amount of loan dispersed to each category of clients, overtime.

The table (Table 4.2) reveals that for the first four years, all the loan portfolio was being dispersed to group lending system even if there is rise and fall of the amount of loan dispersed overtime. According to the response of the administrator's of DMFI, the fall in the disbursement of the loan portfolio in 2005/06 results from the fact that some of the clients of the institution could not repay the loan back and the cost of operation was increasing. In addition, there was shortage of funds which is expected from donors.

Table 4.2 Trend of loan portfolio dispersed to each category of clients

Year	Total amount of loan portfolio dispersed	Amount of loan portfolio dispersed to		
		Group lending	Individual lending	Association
2003/04	1218900	1218900	0	0
2004/05	2872700	2872700	0	0
2005/06	1473740	1473740	0	0
2006/07	3749313	3749313	0	0
2007/08	24626413	13238180	7373685	4014548
2008/09	12167581	7646136	4521445	0
Overall trend 2003/04 -2008/09	46108647	30198969	11895130	4014548

Source: Own compile from DMFI, 2009

However, figure 4.4 shows that there is increasing trend in the amount of loan portfolio disbursed within the given periods of time no matter the fluctuation of the overall loan dispersed. The increasing in the trend of the loan portfolio disbursed to the clients within this period of time did not come from the profitability of the institution; rather, this happens due to the presence of donors of the institution.

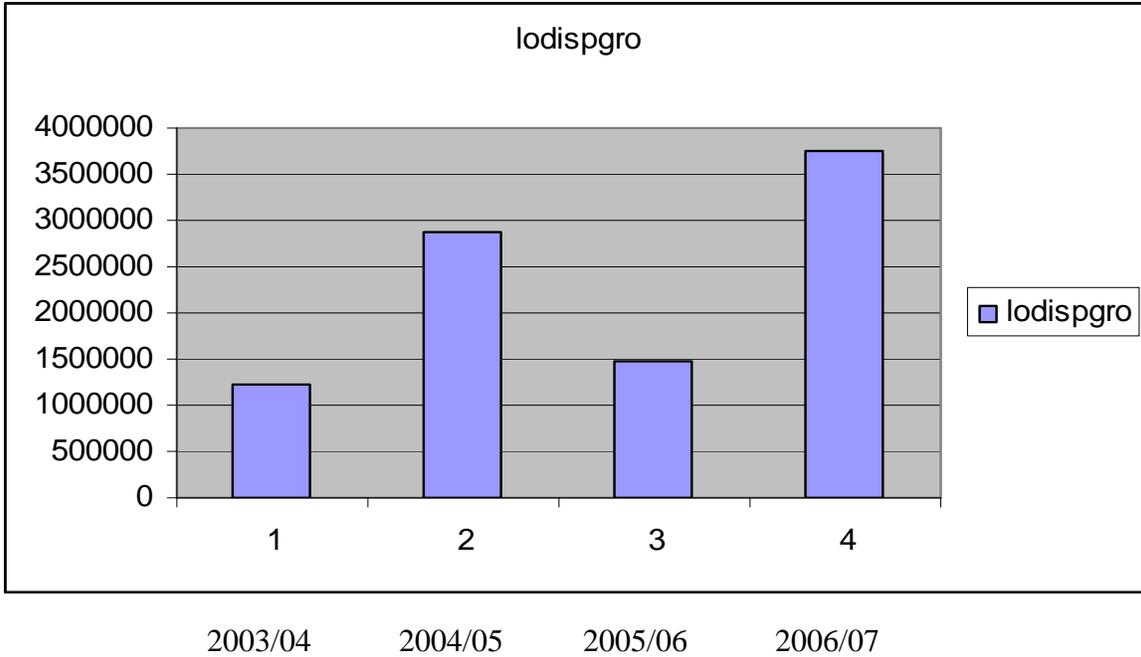


Fig 4.4 Trend of loan portfolio dispersed (from 2003/04 – 2006/07)

The proportion of loan disbursed to each category of clients is the other way that can show us the situation of the shift in target of clients. Hence, Figure 4.5 and figure 4.6 show the shift in target from depth of outreach in terms of the proportion of loan portfolio disbursed to each category of clients.

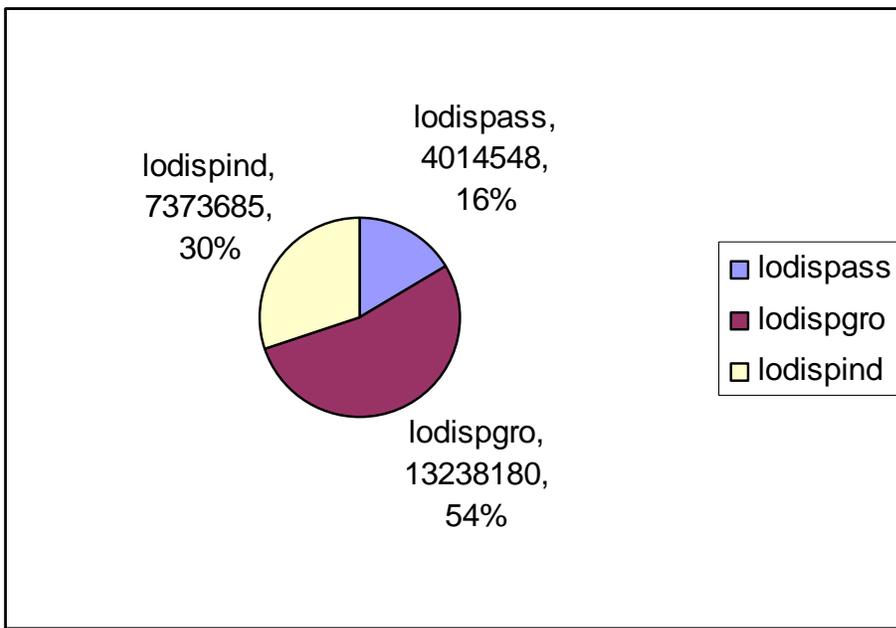


Fig. 4.5 Proportion of loan dispersed to each category of client in 2007/08

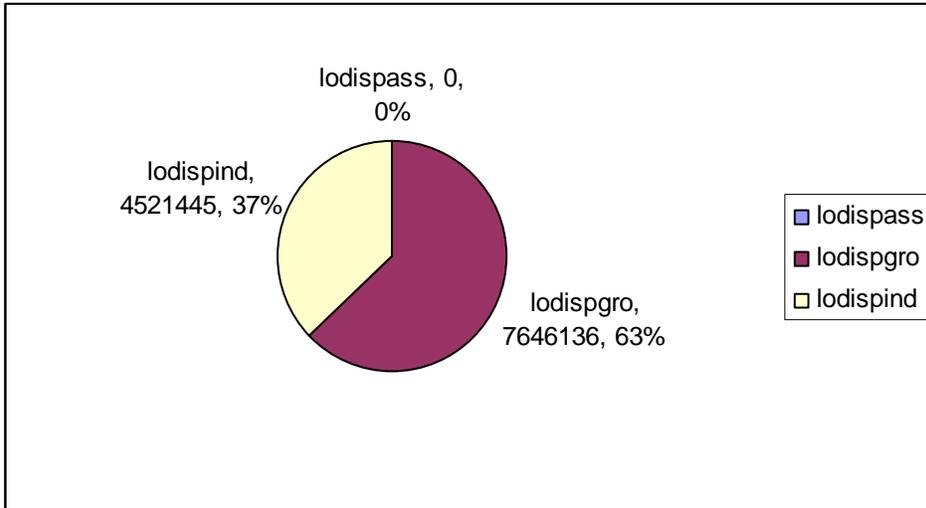


Fig 4.6 Proportion of loan dispersed to each category of client in 2008/09

In the last two years, the proportion of loan portfolio disbursed to group lending is 54% and 63%, respectively. This indicates that within 2007/08 and 2008/09, nearly half and one third amount of loan portfolio that would have been dispersed to the poor has gone to the non targeted groups, respectively. The proportion of loan disbursed to individual lending is 30% and 37% in the same respective periods while it is 16% and 0% for the associations.

4.2. Self Sustainability of Dire Microfinance Institution

Outreach of microfinance institution is likely to be related to its sustainability. Thus, the objective of achieving the desired level of outreach needs to be compromised with the capacity of self sustainability of the institutions. Hence, identifying self sustainability of DMFI is crucial in order to identify the ability of the institution to reach significant number of the poor. Accordingly, operational self sustainability of DMFI was taken as a tool to measure its degree of self sustainability over time. And operational profitability of the institution was taken as a major indicator of its operational self sustainability.

Table 4.3 Trend of operational profitability of the institution under each category of the clients

Year	Total profit	Profit under		
		Association	Group lending	Individual lending
2003/04	-13733	0	-13733	0
2004/05	-624035	0	-624035	0
2005/06	-1320683	0	-1320683	0
2006/07	-1256352	0	-1256352	0
2007/08	-275925	382323	-944782	286534

Source: Own compile from DMFI, 2009

Table 4.3 shows the trend of profitability of the institution under each category of clients over time. From the table, it is clear that the total operational profit of the institution is negative in all the first five years periods of operation (i.e. from 2003/04 – 2007/08).

However, the situation is different for the different categories of clients (for clients under individual lending system and associations). As it is shown in table 4.3, profit generated from group lending is negative in all of the given first five years of operation. But in 2007/08, profits generated from individual lending and associations are positive, at the beginning of the provision of the service to them. This indicates that deviation of the target of the institution from its provision of the financial services to the poor increases its operational self sustainability.

It is also important to look at the degree of operational self sustainability of the institution so as to identify the ability of the institution to cover its operational costs through its operational revenues, over time. Table 4.4 shows the trend of total revenue, total expense and degree of operational self sustainability of the institution. The degree of operational self sustainability of the institution was measured using the ratio of total revenue to total expense which is expressed as:

$$\text{Degree of operational self sustainability} = \frac{\text{Revenue}}{\text{Expense}} \times 100$$

Table 4.4 Trend of total revenue, total expense and degree of operational self sustainability of the institution

Year	Total revenue	Total expense	Operational self sustainability
2003/04	7475	21208	0.352461
2004/05	362105	986140	0.367194
2005/06	574180	1894863	0.303019
2006/07	439765	1696117	0.259278
2007/08	2412407	2688332	0.897362

Source: Own compile from DMFI, 2009

The table (table 4.4) indicates that for the first four years of operation (from 2003/04 – 2006/07) where all of the clients are under the system of group lending, the trend of the degree of operational self sustainability is given by 0.352461, 0.367194, 0.303019 and 0.259278, respectively. This shows that operational revenue of the institution only covers about 35%, 37%, 30% and 25% of the operational costs of the institution in the four respective years of operation. This seems also that there is stagnant trend of degree of operational self sustainability, because the result obtained result is less than the average.

However, during 2007/08, by the time the institution has started to involve other types of clients (clients under individual lending system as well as associations), the degree of operational self sustainability of the institution has shown dramatic improvement (i.e. 89.73%). This implies that operational revenue of the institution may cover about 90% of operational costs of the institution. This may again reveal that shifting the target of clients can improve the degree of operational self sustainability of the institution.

Figure 4.7 shows the graphical presentation of the trend of degree of operational self sustainability of the institution in the first five years of operation. The figure indicates that for the first four years of operation when there is only group lending system, we observe no significant improvement in degree of operational self sustainability. However, this situation is absolutely different in 2007/08, where degree of operational sustainability reaches about 90%.

