

Determinants of Financial Sustainability of Ethiopian
Microfinance Institutions

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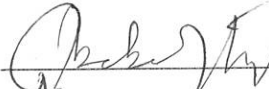
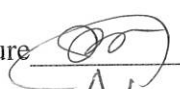

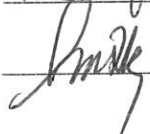
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Abstract

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Microfinance promises to trim down poverty. To achieve this noble objective microfinance institutions (MFIs) have to become steadily profitable because donor constancy is not a given. Thus important question is: what factors drive the financial sustainability of MFIs? Several studies have been conducted to determine the factors affecting financial sustainability of microfinance institutions using large and well developed MFIs in various countries. However, no such study has been conducted in Ethiopia where majority of MFIs are small. This study followed a quantitative research approach using panel data regression as the data analysis technique. The study was based on six years secondary data obtained from 12 sampled MFIs in Ethiopia. We reported three important findings. First, we show that a high quality credit portfolio, coupled with the application of sufficiently high interest rates that allow a reasonable profit and sound management are instrumental to the financial sustainability of MFIs. Second, we show that the percentage of women among the clientele has a weak statistically non-significant negative effect on financial sustainability of MFIs. Third, we find that the client outreach of microfinance programs and the age of MFIs have a positive but lesser impact on attainment of financial sustainability. The policy implication is that MFIs have to emulate profit-making banking practices by implementing a sound financial management and good managerial governance to assure their financial sustainability.

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List of Acronyms

AEMFI	Association of Ethiopian Microfinance Institutions
MFI	Microfinance Institution
ALB	Average loan balance
BPLF	Number of borrower per loan officer
FSS	Financial Self Sufficiency
FE	Fixed Effects
FRR	Financial Revenue Ratio
PCR	Personnel Cost Ratio
PWB	Percentage of Women Borrower
PAR	Portfolio at Risk -At-30 Days
WISDOM	Wisdom Microfinance S.C
ACSI	Amhara Credit and Saving Institutions S.C
OCSSCO	Oromiya Credit and Saving S.C
OMO	Omo Microfinance S.C
ADCSI	Addis Credit and Saving Institutions S.C
DECSI	Dedebit Credit and Saving Institutions S.C
BUGO	Busa Gonofa Microfinance S.C
GASHA	Gasha Microfinance S.C
MEKLIT	Meclit Microfinance S.C
PEACE	Povrty Eriaion Community Empowerment Microfinance S.C
SEPI	Specialized Financial &Promotional Institutions S.C
WASASA	Wasasa Microfinance S.C

Chapter One

1. Introduction

1.1. Background

The 20th century has been characterized by many new products and discoveries in the financial industry. Capitalism has allowed the proliferation of many new ideas in this area. Microfinance is only one of them. The target of clients that microfinance serves represents the difference with many of other discoveries. Whilst most of the new ideas target the smaller and richest part of the world population, microfinance reaches a large number of poorer people enabling them access to financial services such as credit and deposits, simple financial services taken for granted in developed countries. The access to financial services has to be considered formal as there are many informal ways in which people tend to borrow for credit and save money for unexpected situations (CGAP 2004).

Microfinance has been accepted not only as a financial means to target specific people but it comprehends also a social aspect contributing to poverty reduction, women empowerment, economic development and employment creation (Woller and Schreiner 2001). Microfinance allows a sustainable form of financing for the most needed and it helps to reduce inequalities in the world. In 2008 Bill Gates held a speech at the World Economic Forum in Davos (Switzerland) regarding the importance of what he called “Creative Capitalism”, an ideology that points out the creation of a profit and the reduction of world inequalities among the world population (CGAP 2009).

Throughout the world, financial sustainability of microfinance institutions has been one of the issues that have recently captured attention of many researchers due to its importance in the livelihood of microfinance institutions. The financial sustainability of microfinance institutions is a necessary condition for institutional sustainability (Hollis and Sweetman 1998), and the most important requirement for any MFI(Logotri 2006).

In our present capitalist society, in order to make a new development strategy work, sustainability is the key if one's goal is long term survival of the company/institution. In order to make microfinance serve millions of poor households, it needs to demonstrate the sustainability if it wants to attract the necessary capital to serve this purpose. The Consultative Group to Assist the Poorest (CGAP) prepared a list of key principles of microfinance also endorsed by leaders at the G8 Summit held in 2004(CGAP 2004).