Hence, the provision of the financial services by DMFI to individuals under group lending system and associations is a good indicator for the institution to shift its function to other target groups than the existed beneficiaries.

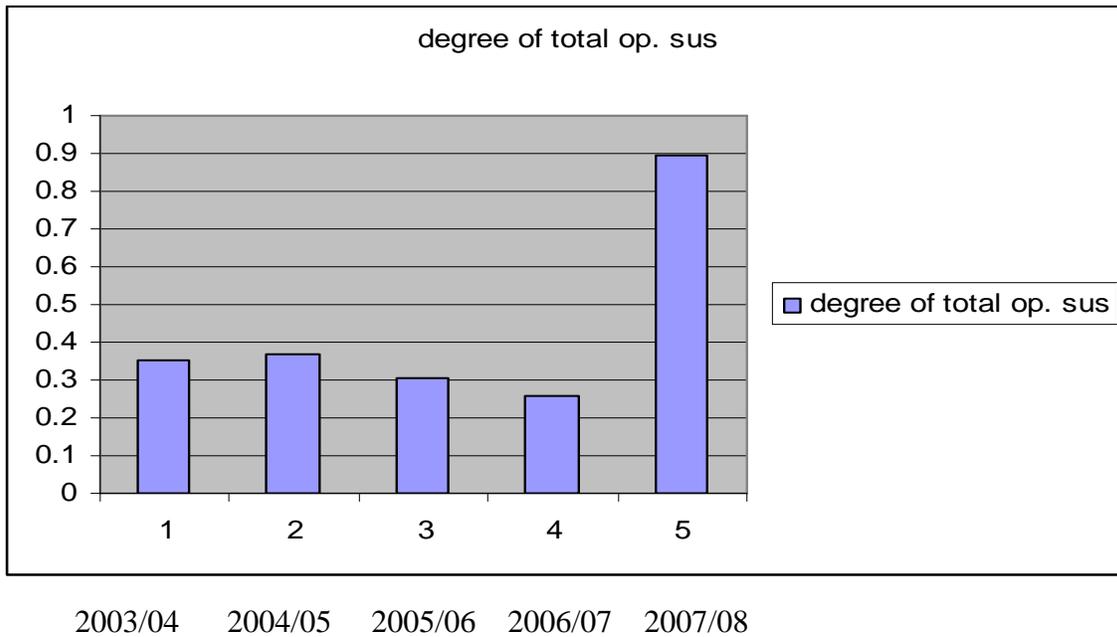


Fig. 4.7 Trend of degree of total operational self sustainability of DMFI (from 2003/04 – 2007/08)

4.3. The Relationship between Outreach and Sustainability of DMFI

Theoretically, as it was explained in the preceding chapters, there can exist significant relationship between outreach and sustainability of microfinance institutions. Hence, it is crucial to give attention to the measurement of this relationship so as to see the overall situation of sustenance in the future as outreach of the institution expands, thereby to take problem solving measures for the betterment of the situation.

Accordingly, the relationship between outreach and sustainability of DMFI was measured taking operational profitability of the institution as a unit of measurement of operational sustainability of the institution. Pearson's correlation coefficient was used as a tool of analysis to measure this relationship.

Table 4.5 presents the trend of total number of clients, number of clients under group lending, total profit generated from all clients and profit generated from group lending system. The relationship between outreach and operational sustainability of the institution was measured

separately to all clients and to clients under group lending system. This is because the overall relationship with respect to all clients may not indicate the possible relationship between depth of outreach and operational sustainability of the institution. Therefore, this separation can help us to identify the situation of sustenance of the institution over time had it been the case that all clients of the institution are poorer.

Table 4.5 Trend of total number of clients, number of clients under group lending, total profit generated from all clients and profit generated from group lending system

Year	Total Number of clients	Number of clients under group lending system	Total profit generated from all clients	Profit generated from group lending
2003/04	833	833	-13733	-13733
2004/05	2417	2417	-624035	-624035
2005/06	936	936	-1320683	-1320683
2006/07	2291	2291	-1256352	-1256352
2007/08	7728	6377	-275925	-944782

Source: Own compile from DMFI, 2009

Table 4.6 indicates the correlation between outreach and the overall operational profitability of the institution with respect to all clients for the first five years of the operation of the institution (i.e. from 2003/04 to 2007/08). The overall correlation between them is 0.3269 which implies that there is direct (positive) relationship between outreach and operational sustainability of the institution with respect to all clients over time.

Table 4.6 Correlation result of the relationship between total number of clients and total profit generated from all clients of the institution

```
(obs=5)
          | numcli~t totpro~t
-----+-----
numclient | 1.0000
totprofit | 0.3269 1.0000
```

On the other hand, table 4.7 indicates that the correlation coefficient between number of clients under group lending system and operational profit generated from clients under group lending is negative (i.e. -0.2004). This implies that there is negative trade-off between depth of outreach and operational sustainability of the institution with respect to clients under group lending

system. The implication of this result is that sustainability of the institution can be improved as more number of non-poor clients is incorporated to be clients of the institution.

Table 4.7 Correlation result of the relationship between number of clients under group lending system and operational profit generated from the clients under group lending

```
(obs=5)
-----+-----
          | numclgro profit~p
numclgro |    1.0000
profitgroup | -0.2004    1.00
```

The implication of this result is that sustainability of the institution can be improved as more number of non-poor clients is incorporated to be clients of the institution.

4.4. The Difference in Economic Impact of DMFI across Its Different Groups of Clients

One of the most important measurements of the performance of MFIs is their ability to improve the lives of their clients (source of income). However, since all clients are not the poorest of the poor; and at the same time, clients are with different capacity, skill and economic status, its impact varies from group to group according to their economic status. Hence, a measurement of the overall impact of the institutions on all clients of the institutions may not indicate the specific situation happens to each group of clients.

Thus, their impact can be assessed by categorizing the clients as per their involvement on credit, their economic status and the system they are involved in credit (group lending, individual lending and so on).

Accordingly, the economic impact of DMFI on its clients under group lending, individual lending, and on all of its clients was measured separately. Per capita consumption of the households (in 2008/09) was used as an indicator of impact of the institution. As it was explained in the methodology in the preceding chapter, 30 clients from group lending system and 30 non clients with similar occupation and characteristics as these clients were sampled to measure the

impact of the institution on its clients under group lending system. Similarly, to measure the impact of the institution on its clients under individual lending system, 25 clients from individual lending and 25 non clients having similar occupation and characteristics were sampled. Finally, impact of the institution on all of its clients is analyzed by combining all the clients and non clients.

Ordinary Least Square (OLS) regression method of econometrics was used as a tool of estimation. This regression was carried out for each of the three upper mentioned cases separately using per capita household consumption of 2008/09 as a dependent variable and the major factors that are expected to affect the per capita consumption of the households as the explanatory variables. To reduce the problems affecting the accurateness of the results of the OLS regressions, tests and adjustments were made. For details, please refer the methodology, which is given in the preceding chapter.

Generally, for interpretation of results and discussions regarding the significance of impact of the institution, the econometric analysis that shows the relationship between per capita household consumption (avhhc) and the explanatory variables was presented in section (4.4.2.1., 4.4.2.2. and 4.4.2.3.).

The model of the OLS regression which is expected to show the relationship between per capita household consumption and the explanatory variables including participation in DMFI was presented in the preceding chapter (under methodology part). The following are the major variables used in the OLS regression which are theoretically expected to affect consumption in 2008/09 (through income):

- Education: is expected to be positively related to consumption
- Age: is expected to be positively related to consumption
- Square of age: is expected to be negatively related to consumption
- Work experience: is expected to be positively related to consumption
- Previous year saving: is expected to be positively related to consumption
- Different sources of income (in the case of this study only remittance, trade and salary (wage): indeterminate

- Occupation (in the case of this study student, trade, informal employee, formal employee, unemployed, retired, children and service provision)
- Employment: is expected to be positively related to consumption
- Participation in DMFI

Household consumption (not individual consumption) was used as an indicator of impact of participation in DMFI. The main reason for this is to consider the effect of household factors on consumption. But using total consumption of the household to show the impact may be problematic, for different number of the household members. Hence, per capita household consumption was used as a major indicator of impact of participation. Accordingly, averages of the above explanatory variables were used to run the OLS regression. Therefore, they were modified as:

- Average education (aveduc) = total years of education in the hh/ number of hh members
- Average age (avage) = total age in the hh/number of hh members
- Average work experience (avworkexp) = total work experience in the hh/number of hh members
- Square of average age (age2)
- Average saving in 2008 of the hh (avs2008)
- Source of income from own investment
- Source of income of the hh from remittance and salary
- Source of income of the hh from salary
- Source of income of the hh from investment and salary
- Source of income of the hh from investment and rent
- Source of income of the hh from sale of assets and salary
- Source of income of the hh from remittance, salary and rent
- Source of income of the hh from investment, salary and rent
- Average number of students with in the hh (mm1) = number of students in the hh/number of the hh members
- Average number of individuals engaged in trade (mm3) = number of individuals engaged in trade in the hh/number of the hh members

- Average number of informally employed individuals in the hh (mm4) = number of informally employed individuals in the hh/number of the hh members
- Average number of formally employed individuals in the hh (mm5) = number of formally employed individuals in the hh/number of the hh members
- Average number of unemployed individuals in the hh (mm7) = number of unemployed individuals in the hh/number of the hh members
- Average number of retired individuals in the hh (mm8) = number of retired individuals in the hh/number of the hh members
- Average number of children in the hh (mm9) = number of children in the hh/number of hh members
- Average number of individuals who are engaged in provision of services in the hh (mm12) = number of individuals who are engaged in provision of services in the hh/number of hh members
- The proportion of employed individuals in the hh (empratio) = number of employed in the hh/number of the hh members
- Number of the hh members (numhbm)
- Average number of working age individuals in the hh (ability) = number of working age individuals in the hh/number of the hh members
- Participation in DMFI (clientdmfi)

Note: Sources of income were not denoted identically for the three cases of impact estimation. This is because the categories of sources of income are not identical across the groups of individuals, according to the result of the survey made on each group of individuals. For instance, there are no individuals in the second sampled group (clients under individual lending system and those with non clients similar economic characteristics) who has a source of income from own investment only. But, this prevails in the first group (clients under group lending and the non participants with similar economic characteristics).

4.4.1. Descriptive Analysis of Economic Impact of DMFI

4.4.1.1. The Impact of DMFI on its Clients under Group Lending System

The existence of DMFI is expected to have positive and significant impact on the consumption of the poor because the establishment of MFIs is to serve the poorest of the poor and solve their financial constraints. Thus, according to the response on the survey from the sampled respondents of clients under group lending system, 90% of them claimed that existence of the institution had a significant impact on the lives of the beneficiaries (improving their economic status).

They stated that their production and investment has improved in terms of quality and quantity with the provision of the loan by the institution. And, among these respondents, some (20%) who were initially unemployed argued that they were able to get job and got themselves out of problem of unemployment. These respondents stated that their habits and level of savings have improved and this is due to the financial strength they acquired as a result of the advice and follow up provided by the institution.

That is, the improvement in quality and quantity of production of these clients is related to the fulfillment of some important working capital, which is acquired by the clients from the institution in the form of loans, made them to be different from the non-clients. For instance, according to the survey, the participants who are engaged in production of food items could purchase some household durables such as refrigerator, machines etc. which helped them to provide better service (in terms of quality and quantity) to their customers and/or having better facilities in their house. This advantage would not have secured by the non-participants that had unless they are helped by others. The provision of saving and advising services by the institution are the other factors that create the difference between the participants and non participants of this group of individuals.

4.4.1.2. The Impact of DMFI on its Clients under Individual Lending System

As it was explained in the conceptual framework, in the preceding chapter (under methodology), the clients under individual lending are civil servants (governmentally employed individuals) who are relatively with better economic status compared to the clients under group lending

system. Hence, the loan size provided by DMFI might be perceived as smaller in the eyes of this group of individuals. Consequently, the provision of the loan, which is supposed to be smaller in size in their perception, is expected to have no significant effect on the lives of these individuals.

According to the survey made on the sampled respondents of clients under individual lending, that is 24 of the 25 (which is equal to 96% of the sampled clients under individual lending) said that they took the loan for the purpose of consumption, purchase of furniture and house materials; not for investment. They claimed that they have nothing to do with a loan that they borrowed because the loan size is not sufficient enough to make an investment. According to them the loan size provided by DMFI relatively is not large enough for them to invest on activities they prefer (which is relatively large scale compared to the activities to be engaged by clients under group lending system).

They stated that they don't want to spend time on very small scale economic activities from which only small amount of income is generated. This is because they are already employed and earning incomes much lower than the amount of income that can be earned from very small scale economic activities. Therefore, the loan provided by DMFI is used to fulfill their consumption needs, which is also related (indirectly) to their wellbeing.

It is also expected that the loan they took in previous year (i.e. 2007/08) has negative implication on their consumption in 2008/09. This is because they are expected to repay the loan back gradually within two years from the time it was taken. Hence, this has the possibility to reduce their current consumption (in 2008/09).

However, the researcher believes that there should be further investigation to clearly identify the exact weaknesses of this group of individuals to appropriate the provision the financial services provided by DMFI.

4.4.2. Econometric Estimation of the Impact of DMFI on Its Clients

4.4.2.1. The Impact of DMFI on Its Clients under Group Lending System

In order to examine the factors that influence the per capita household consumption, the major variables that are expected to affect it including participation in DMFI were considered to run the OLS regression related to this group. The equation of the OLS regression to estimate the economic impact of participation in DMFI by clients under group lending system is given by:

$$H_p = B_0 + B_1X_1 + B_2X_2 + B_3X_3 - B_4X_4 + B_5X_5 - B_6X_6 + B_7X_7 + B_8X_8 + B_9X_9 - B_{10}X_{10} - B_{11}X_{11} - B_{12}X_{12} + B_{13}X_{13} + B_{14}X_{14} - B_{15}X_{15} + B_{16}X_{16} + B_{17}X_{17} + B_{18}X_{18} + B_{19}X_{19} + B_{20}X_{20} + B_{21}X_{21} + B_{22}X_{22} + B_{23}X_{23} + \varepsilon \dots\dots\dots (1)$$

Where: The terms of the variables were expressed in the preceding chapter (under methodology)

As it is given by the above equation average work experience, average education, average age, average saving of 2008, the ratio of number of working individuals to number of household members, ratio of number of employed individuals to number of household members (which were denoted by X1, X2, X3, X5, X14, X16, respectively) are theoretically expected to have positive effect on per capita household consumption. Whereas number of household members, ratio of number of students to number of household members, ratio of unemployed to number of household members, ratio of retired to number of household members, ratio of number of children to number of household members, square of average age of the household (which were denoted by X4, X6, X10, X11, X12, X15, respectively) are expected to have negative effect on household per capita consumption. However, the rest variables are characterized by categorization, for which there are no theoretical justifications to expect their effect. But, they were specified with positive sign as general function in the model. For instance, if we take the ratio of number of traders to total number of household members (which was denoted by X7), we cannot specifically state its effect on per capita household consumption because there is no any theoretical base to rely on for the specification.

The result of the OLS regression related to the estimation of impact on clients under group lending system was presented in Appendix 22. The first column of the table shows the variables

of the regression result including avhhc. The second column indicates the value of the coefficient of each explanatory variable. The third column shows the robust standard error of each explanatory variable. The fourth column indicates the t-value of each explanatory variable which is used to test the significance of each explanatory variable to determine the dependent variable (avhhc). The fifth column shows the P-value of t-test (the probability that t-value of the distribution is greater than t-value of the regression result). This is also used to test the significance of each explanatory variable to affect the dependent variable. Finally, the last column presents the interval in which the value of coefficients of the estimator of each explanatory variable exists at 95% of confidence interval.

As it is indicated in Appendix 22, the number of observations of the model is 60. The F-value of the regression result at 18, 41 degree of freedom is 10.74 (i.e. $F(18, 41) = 10.74$) which is greater than the value in the F-distribution at the same level of degree of freedom. This implies that all the variables have jointly statistically significant impact on the per capita household consumption. The same explanation follows from the fact that the probability that the F-value of the F-distribution exceeds the F-value of the regression result is zero (i.e. $\text{Prob} > F = 0.0000$). The goodness of fit of the model as it was expressed by the R-squared is 0.7698. This indicates that 76.98% of the outcome of per capita household consumption (avhhc) is explained by the elements of the regression result (the explanatory variables of the model). In other words, only 23.02% of the outcome is explained by elements outside this model.

Generally, the result of the regression can be expressed in mathematical equation as:

$$\begin{aligned} \text{avhhc} = & 6395.319 + 737.3518\text{avworkexp} + 251.7029\text{aveduc} + -243.438\text{avage4} + \\ & -432.2548\text{numhhm} + -0.4781313\text{avs2008} + -2727.58\text{mm1} + -1406.798\text{mm3} + 440.2551\text{mm5} + \\ & -1606.56\text{mm7} + 4239.522\text{mm8} + 2358.603\text{mm9} + 2478.035\text{mm12} + 2418.958\text{ability} + \\ & 1690.988\text{empratio} + -2710.853\text{tysoinc1} + -4868.037\text{tysoinc2} + -3743.266\text{tysoinc4} + \\ & 3070.9\text{clientdmfi} \end{aligned}$$

..... (1')

Robust std. error: (3443.542) (249.2754) (102.803) (103.4116) (190.1966)
(0.1764931) (3056.22) (1548.606) (2546.689) (3140.667)
(4902.006) (3511.245) (1860.789) (1476.687) (3049.933)
(1353.517) (1378.549) (1559.222) (621.7566)

t-value: (1.86) (2.96) (2.45) (-2.35) (-2.27) (-2.71) (-0.89) (-0.91) (0.170)
(-0.51) (0.86) (-0.67) (1.33) (1.64) (0.55) (-2.00) (-3.53) (-2.40)
(4.94)

P-value: (0.070) (0.005) (0.019) (0.023) (0.028) (0.010) (0.377) (0.369)
 (0.864) (0.612) (0.392) (0.506) (0.190) (0.109) (0.582) (0.052)
 (0.001) (0.021) (0.000)

The t-value of the explanatory variable of participation in DMFI (clientdmfi) is 4.94 which is greater than the value in the distribution at 5% of level of significance. This implies that participation in DMFI has significant impact on the per capita household consumption (avhhc). Similarly, P-value of the regression result is 0.0000 which supports the same explanation that being client of DMFI has significant impact on the per capita consumption of the households at 5% of level of significance. The t-value and P-value of clientdmfi also show that participation in DMFI has significant impact on the per capita household consumption of the participants even at 1% of level of significance. The t-value of the regression result (i.e. 4.94) is greater than the value of the t-distribution at 1% of level of significance. This can be approved by the P-value (i.e. $P > |t| = 0.0000$) which is less than 0.01 at 1% of level of significance. This result shows the similarity of the result of the econometric analysis and the descriptive analysis. It also coincides with the theoretical expectation of the importance of microfinance to the poorest.

The coefficient of clientdmfi (i.e. 3070.9) tells us that being a client of DMFI results in an increase in the yearly per capita consumption of the participant household by 3070.9 Birrs, other things remaining constant.

The regression result, as it is shown in Appendix 22 and the mathematical equation (equation 1'), also shows that average work experience (avworkexp) and source of income from remittance salary (tysoinc2) are highly significant to affect the yearly per capita household consumption, at 5% level of significance. They have P-value of 0.005 and 0.001, respectively. The sign of the coefficient of average work experience is similar to the theoretical expectation as it is shown in the initial model under methodology, while the sign of tysoinc2 which was not definitely expressed in the model (due to its categorical nature) has a negative sign in this regression result.

4.4.2.2. The Impact of the Existence of DMFI on Its Clients Under Individual Lending System

It was explained in the preceding chapter that 25 clients from individual lending and 25 non clients with the same occupation and economic characteristics as these clients were taken to form a sample size of 50 observations so as to estimate the economic impact of the institution on its clients under individual lending system. Using the same procedure as of the estimation made on clients under group lending, the OLS regression was undertaken taking the per capita household consumption of 2008/09 as dependent variable and considering the possible explanatory variables that are expected to affect the per capita household consumption. The OLS regression equation for estimation of impact related to clients under individual lending is given by:

$$H_N = B_0 + B_1X_1 + B_2X_2 + B_3X_3 - B_4X_4 + B_5X_5 - B_6X_6 + B_7X_7 + B_8X_8 + B_9X_9 - B_{10}X_{10} - B_{11}X_{11} - B_{12}X_{12} + B_{13}X_{13} + B_{14}X_{14} - B_{15}X_{15} + B_{16}X_{16} + B_{17}X_{17} + B_{18}X_{18} + B_{19}X_{19} + B_{20}X_{20} + B_{21}X_{21} + B_{22}X_{22N} + \mathcal{U} \dots\dots\dots (2)$$

Where: The variables of this equation were expressed in the preceding chapter (under methodology)

As it is given by the above equation average work experience, average education, average age, average saving of 2008, the ratio of number of working individuals to number of household members, ratio of number of employed individuals to number of household members (which were denoted by X1, X2, X3, X5, X14, X16, respectively) are theoretically expected to have positive effect on per capita household consumption. Whereas number of household members, ratio of number of students to number of household members, ratio of unemployed to number of household members, ratio of retired to number of household members, ratio of number of children to number of household members, square of average age of the household (which were denoted by X4, X6, X10, X11, X12, X15, respectively) are expected to have negative effect on household per capita consumption. However, the rest variables are characterized by categorization, for which there are no theoretical justifications to expect their effect. But, they were specified with positive sign as general function in the model.

As it is shown in Appendix 23, some of the explanatory variables (mm3, mm5, mm12, mm4, age2, empratio, tysoinc1, tysoinc3 and tysoinc5) were dropped due to higher rate of multicollinearity, systematically. Hence, this does not have significant effect on the outcome of this regression result.

Appendix 23 presents the OLS regression result to estimate the economic impact of DMFI on its clients under individual lending system. All the elements in the table are expressed in the same way as it was expressed in the case of table 4.8. The number of observations in this regression is 50. F-value of this regression result is 16.14 (i.e. $F(13, 36) = 16.14$) which is greater than the value in the F-distribution at the specified level of degree of freedom) at 5% of level of significance. This indicates that all the explanatory variables are jointly significant to affect the per capita household consumption. The P-value of F (Prob > F = 0.0000) supports this explanation.

The R-squared of this model is 0.7509 which indicates that 75.09% of the outcome of per capita household consumption (avhhc) is determined by the elements of this model (the stated explanatory variables of this model). This implies that only 24.91% of the outcome is determined by variables outside this model (residuals).