The forth principle states that:

Financial sustainability is necessary to reach significant numbers of poor people. Most poor people are not able to access financial services because of the lack of strong retail financial intermediaries. Building financially sustainable institutions is not an end in itself. It is the only way to reach significant scale and impact far beyond what donor agencies can fund. Sustainability is the ability of a microfinance provider to cover all of its costs. It allows the continued operation of the microfinance provider and the ongoing provision of financial services to the poor. Achieving financial sustainability means reducing transaction costs, offering better products and services that meet client needs, and finding new ways to reach the unbanked poor(CGAP 2004 pp 354.).

More interestingly some Microfinance Institutions (MFIs) have found their own way to financial viability or sustainability. On the other hand many of them have failed in this effort and private or governmental donations and/or grants still represent the reason why these institutions are able to survive. What distinguishes microfinance from other masses

development strategies is that microfinance holds out the promise that development can be made to pay for itself, and maybe even generate a surplus, enough to fund an ever-expanding number of beneficiaries on a permanent basis. Here is the opportunity to achieve program sustainability on a truly significant scale (almost unheard of in grassroots development) that provides an integral piece of poor households' livelihood and coping strategies: financial services. This promise has captured the imagination and mobilized the resources of policymakers, donors, development practitioners, and, increasingly, formal sector financial services institutions (Hermes and Lensink 2007).

In the parlance of the microfinance industry, program sustainability has come to be more or less synonymous with financial self-sufficiency. Financial self-sufficiency is the non-profit equivalent of profitability. In microfinance, it is defined as when a microfinance institution's (MFI's) inflation-adjusted operating revenues, less monetary and in-kind subsidies, exceed its inflation-adjusted operating costs plus its actual and imputed (the rate the MFI would have paid in the market) funding costs. Arguably, financial self-sufficiency is the principal focus of the microfinance industry today (Littlefield and Rosenberg 2004).

The main objective of this study was to identify factors influencing (determinants of) the financial sustainability of microfinance institutions in Ethiopia. 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 does not depend on long-term support, either from donors or the government (Robinson 2003).

1.2. Statement of the problem

It is accepted that providing capital for poor would help to reduce poverty and enable to utilize local entrepreneurial initiative and capacity. This, in effect, could be used as a poverty alleviating and economic development endeavor or strategy. To this end, government and various NGOs started providing micro loans at subsidized rates since 1970s. But these schemes are not successful since they are project based (Tsigie 2005)

Microfinance institutions are established with the objective of alleviating poverty through provision of financial services to the economically active poor. They provide poor people with access to financial resources in a way that enable them to identify their own livelihood projects, create sources of income and provide self-employment for themselves and their children, and mobilize underutilized local resources (Robinson 2001).

To achieve their prime objective i.e. alleviating poverty, MFIs should be able to provide financial services on a sustainable way. To be sustainable, MFIs should generate an income adequate to cover their financial costs, costs of administration, and loan loss provisions. An MFI working towards sustainability on market principle is not different from a formal bank except its clientele. Hence, it will face a challenge that a formal bank faces in achieving its objectives (Hartungi 2007).

The financial sustainability of MFIs can be expressed in terms of operational self-sufficiency and financial self-sufficiency (CGAP 2003). It also can be measured in terms of its dependence on subsidy (Yaron 1992). A microfinance institution is said to be operationally self-sufficient if its operating revenues are sufficient enough to cover its financial and operating expenses. Likewise, an MFI will be considered as financially self-sufficient if its total operating revenues adjusted for inflation, subsidy, loan loss provision expense and cost of capital is greater than the total operating and financial expenses (Braun and Woller 2004).