The mathematical equation expression of the regression result is shown as:

$$\begin{aligned} \text{avhhc} = & 9287.487 + 61.11918\text{avworkexp} + 799.6875\text{aveduc} + -0.7746104\text{avage} + \\ & -1047.361\text{numhnm} + -0.04606\text{avs2008} + -7176.45\text{mm1} + -605.9087\text{mm7} + \\ & -6968.757\text{mm8} + -11097.79\text{mm9} + -4731.819\text{ability} + -1552.86\text{tysoinc2} + \\ & -1286.999\text{tysoinc4} + -269.2166\text{clientdmfi} \dots\dots\dots (2') \end{aligned}$$

Robust std. error: (4379.481) (162.6925) (201.9444) (169.9398) (309.8938)
 (0.1041475) (1980.028) (3840.642) (4040.145) (5539.77)
 (4224.6) (1685.954) (879.4756) (1147.204)

t-value : (2.12) (0.38) (3.96) (-0.00) (-3.38) (-0.44) (-3.62) (-0.16) (-1.72)
 (-2.00) (-1.12) (-0.92) (-1.46) (-0.23)

P-value : (0.041) (0.709) (0.000) (0.996) (0.002) (0.661) (0.001) (0.876) (0.093)
 (0.053) (0.270) (0.363) (0.152) (0.816)

As it is shown from the mathematical equation of the regression result, t-value and P-value of participation in DMFI (clientdmfi) are -0.23 and 0.816. Since $|-0.23|$ is less than the value of t in the t distribution, at 5% level of significance) and 0.816 is greater than 0.05, participation in DMFI (clientdmfi) is not expected to have significant impact on yearly per capita household consumption (avhhc) of the participants. Even the coefficient of participation in DMFI (clientdmfi) shows that the participation has negative impact on the per capita household consumption of clients under individual lending no matter its non significance. This result does not contradict with the descriptive analysis which states that the service provided by DMFI has no significant impact on the lives of the non poor.

Equation 2' also shows that average education (aveduc), number of household members (numhbm) and average number of students within a household (mm1) have significant impact on the per capita household consumption, at 5% level of significance. As it is indicated in the equation, the signs of the coefficients of aveduc, numhbm and mm1 are positive, negative and negative, respectively. This implies that these variables affect per capita household consumption as they were expected and stated in the methodology.

The expected major reasons, according to the response of these clients on the survey (as it was explained in the descriptive analysis), for the non significance and negative impact of participation on its clients under individual lending are:

- The smallness of the size of the loan provided to the clients, and
- The purpose the loan was taken for (i.e. Most of the time for consumption)

4.4.2.3. The Overall Impact of DMFI on All of Its Clients

The measurement of overall economic impact of DMFI on all of its clients was undertaken so as to show how its result is different from the result of the estimation of impact made on each specific group of clients. As of the estimations made on the specific groups of clients, the overall economic impact of the institution on the households' per capita consumption of its clients was estimated using OLS regression model of econometrics. In similar fashion, the major possible factors affecting per capita consumption of households in addition to participation in DMFI were

The goodness of fit of the regression result (R-squared = 0.7658) shows that 76.58% of the outcome of per capita household consumption (avhhc) is determined by the elements (the explanatory variables) in the model. In other words, only 23.42% of the outcome is determined by elements outside this model (residuals).

Note that similar to the preceding regression result of estimation of impact of participation in DMFI on its clients under individual lending system, some of the explanatory variables (mm3, mm4, mm5, mm12, empratio, age2, tysoinc1, tysoinc3, tysoinc5, tysoinc6, tysoinc7, tysoinc8) were excluded from the model systematically without any significant effect on the outcome of the regression result.

The result of this regression is also expressed in mathematical equation as shown below:

$$\begin{aligned} \text{avhhc} = & 2499.257 + 597.528\text{avworkexp} + -24.52815\text{aveduc} + .4928239\text{avage} + \\ & -558.9828\text{numhhm} + -0.0631815\text{avs2008} + -3134.106\text{mm1} + -3307.114\text{mm7} + \\ & -4114.035\text{mm8} + -4339.832\text{mm9} + 2192.149\text{ability} + 1789.909\text{tysoinc2} + \\ & 407.0567\text{tysonc4} + 1124.157\text{clientdmfi} \dots\dots\dots (3') \end{aligned}$$

Robust std. error: (2194.19) (107.645) (57.35271) (49.11523) (236.1437)
 (0.115036) (2151.149) (2020.735) (2298.172) (3155.37)
 (1738.08) (818.4998) (713.1478) (654.3551)

t-value: (1.14) (5.55) (-0.43) (0.01) (-2.37) (-0.55) (-1.46) (-1.64) (-1.79)
 (-1.38) (1.26) (2.19) (0.57) (1.72)

P-value: (0.258) (0.000) (0.670) (0.992) (0.020) (0.584) (0.148) (0.105)
 (0.077) (0.172) (0.210) (0.031) (0.569) (0.089)

As it is shown in the equation of the regression result (equation 3'), the t-value and P-value of clientdmfi are 1.72 and 0.089. This indicates that at 5% of level of significance, since 1.72 (i.e. the value of the regression result) is lower than the value in the distribution at the same level of significance; we accept the null hypothesis (Ho) that the coefficient of clientdmfi is zero. The implication of the test is that being a client of DMFI has nothing to do with the per capita household consumption of the participants at 5% of level of significance.

Generally, as it is shown in the equation of the regression result, only average work experience (avworkexp), number of household members (numhbm), and source of income from transfer money and salary (tysoinc2) have significant impact on per capita household consumption at 5% of level of significance. They have P-value of 0.0000, 0.0020 and 0.031), respectively. However, the result shows that at 10% of level of significance, being a participant of the institution (clientdmfi) having a P-value of 0.089 can influence the per capita household consumption.

CHAPTER FIVE

CONCLUSIONS AND RECOMMENDATIONS

5.1. Conclusions

Micro-financial activities in the poor countries in the world, especially in the tropics and subtropics, have a relatively short history. Their importance (beginning) developed in the 70s of the last century, but they are also complemented by various complications. The complexion of microfinance consists in providing micro-financial services in very small amounts mainly to the poor who are often without any belongings (Jenicek 2008).

The delivery of financial services to the poor is a very recent development in Ethiopia as it is one of the countries in the tropics and subtropics. In the country, Micro credit programs were introduced as components of NGO operations in the 1990s. In 1994, the Government of Ethiopia opened the commercial banking sector to private banks, and in 1996, microfinance Institutions were created to serve populations with no access to financial services (AEMFI, 2006).

Hence, provision and expansion of financial services by these institutions is expected to reduce poverty. However, from what is observed, suspicions are raised with regard to the achievement of the desired objective that the institutions established for. Thus, examining the sustainability and outreach of the MFIs is paramount important, and specifically the researcher was interested to assess these relationships taking a case study of DMFI. In addition, the researcher wants to answer the question whether the existence of MFIs enable to change the lives of the poorest section of the society, or not.

In cognizant of this, the researcher has undertaken this study to show the performance and viability of Dire Microfinance Institution (DMFI) (in terms of the achievement of expansion of depth of outreach, improvement of self sustainability and improvement of the lives of the poor).

While conducting this study, both primary and secondary data were collected systematically. The primary data was collected using a survey on respondents which incorporates a sample size of 110 individuals. Of which, 55 are clients of DMFI who were selected using stratified random sampling method while the rest 55 are non clients who were selected using purposive sampling method, for the sake of reducing sample selection bias. Of the 55 sampled clients, 30 were selected from group lending system and 25 were selected from individual lending system. Similarly, of the 55 sampled non clients, 30 are expected to have similar occupation and economic characteristics as the sampled clients under group lending system; and the rest 25 are expected to have similar occupation and economic characteristics as the sampled clients under individual lending system

The selected 30 clients under group lending and the 30 selected non clients (having similar occupation and economic characteristics as the sampled clients under group lending) were aggregated to form a total group size of 60. The sampled individuals under this category are poorer and with relatively lower average monthly earning than the 25 sampled clients under individual lending system and the 25 non clients (having similar occupation and economic characteristics as the sampled clients under individual lending system), who altogether form a sample size of 50 individuals. The second category is group of individuals who are civil servants (governmentally employed) can borrow money individually from DMFI, pledging their future income as collateral.

Consequently, the collected data were analyzed using different statistical techniques of analysis which are believed to be appropriate tools to attain the stated objectives. To examine the performance of outreach and self sustainability of the institution, simple statistical techniques as percentages, bar graphs and pie charts were applied. Simple correlation coefficient was also used to analyze the relationship between outreach and self sustainability of the institution. In relation to the analysis of specific performance of the institution in terms of improving the lives of its different groups of clients, Ordinary Least Square (OLS) regression was applied separately to each group of clients. Finally, tests and adjustments were made for the accuracy of the results of the estimation of the OLS regressions.

The result of the analysis of performance of DMFI in terms of expanding its level of outreach shows that there is a tendency of increasing and decreasing in the number of clients of the institution, over time (for the first four years of operation of the institution, from the commencement of the operation in 2003/04 until 2006/07). During these four years of operation of the institution, all the clients are under the system of group lending who cannot pledge physical capital to borrow money individually from the institution. Hence, if we take clients under this category as poorer, the trend of depth of outreach by the institution is supposed to be not improving, in the given period of time.

The analysis of the performance of outreach also shows that the percentage shares of clients under group lending system, individual lending system and association are 86%, 13% and 1%, respectively, by the time the institution started to diversify its products (in 2007/08). Whereas in the following period (in 2008/09), the percentage shares of clients under group lending, individual lending and association are 59%, 40% and 1%, respectively. This probably shows the reduction in the percentage share of depth of outreach, over time. This implies there is a tendency of shifting in target of clients, over time which could happen as a result of the question of sustainability.

The trend of the share of loan disbursement was also used to show the tendency of the shift in target, over time. All the loan portfolio of the institution used to be dispersed only to clients under the system of group lending system, for the first four years of operation (from 2003/04 until 2006/07). However, the share of the amount of loan dispersed to clients under group lending is 64% and 63% in 2007/08 and 2008/09, respectively.

The other important indicator of performance of a microfinance institution is sustainability. Accordingly, operational self sustainability of DMFI was measured using the ratio of revenue to expense, over time. The percentages of the overall operational self sustainability of the institution for the first four years of the operation of the institution are 35%, 37%, 30% and 26%, respectively. This indicates that revenues generated by the institution could not pay for its costs of operation, as well as the trend seems to be stagnant.

However, the analysis shows that this ratio has dramatically increased to about 90% in 2007/08 (by the time the institution has started individual lending system and provision of the service to

associations). This means the institution was able to cover about 90% of its operational costs with its operational revenue. This is likely to reveal that operational self sustainability of the institution can be dramatically improved if the institution provides its services to non poor clients without reducing the number of poor clients.

It is expected that outreach of microfinance institution is related to its level of sustainability. This relationship was estimated in the case of DMFI (for its five years of operation) taking operational profit and number of clients as the major indicators of sustainability and outreach, respectively. The relationship was measured with respect to all clients and clients under group lending system, separately using simple correlation coefficient.

The result of the correlation coefficient related to the estimation of the overall relationship (between total operational profit and total number of clients of the institution) is 0.3269. The positive sign of this coefficient indicates that there is direct relationship (no trade-off) between outreach and sustainability of the institution. On the other hand, the negative coefficient (-0.2004) in relation to the estimation of the relationship between operational profit generated from clients under group lending system and number of these clients shows a negative trade-off between depth of outreach and self sustainability of the institution.

The estimation of economic impact of the institution on different groups of its clients is the other major objective of this study. The estimation was undertaken using OLS regression taking per capita household consumption as an indicator of the change in the lives of the households. The major possible variables that are expected to affect the per capita household consumption were taken into account. Finally, tests and adjustments were made for the accuracy of the result of the OLS regressions.

The result of the OLS regression related to the sampled clients under group lending system indicates that the existence of the institution has positive and significant impact on the per capita household consumption of this group of clients both at 5% and at 1% of level of significance. On the other hand, the result of the estimation of economic impact of participation in DMFI by clients under individual lending system shows that the existence of the institution has no significant impact (even it is negative) on per capita household consumption of the clients under this group, at 5% and 10% of level of significance. The expected reason for this is that the

participants under this category perceive the loan size as very small on which they are not likely to invest; rather, they use it for the purpose of consumption and short term fulfillment of house materials.

The overall estimation of economic impact of the institution was also undertaken taking all of the clients into account. The result of this estimation indicates that participation in DMFI has no significant impact on the per capita household consumption of the participants at 5% of level of significance. This result tells us that the estimation of the overall impact of the institution in relation to all of the clients cannot clearly show the specific economic impact of the institution on its appropriate targeted group of clients. Hence, the general implication of the regression result of estimation of the economic impact of participation in DMFI is that one may not identify the exact specific impact of MFIs to different groups of their clients unless specific estimation of the impact on each group is made. In other words, we may end up with undesired and wrong conclusion with regard to the economic impact of MFIs on their targeted group unless specific estimation in relation to the specific group is made.

5.2. Recommendations

To sum up, result of the survey analysis shows us two major contradictory situations regarding the viability and performance of DMFI:

- The valuability of microfinance to the poor than the non-poor ones
- The unsustainability of microfinance with respect to the poor than the non-poor

Consequently, the result reveals that depth of outreach of the institution could not grow as it was desired for the fact that sustainability of the institution is in question as it expands its depth of outreach providing its financial services to the poorest segment of the society. This seems not to couple up with the objective and valuability of the institution. Hence, there should be mechanisms that make depth of outreach compatible to sustainability of the institution.

One of the possible mechanisms for the compatibility of these two opposite elements is to find out the major factors resulting in the increment in costs of operation of the institution as it

provides its financial services to the poorest segment of the society. These factors need to be analyzed carefully and appropriate measures should be taken so as to neutralize their effects.

The other important recommendation which is mostly related to the findings of this study is the optimality of depth of outreach constrained by a given level of sustainability. According to the result of this study, sustainability of the institution can be improved (given the number of poor clients) as non poor clients are involved in the institution. Hence, the presence of non poor clients is expected to be important to strengthen the sustainability of the institution.

According to the perception of the researcher, the intuition is that, the higher the level of profit generated due to the presence of the non poor clients, the higher will be the possibility to accumulate more amount of funds to be dispersed to the poor. The dispersion of the fund to the poor may again reduce profitability of the institution. Hence, we need to set a limit for the amount of the fund to be dispersed to the poor (and the number of poor clients). This implies we need to have estimation of optimality of depth of outreach for a given level of sustainability.

Inspired by the result of this study and the theoretical analysis by E. Rhyne (1998), with regard to optimality of depth of outreach, the researcher puts three cases that can possibly be faced.

- i. A situation when the rate of profit generated through the involvement of the non poor clients exceeds the rate of the loss resulting from the involvement of the poor clients. In this case, we can continuously increase the depth of outreach taking optimality into account.
- ii. A situation when the rate of profit generated from the involvement of the non poor is lower than the rate of the loss resulting from the involvement of the poor clients. If this is the case, it is difficult to increase the depth of outreach without the involvement of large number of non poor clients. In this case, we may require huge investment
- iii. A situation when the rate of profit generated from the involvement of the non poor clients is equal to the loss resulting from the involvement of the poor. In this case, increasing the depth of outreach is possible through involvement of a little bit more number of non poor clients.

Given these possible situations, there is a need of associating these relationships with the actual finding of this study. The finding reveals that diversification of output of MFIs involving non

poor clients has the possibility to put the institutions in a position to accumulate more funds thereby strengthen their sustainability. In turn, the strength of sustainability of the institutions is likely to improve the ability of the institutions to increase their depth of outreach involving large more number of poorest clients.

The other important issue that we raise, related to the findings of this study, is the problem associated with specific estimations of:

- The relationship between outreach and sustainability, and
- The economic impact of the institutions across different groups of the society.

There should be specific estimation of the relationship between depth of outreach and sustainability. Actually, it is difficult to verify the relationship between depth of outreach and sustainability using an estimation showing the overall relationship between breadth of outreach and sustainability, taking all kinds of clients in to account.

Similarly, an estimation of the overall economic impact of MFIs (considering all of their clients) may lead us to have wrong and undesired conclusion regarding the economic impact of the institutions on a specific group of clients. In other words, one may not identify the exact specific impact of MFIs to different groups of their clients unless specific estimation of the impact on each group is made.

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APPENDIX

Appendix 1 Result of limited dependent model to estimate the likelihood of participation by clients under group lending and the non clients with similar economic characteristics (the first step of sample selection model)

Probit regression		Number of obs	=	60
		LR chi2(15)	=	35.02
		Prob > chi2	=	0.0024
Log likelihood = -24.044319		Pseudo R2	=	0.4214

clientdmfi	Coef.	Std. Err.	z	P> z	[95% Conf. Interval]
interedmf	1.008973	.6312435	1.60	0.110	- .2282417 2.246187
avworkexp	.1546878	.1654197	0.94	0.350	- .1695288 .4789043
aveduc	.3979794	.2134854	1.86	0.062	- .0204444 .8164031
avage4	- .0703493	.1060901	-0.66	0.507	- .2782821 .1375835
numhbm	.3505634	.1815912	1.93	0.054	- .0053489 .7064757
avs2008	.000415	.0003363	1.23	0.217	- .000244 .0010741
mm1	-2.50714	3.34948	-0.75	0.454	-9.071999 4.05772
mm3	-2.363044	1.964106	-1.20	0.229	-6.212622 1.486533
mm5	.2802594	2.26947	0.12	0.902	-4.16782 4.728339
mm7	-1.662444	3.58156	-0.46	0.643	-8.682172 5.357284
mm8	-3.131238	5.419171	-0.58	0.563	-13.75262 7.490143
mm9	-2.197616	4.409834	-0.50	0.618	-10.84073 6.445501
mm12	-2.216607	2.388182	-0.93	0.353	-6.897357 2.464144
ability	-1.747832	1.74066	-1.00	0.315	-5.159462 1.663799
empratio	- .3472918	3.463896	-0.10	0.920	-7.136403 6.44182
_cons	- .9566343	4.351203	-0.22	0.826	-9.484836 7.571567

**Appendix 2 OLS regression result to measure the significance of selection bias in the model
(the second step of the sample selection model)**

Linear regression

Number of obs = 60
 F(18, 41) = 4.70
 Prob > F = 0.0000
 R-squared = 0.6102
 Root MSE = 2090.3

avhhc	Coef.	Robust Std. Err.	t	P> t	[95% Conf. Interval]	
avworkexp	812.7975	383.8414	2.12	0.040	37.61396	1587.981
aveduc	337.8253	124.8446	2.71	0.010	85.69653	589.9541
avage4	-283.5963	138.8386	-2.04	0.048	-563.9866	-3.206002
numhhm	-244.5502	275.0054	-0.89	0.379	-799.9349	310.8345
avs2008	-.3389393	.2517002	-1.35	0.186	-.8472582	.1693796
mm1	-2559.997	3384.476	-0.76	0.454	-9395.085	4275.09
mm3	-2120.142	2680.92	-0.79	0.434	-7534.37	3294.086
mm5	-1235.476	3311.669	-0.37	0.711	-7923.528	5452.576
mm7	-753.5105	4073.417	-0.18	0.854	-8979.944	7472.923
mm8	5454.533	6527.818	0.84	0.408	-7728.663	18637.73
mm9	-3513.461	3791.7	-0.93	0.360	-11170.95	4144.032
mm12	1383.522	2886.796	0.48	0.634	-4446.48	7213.525
ability	2137.602	2023.925	1.06	0.297	-1949.796	6225.001
empratio	2808.834	3698.184	0.76	0.452	-4659.799	10277.47
tysoinc1	-2541.511	1866.202	-1.36	0.181	-6310.383	1227.36
tysoinc2	-4091.826	1918.58	-2.13	0.039	-7966.476	-217.1761
tysoinc4	-2387.369	1960.417	-1.22	0.230	-6346.512	1571.773
imr	-1596.22	3087.76	-0.52	0.608	-7832.077	4639.637
_cons	5896.717	3305.984	1.78	0.082	-779.854	12573.29

Appendix 3 Result of the limited dependent model (the first step) to estimate the likelihood of participation by the sampled clients under individual lending system and the non clients with similar economic characteristics

Probit regression Number of obs = 50
LR chi2(11) = 27.69
Prob > chi2 = 0.0036
Log likelihood = -20.654103 Pseudo R2 = 0.4013

clientdmfi	Coef.	Std. Err.	z	P> z	[95% Conf. Interval]	
interedmf1	.1829176	.5278059	0.35	0.729	-.851563	1.217398
avworkexp	.2171597	.1635267	1.33	0.184	-.1033467	.5376661
aveduc2	.0779177	.1201194	0.65	0.517	-.157512	.3133473
avage	-.032913	.0955067	-0.34	0.730	-.2201027	.1542767
numh1m	.6686794	.4008531	1.67	0.095	-.1169782	1.454337
avs2008	-.0003648	.0001086	-3.36	0.001	-.0005776	-.0001519
mm1	-.6135593	2.63306	-0.23	0.816	-5.774261	4.547143
mm7	.8040839	2.583073	0.31	0.756	-4.258646	5.866814
mm8	-5.238516	3.988384	-1.31	0.189	-13.05561	2.578573
mm9	-1.857597	4.270351	-0.43	0.664	-10.22733	6.512138
ability	2.769095	3.50266	0.79	0.429	-4.095992	9.634182
_cons	-4.657191	3.742764	-1.24	0.213	-11.99287	2.678492

Appendix 4 Result of the OLS regression model to measure the significance of imr to affect the per capita household consumption of the participants under individual lending system

Linear regression Number of obs = 50
F(13, 36) = 15.46
Prob > F = 0.0000
R-squared = 0.7555
Root MSE = 3355.6

avhhc	Coef.	Robust Std. Err.	t	P> t	[95% Conf. Interval]	
avworkexp	8.23798	179.6077	0.05	0.964	-356.0233	372.4992
aveduc2	772.8866	202.2519	3.82	0.001	362.7008	1183.072
avage	11.4014	170.662	0.07	0.947	-334.7171	357.5199
numh1m	-1451.605	545.0394	-2.66	0.011	-2556.996	-346.2137
avs2008	.1573601	.159669	0.99	0.331	-.1664636	.4811837
mm1	-6657.357	2256.434	-2.95	0.006	-11233.62	-2081.098
mm7	-962.2907	3707.155	-0.26	0.797	-8480.748	6556.167
mm8	-4879.49	4113.061	-1.19	0.243	-13221.16	3462.184
mm9	-8465.197	6142.835	-1.38	0.177	-20923.44	3993.049
ability	-5787.283	4667.461	-1.24	0.223	-15253.33	3678.766
tysoinc2	-1245.238	1486.007	-0.84	0.408	-4259.001	1768.524
tysoinc4	-1781.87	1032.789	-1.73	0.093	-3876.464	312.7234
imr	-5677.283	5940.433	-0.96	0.346	-17725.04	6370.474
_cons	8856.835	4263.462	2.08	0.045	210.1326	17503.54

Appendix 5 Result of limited dependent model for the estimation of the likelihood of participation by all the sampled individuals (first step of the two steps sample selection model)

```

Probit regression                               Number of obs =      110
                                                LR chi2(11)   =      40.16
                                                Prob > chi2   =      0.0000
Log likelihood = -56.00317                     Pseudo R2    =      0.2639
    
```

clientdmfi	Coef.	Std. Err.	z	P> z	[95% Conf. Interval]
interedmf1	.7322976	.3214898	2.28	0.023	.1021892 1.362406
avworkexp	.0539409	.0488518	1.10	0.270	-.041807 .1496887
aveduc	.0500822	.0324677	1.54	0.123	-.0135534 .1137177
avage4	.0222937	.0263768	0.85	0.398	-.0294039 .0739913
numh1m	.415486	.1198363	3.47	0.001	.1806111 .6503609
avs2008	-.0001852	.0000649	-2.85	0.004	-.0003123 -.000058
mm1	-.834485	.9318371	-0.90	0.371	-2.660852 .9918821
mm7	-.9071932	1.238111	-0.73	0.464	-3.333846 1.519459
mm8	-2.461211	1.77414	-1.39	0.165	-5.93846 1.016039
mm9	-.8661042	1.661233	-0.52	0.602	-4.122061 2.389853
ability	-.6288428	1.062437	-0.59	0.554	-2.711181 1.453495
_cons	-2.473313	1.268809	-1.95	0.051	-4.960134 .0135079

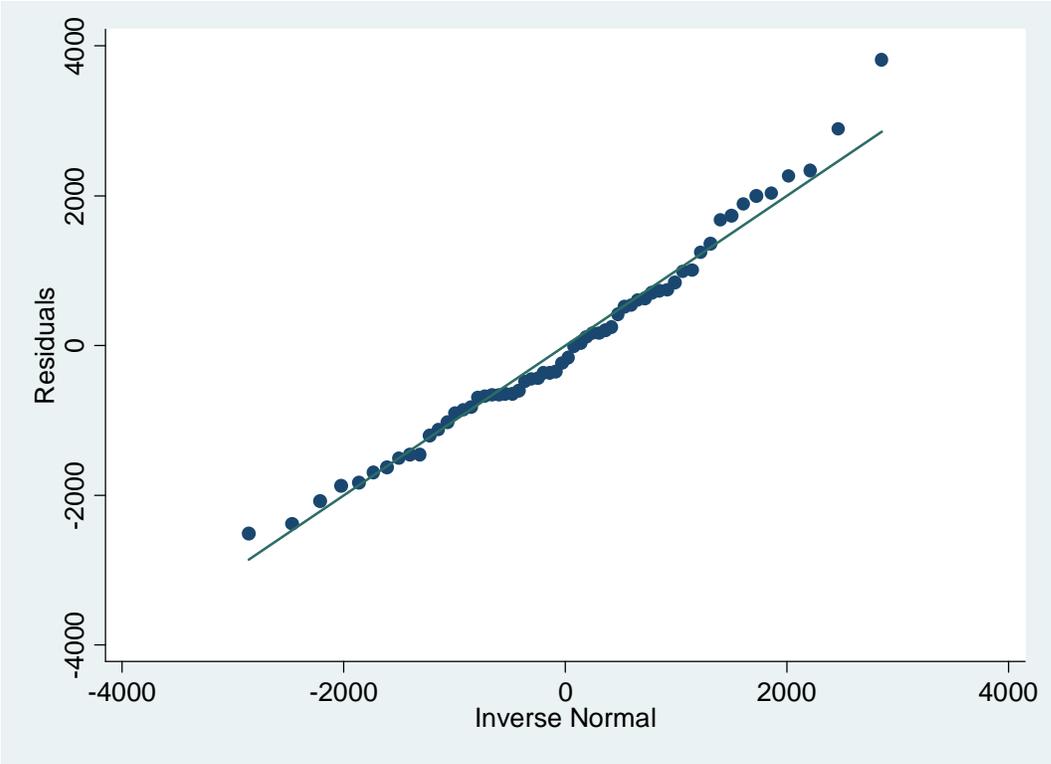
Appendix 6 Result of the OLS regression model to test the significance of the distribution of the likelihood of participation by all the sampled individuals

```

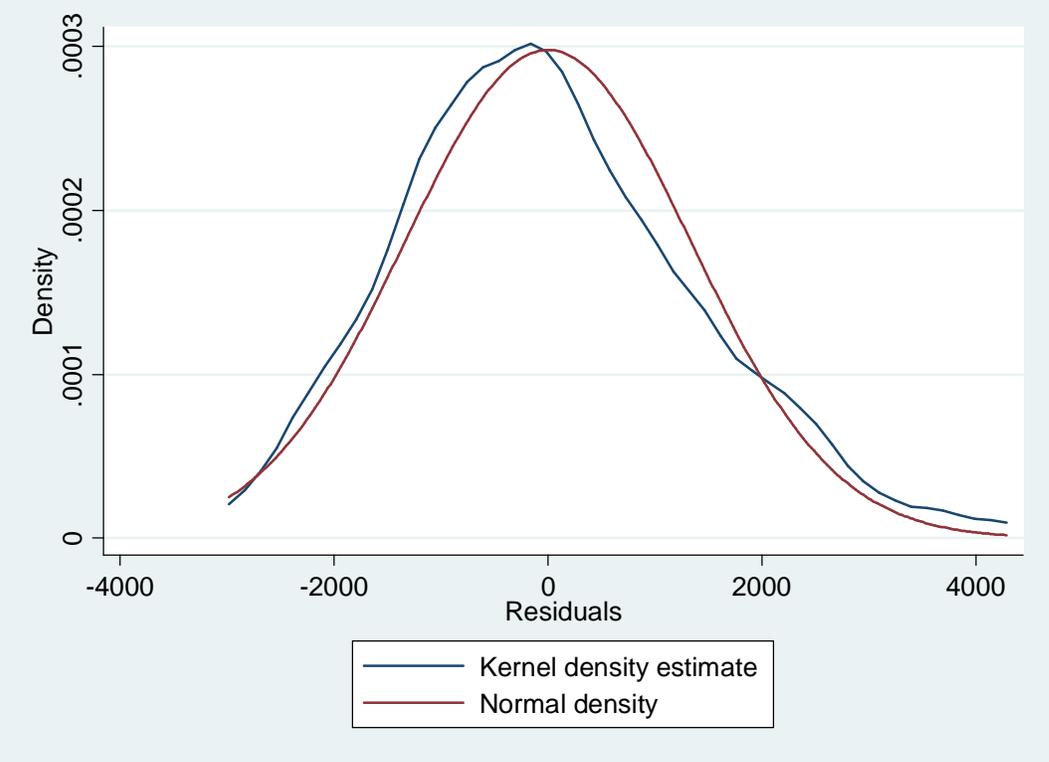
Linear regression                               Number of obs =      110
                                                F( 13, 96)     =      19.55
                                                Prob > F       =      0.0000
                                                R-squared     =      0.7607
                                                Root MSE     =      2997.8
    
```

avh1c	Coef.	Robust Std. Err.	t	P> t	[95% Conf. Interval]
avworkexp	578.5311	115.0243	5.03	0.000	350.2097 806.8526
aveduc	-31.35339	65.23686	-0.48	0.632	-160.8475 98.14075
avage4	-7.145339	52.96645	-0.13	0.893	-112.2829 97.99222
numh1m	-667.1708	422.3702	-1.58	0.117	-1505.569 171.2275
avs2008	-.0361289	.1394772	-0.26	0.796	-.312989 .2407312
mm1	-2692.841	2439.602	-1.10	0.272	-7535.412 2149.73
mm7	-2939.933	2182.403	-1.35	0.181	-7271.97 1392.103
mm8	-3897.928	2757.712	-1.41	0.161	-9371.943 1576.087
mm9	-4099.863	3449.416	-1.19	0.238	-10946.9 2747.174
ability	2591.102	1970.28	1.32	0.192	-1319.874 6502.077
tysoinc2	1903.761	807.0724	2.36	0.020	301.7345 3505.787
tysoinc4	840.8937	696.2013	1.21	0.230	-541.0549 2222.842
imr	-3493.014	4932.217	-0.71	0.481	-13283.39 6297.359
_cons	1989.494	2408.517	0.83	0.411	-2791.374 6770.362

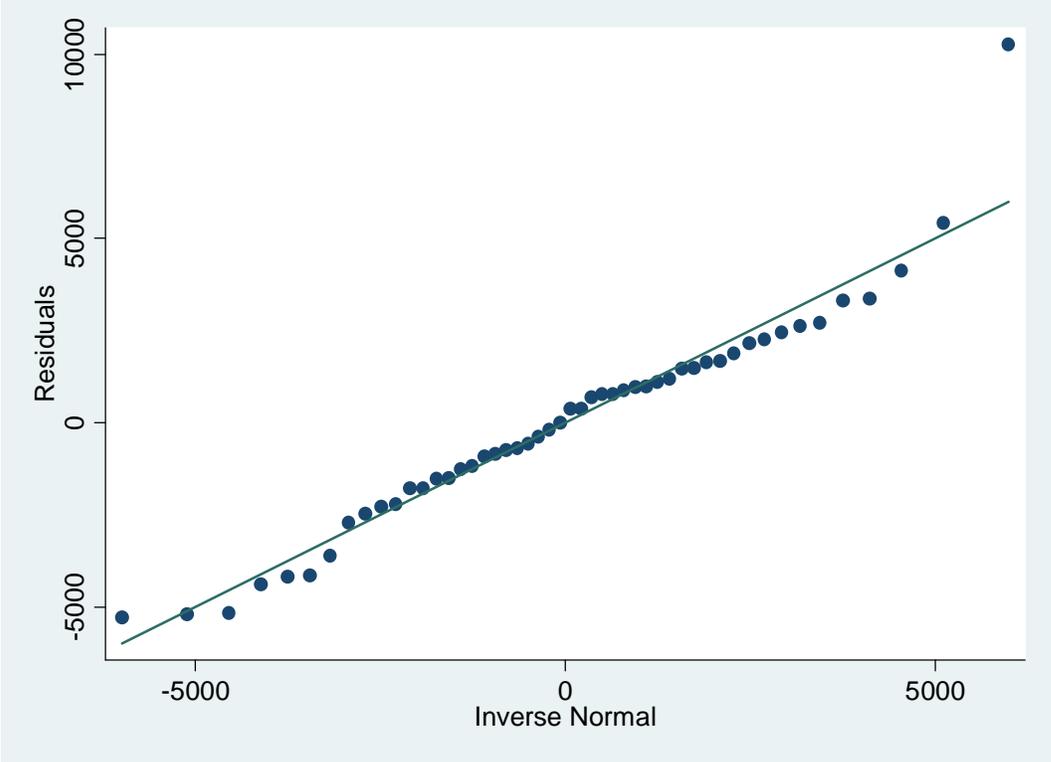
Appendix 7 Test of normality of distribution of the residuals for the OLS regression (related to clients under group lending system) using the line of normal distribution



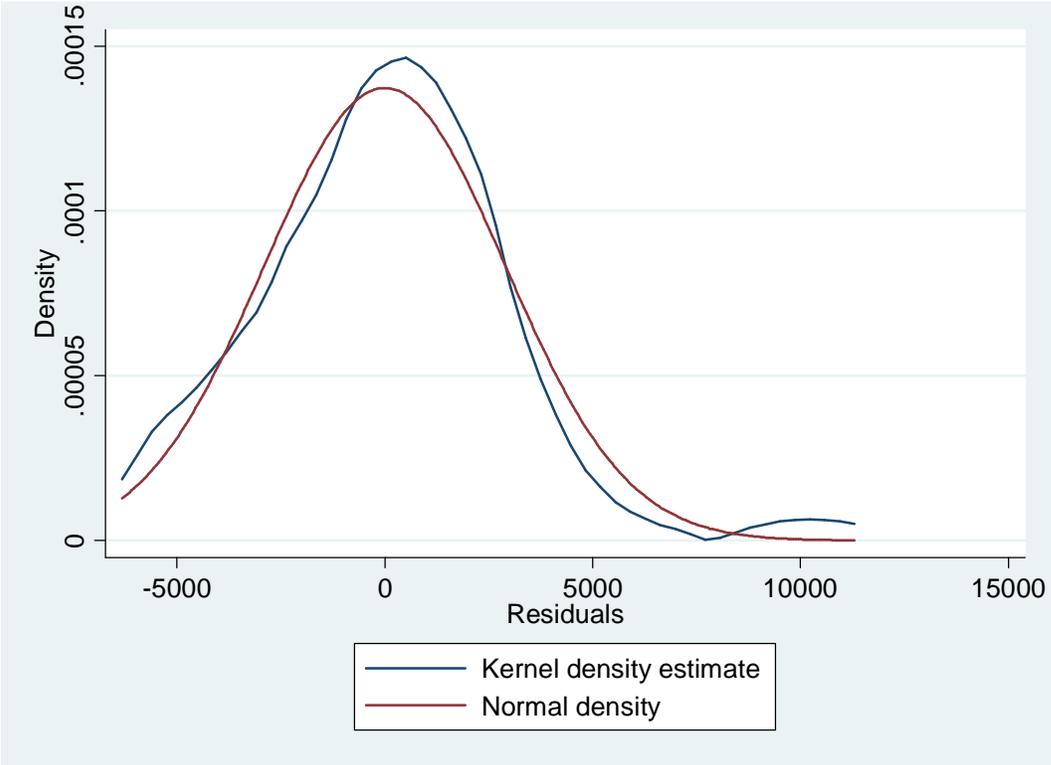
Appendix 8 Test of normality of distribution of the residuals of the OLS regression (related to clients under group lending system) using Kernel density estimate



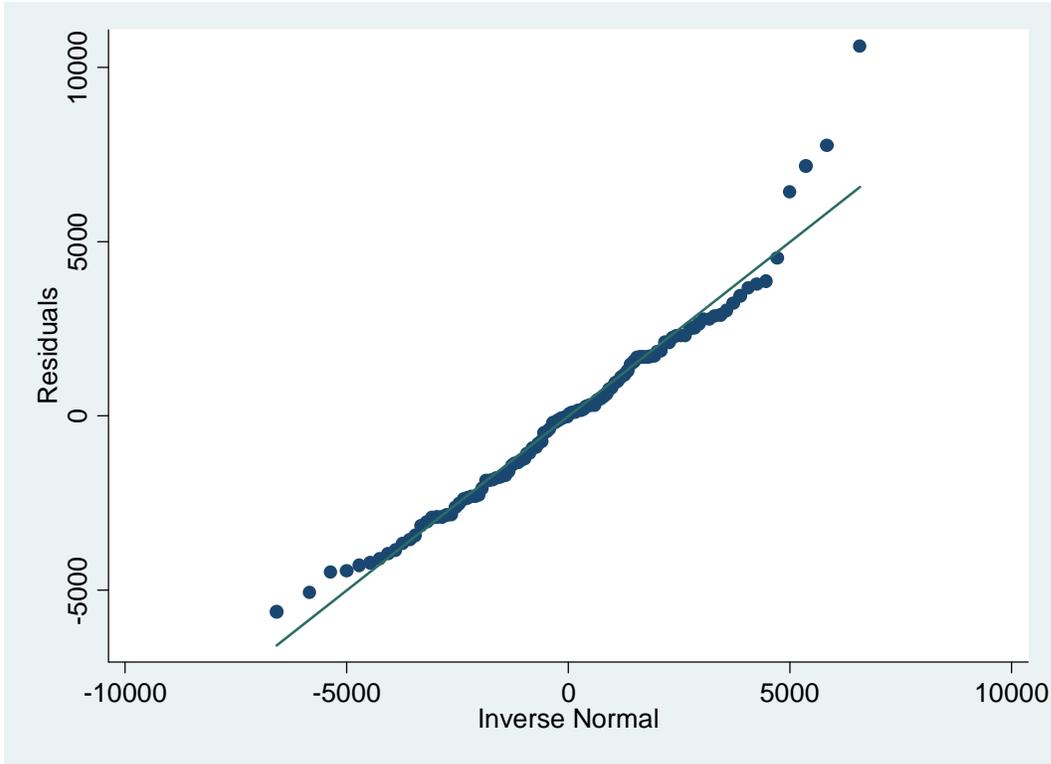
Appendix 9 Result of the test of normality of distribution of the residuals of the OLS regression (related to clients under individual lending system) using the line of normal distribution



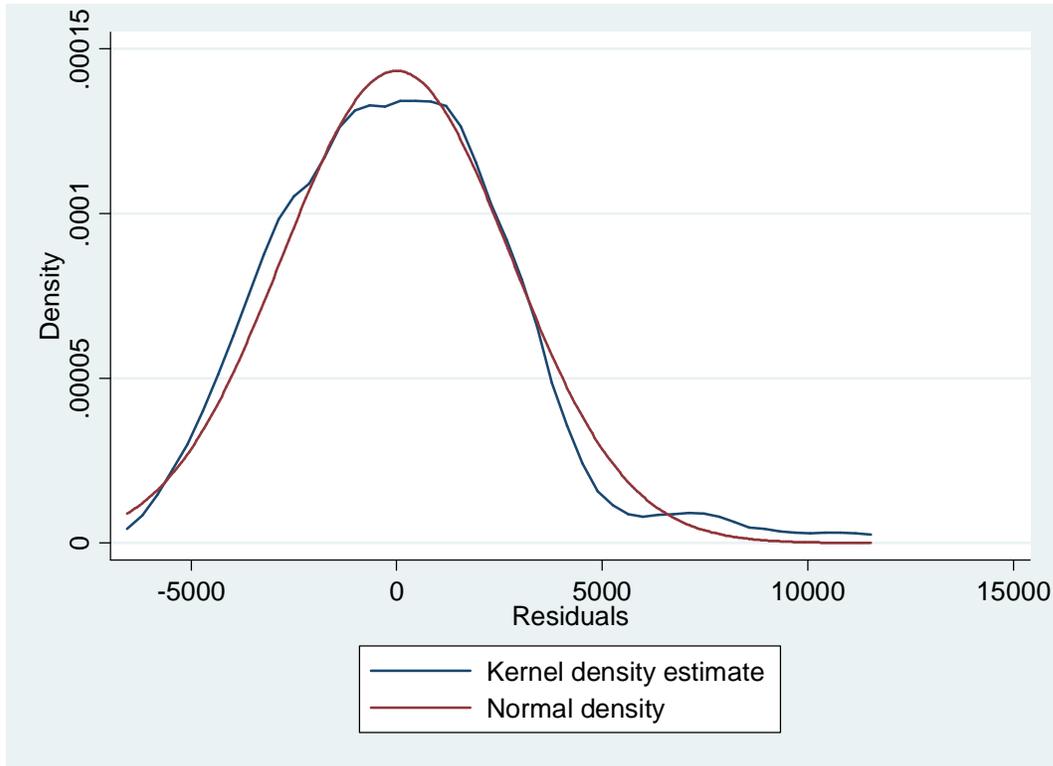
Appendix 10 Result of test of normality of distribution of the residuals of the OLS regression for the impact estimation related to participants under individual lending, using the Kernel density estimate



Appendix 11 Test of the normality of distribution of the residuals of OLS regression in relation to all participants of DMFI, using the normal distribution line



Appendix 12 Test of normality of distribution of the residuals of the OLS regression related to the estimation of economic impact of the institution on all participants, using Kernel density estimate



Appendix 13 Result of the test of the presence of heteroskedasticity in the OLS regression related to the estimate of economic impact made on participants under group lending system

```
. imtest
Cameron & Trivedi's decomposition of IM-test
```

Source	chi2	df	p
Heteroskedasticity	60.00	59	0.4392
Skewness	33.83	18	0.0132
Kurtosis	0.00	1	0.9745
Total	93.83	78	0.1069

Appendix 14 Result of test of the presence of heteroskedasticity made on the estimate of OLS regression related to the participants under individual lending system

. imtest

Cameron & Trivedi's decomposition of IM-test

Source	chi2	df	p
Heteroskedasticity	47.94	48	0.4752
Skewness	3.83	13	0.9928
Kurtosis	0.92	1	0.3362
Total	52.70	62	0.7940

Appendix 15 Result of test of the presence of heteroskedasticity made on the OLS regression of the estimate of economic impact related to all the participants of DMFI

. imtest

Cameron & Trivedi's decomposition of IM-test

Source	chi2	df	p
Heteroskedasticity	74.27	98	0.9646
Skewness	9.23	13	0.7551
Kurtosis	1.14	1	0.2859
Total	84.64	112	0.9748

Appendix 16 Result test of endogeneity for the estimate of impact related to the participation under group lending system

Source	SS	df	MS	Number of obs =	60
Model	1.4901e-08	18	8.2784e-10	F(18, 41) =	0.00
Residual	105782757	41	2580067.23	Prob > F =	1.0000
Total	105782757	59	1792928.08	R-squared =	0.0000
				Adj R-squared =	-0.4390
				Root MSE =	1606.3

residhat	Coef.	Std. Err.	t	P> t	[95% Conf. Interval]
avworkexp	-1.31e-06	173.5999	-0.00	1.000	-350.592 350.592
aveduc	1.27e-06	127.306	0.00	1.000	-257.0997 257.0997
avage4	6.53e-08	89.45169	0.00	1.000	-180.6514 180.6514
numhbm	2.16e-06	154.1655	0.00	1.000	-311.3436 311.3436
avs2008	3.33e-10	.1762099	0.00	1.000	-.3558632 .3558632
mm1	.0000328	2275.148	0.00	1.000	-4594.755 4594.755
mm3	9.70e-06	1803.757	0.00	1.000	-3642.761 3642.761
mm5	-.0000831	2169.59	-0.00	1.000	-4381.576 4381.576
mm7	.0000567	2844.333	0.00	1.000	-5744.247 5744.247
mm8	-6.49e-06	4202.48	-0.00	1.000	-8487.08 8487.08
mm9	.0000497	2967.397	0.00	1.000	-5992.779 5992.779
mm12	-.000024	1997.657	-0.00	1.000	-4034.35 4034.35
ability	-2.13e-06	1619.106	-0.00	1.000	-3269.85 3269.85
empratio	.0000506	2593.418	0.00	1.000	-5237.515 5237.515
tysoinc1	.0000178	1174.819	0.00	1.000	-2372.596 2372.596
tysoinc2	.0000343	1634.598	0.00	1.000	-3301.137 3301.137
tysoinc4	.0000385	1158.678	0.00	1.000	-2339.997 2339.997
clientdmfi	-.000013	572.9302	-0.00	1.000	-1157.056 1157.056
_cons	-.0000706	2938.826	-0.00	1.000	-5935.08 5935.08

Appendix 17 Result test of endogeneity for the estimate impact related to the participation under individual lending system

Source	SS	df	MS	Number of obs = 50		
Model	1.1921e-07	13	9.1699e-09	F(13, 36)	=	0.00
Residual	413009456	36	11472484.9	Prob > F	=	1.0000
				R-squared	=	0.0000
				Adj R-squared	=	-0.3611
Total	413009456	49	8428764.4	Root MSE	=	3387.1

residhat	Coef.	Std. Err.	t	P> t	[95% Conf. Interval]	
avworkexp	1.86e-06	163.4132	0.00	1.000	-331.4173	331.4173
aveduc2	5.74e-06	253.963	0.00	1.000	-515.0608	515.0608
avage	6.75e-08	160.0031	0.00	1.000	-324.5012	324.5012
numhbm	.0000134	465.4912	0.00	1.000	-944.0599	944.0599
avs2008	-2.95e-09	.158417	-0.00	1.000	-.3212847	.3212847
mm1	-.0000373	4285.621	-0.00	1.000	-8691.643	8691.643
mm7	.0000334	5120.14	0.00	1.000	-10384.13	10384.13
mm8	-.0000918	4706.311	-0.00	1.000	-9544.842	9544.841
mm9	-.0001613	7686.094	-0.00	1.000	-15588.12	15588.12
ability	-.0000129	6052.258	-0.00	1.000	-12274.55	12274.55
tysoinc2	-.0000738	1904.873	-0.00	1.000	-3863.262	3863.262
tysoinc4	-.0000101	2982.057	-0.00	1.000	-6047.892	6047.892
clientdmfi	-.0000203	1232.781	-0.00	1.000	-2500.195	2500.195
_cons	-.0000629	6248.144	-0.00	1.000	-12671.82	12671.82

Appendix 18 Result test of endogeneity for the estimate impact related to all the participants of the institution

Source	SS	df	MS	Number of obs = 110		
Model	0	13	0	F(13, 96)	=	0.00
Residual	844287989	96	8794666.56	Prob > F	=	1.0000
				R-squared	=	0.0000
				Adj R-squared	=	-0.1354
Total	844287989	109	7745761.37	Root MSE	=	2965.6

residhat	Coef.	Std. Err.	t	P> t	[95% Conf. Interval]	
avworkexp	-5.62e-06	106.6976	-0.00	1.000	-211.793	211.793
aveduc	1.82e-06	48.78379	0.00	1.000	-96.83505	96.83505
avage4	-9.83e-07	42.23181	-0.00	1.000	-83.82948	83.82948
numhbm	.000017	203.5966	0.00	1.000	-404.1361	404.1361
avs2008	3.16e-09	.1115022	0.00	1.000	-.2213301	.2213301
mm1	-.0001118	1890.147	-0.00	1.000	-3751.911	3751.911
mm7	-.0000868	2575.928	-0.00	1.000	-5113.176	5113.176
mm8	-.0000768	3018.186	-0.00	1.000	-5991.051	5991.051
mm9	-.000161	3409.565	-0.00	1.000	-6767.933	6767.933
ability	-.0000398	2138.227	-0.00	1.000	-4244.347	4244.347
tysoinc2	-.0000179	998.7741	-0.00	1.000	-1982.551	1982.551
tysoinc4	1.12e-06	871.8194	0.00	1.000	-1730.548	1730.548
clientdmfi	-.0000123	690.9681	-0.00	1.000	-1371.561	1371.561
_cons	.0000507	2387.042	0.00	1.000	-4738.241	4738.241

Appendix 19 Result of the test of multicollinearity on the estimate of the impact related to participation under group lending system

. vif

Variable	VIF	1/VIF
empratio	13.93	0.071777
tysoincl	8.02	0.124761
avage4	7.94	0.125900
tysoinc4	7.59	0.131780
mm1	7.47	0.133833
mm5	7.34	0.136301
mm3	5.94	0.168373
avworkexp	4.52	0.221482
mm8	3.85	0.260030
mm9	3.45	0.290048
mm12	3.12	0.320393
ability	2.70	0.370663
mm7	2.69	0.371366
numhbm	2.45	0.407827
aveduc	2.42	0.412611
tysoinc2	2.00	0.499462
clientdmfi	1.91	0.524589
avs2008	1.26	0.793394
Mean VIF	4.92	

Appendix 20 Result of the test of multicollinearity on the estimate of the impact related to participation under individual lending system

. vif

Variable	VIF	1/VIF
avage	4.80	0.208522
ability	4.57	0.218816
avworkexp	3.40	0.293693
mm9	3.06	0.326613
mm1	3.06	0.326844
aveduc2	3.06	0.327056
numhbm	2.53	0.395770
mm7	1.91	0.523601
clientdmfi	1.65	0.607805
avs2008	1.58	0.634735
tysoinc4	1.49	0.671931
tysoinc2	1.42	0.702608
mm8	1.35	0.743033
Mean VIF	2.60	

Appendix 21 Result of the test of multicollinearity on the estimate of the impact related to all of the participants

. vif

Variable	VIF	1/VIF
aveduc	3.85	0.259768
avworkexp	3.46	0.289038
tysoinc2	2.97	0.336616
avage4	2.96	0.337950
mm1	2.64	0.378145
ability	2.43	0.411521
numhbm	2.40	0.416489
mm9	2.15	0.465945
tysoinc4	1.72	0.582782
clientdmfi	1.49	0.671838
mm8	1.31	0.765507
mm7	1.28	0.782044
avs2008	1.19	0.842712
Mean VIF	2.30	

Appendix 22 OLS regression result of the sampled clients under group lending and the sampled non clients having similar occupation and characteristics to estimate the economic impact of the institution

Linear regression

Number of obs = 60
 F(18, 41) = 10.74
 Prob > F = 0.0000
 R-squared = 0.7698
 Root MSE = 1606.3

avhhc	Coef.	Robust Std. Err.	t	P> t	[95% Conf. Interval]	
avworkexp	737.3518	249.2754	2.96	0.005	233.9299	1240.774
aveduc	251.7029	102.803	2.45	0.019	44.08804	459.3178
avage4	-243.438	103.4116	-2.35	0.023	-452.282	-34.59397
numhhm	-432.2548	190.1966	-2.27	0.028	-816.3647	-48.1449
avs2008	-.4781313	.1764931	-2.71	0.010	-.8345663	-.1216962
mm1	-2727.58	3056.22	-0.89	0.377	-8899.742	3444.581
mm3	-1406.798	1548.606	-0.91	0.369	-4534.271	1720.674
mm5	440.2551	2546.689	0.17	0.864	-4702.889	5583.399
mm7	-1606.56	3140.667	-0.51	0.612	-7949.266	4736.146
mm8	4239.522	4902.006	0.86	0.392	-5660.281	14139.32
mm9	-2358.603	3511.245	-0.67	0.506	-9449.706	4732.501
mm12	2478.035	1860.789	1.33	0.190	-1279.904	6235.974
ability	2418.958	1476.687	1.64	0.109	-563.2715	5401.187
empratio	1690.988	3049.933	0.55	0.582	-4468.476	7850.453
tysoinc1	-2710.853	1353.517	-2.00	0.052	-5444.336	22.6294
tysoinc2	-4868.037	1378.549	-3.53	0.001	-7652.074	-2084.001
tysoinc4	-3743.266	1559.222	-2.40	0.021	-6892.179	-594.3538
clientdmfi	3070.9	621.7566	4.94	0.000	1815.237	4326.563
_cons	6395.319	3443.542	1.86	0.070	-559.0554	13349.69

Appendix 23 OLS regression result of the sampled clients under individual lending and the non clients having similar occupation and characteristics to estimate the economic impact of the institution

Linear regression

Number of obs = 50
 F(13, 36) = 16.14
 Prob > F = 0.0000
 R-squared = 0.7509
 Root MSE = 3387.1

avhhc	Coef.	Robust Std. Err.	t	P> t	[95% Conf. Interval]	
avworkexp	61.11918	162.6925	0.38	0.709	-268.8366	391.0749
aveduc2	799.6875	201.9444	3.96	0.000	390.1252	1209.25
avage	-.7746104	169.9398	-0.00	0.996	-345.4284	343.8792
numhlm	-1047.361	309.8938	-3.38	0.002	-1675.855	-418.8673
avs2008	-.04606	.1041475	-0.44	0.661	-.2572808	.1651609
mm1	-7176.45	1980.028	-3.62	0.001	-11192.13	-3160.767
mm7	-605.9087	3840.642	-0.16	0.876	-8395.091	7183.273
mm8	-6968.757	4040.145	-1.72	0.093	-15162.55	1225.036
mm9	-11097.79	5539.77	-2.00	0.053	-22332.97	137.3794
ability	-4731.819	4224.6	-1.12	0.270	-13299.71	3836.068
tysoinc2	-1552.86	1685.954	-0.92	0.363	-4972.133	1866.413
tysoinc4	-1286.999	879.4756	-1.46	0.152	-3070.658	496.6601
clientdmfi	-269.2166	1147.204	-0.23	0.816	-2595.854	2057.421
_cons	9287.487	4379.481	2.12	0.041	405.487	18169.49

Appendix 24 OLS regression result of all of the clients to estimate the economic impact of participation in DMFI on per capita household consumption of the participants

Linear regression

Number of obs = 110
 F(13, 96) = 18.72
 Prob > F = 0.0000
 R-squared = 0.7658
 Root MSE = 2965.6

avhhc	Coef.	Robust Std. Err.	t	P> t	[95% Conf. Interval]	
avworkexp	597.528	107.645	5.55	0.000	383.8544	811.2015
aveduc	-24.52815	57.35271	-0.43	0.670	-138.3724	89.31608
avage4	.4928239	49.11523	0.01	0.992	-97.00013	97.98578
numhhm	-558.9828	236.1437	-2.37	0.020	-1027.724	-90.2413
avs2008	-.0631815	.115036	-0.55	0.584	-.2915261	.1651631
mm1	-3134.106	2151.149	-1.46	0.148	-7404.103	1135.89
mm7	-3307.114	2020.735	-1.64	0.105	-7318.242	704.0144
mm8	-4114.035	2298.172	-1.79	0.077	-8675.87	447.7993
mm9	-4339.832	3155.37	-1.38	0.172	-10603.19	1923.527
ability	2192.149	1738.08	1.26	0.210	-1257.912	5642.211
tysoinc2	1789.909	818.4998	2.19	0.031	165.1999	3414.618
tysoinc4	407.0567	713.1478	0.57	0.569	-1008.53	1822.644
clientdmfi	1124.157	654.3551	1.72	0.089	-174.7274	2423.042
_cons	2499.257	2194.19	1.14	0.258	-1856.176	6854.689