Several studies have been conducted to determine the factors affecting financial sustainability of microfinance institutions using large and well developed MFIs in various countries (Cull et al (2007; Woller and Schreiner 2002; Christen 2000). The level of significance of these factors in affecting the financial sustainability of MFIs, however, varies with studies. While some of the determinants are found to be significant in one economy or applicable to a set of microfinance institutions, some are not significant (Cull et al 2007; Woller and Schreiner 2002). Moreover, no such study with regard to identification and assessment of factors that affect has been conducted in Ethiopia where the majority of MFIs are not well developed or small. The studies conducted in the areas of microfinance institutions in Ethiopia are few in number and did not give such an emphasis on the factors considered to be determinants of financial sustainability of microfinance institutions in Ethiopia. For example, Kereta (2007) studied the microfinance industry's outreach and financial performance using simple descriptive analysis and employing graphs and percentage growth rates. The study did not say anything about factors affecting financial sustainability of MFIs. The study by Kidane

(2007) on a single MFI, Amhara Credit and Saving Institution (ACSI) has limited itself on the number of clients served by the institution. Consequently, the factors affecting the financial sustainability of Ethiopian MFIs are not known. Besides, applicability or limitations of the findings from other studies to the MFIs in Ethiopia have not been documented. This study, therefore, is set out to bridge this knowledge gap and focus on evaluation of financial sustainability of MFIs and identifying determinants of financial sustainability of MFIs in Ethiopia.

1.3. Objectives of the study

The general objective of this study is to identify the determining factors of financial sustainability of Microfinance Institutions in Ethiopia. The specific objectives include:

1. To determine the relationship between the portfolio at risk and financial sustainability of an MFI.
2. To assess the contribution of interests charged by MFIs towards the attainment of financial sustainability.
3. To determine the effects of microfinance institutions' efficiency and productivity on the financial sustainability.

Efficiency refers to attaining more output at the same level of input. Thus, an MFI will be considered efficient if compared to other MFIs, at the same level of input, more output is achieved. In as far as MFIs are concerned; Woller (2000) defines efficiency as the most effective way of delivering small loans to the very poor. There are several indicators of MFIs' efficiency. These can be categorized into three main categories namely: asset and

liability management; human resources management and loan portfolio quality. These measures of efficiency indicate that the more the output at a given level of input the better the contribution towards financial sustainability.

On the other hand, while MFIs are required to be efficient, they are also expected to earn a positive return from their operations. This is measured by the return on portfolio (productivity of portfolio). The return on portfolio is commonly measured by portfolio yield and interest spread. The portfolio yield refers to effective interest rate. This is measured by total interest income over average loan portfolio.

1.4. Significance of the study

Although there have been numerous studies on sustainability of microfinance institutions in other countries where MFIs are relatively large and well developed compared to MFIs in Ethiopia; no such studies have been done in Ethiopia . This study, as an attempt to assess the determinants of financial sustainability of MFIs in Ethiopia, provides evidence on what affect their financial sustainability. Understanding factors affecting the financial sustainability of MFIs in Ethiopia is a major stepping stone to enlighten what should be done if financial sustainability is to be achieved.

The findings of the study will also be of benefits to donors, managers and others interested in the MFIs study for it will show the level of financial sustainability the MFIs operating in the country have reached. This in turn helps them knowing factors affecting financial sustainability and thereby takes appropriate actions to increase financial sustainability of MFIs. It is hoped that the outcome of this study will also provide an insight of the MFIs industry to other researchers.

1.5. Methodology

The study with the aims of assessing determinants of financial sustainability of microfinance institutions in Ethiopia made use of quantitative research approach. Quantitative research is one in which the investigator primarily uses positivist claims for developing knowledge (Creswell 2003, p. 18) as cited in Yesegat(2009). Merriam (1998) also noted that quantitative research design is based on the philosophy of positivism, logic and empiricism. Quantitative research employs a review of the existing literature to deductively develop theories and hypotheses to be tested i.e., in this approach, the research problem is translated to specific variables and hypotheses. As the literature on research methodology shows, quantitative research approach tends to assume that there is a cause and effect relationship between known variables of interest. In line with this, quantitative research tests the theoretically established relationship between variables using sample data with the intention of statistically generalizing for the population under investigation.

Secondary data were collected from microfinance institutions selected for the study. The analysis of the collected data, Econometric model (Multiple Regression Model) was applied to assess determinants of Financial sustainability of MFIs.

1.6. Organization of the paper

The proposed research paper has the following form; chapter one including introduction, statement of the problem, objectives, and research methodology; Chapter two consists of literature review both theories and empirical studies, and the hypotheses to be tested in the study, chapter three Methodology, chapter four data analysis and presentation and lastly chapter five: conclusion and recommendation.

Chapter Two

2. Literature Review

2.1. Introduction

This section presents theoretical background guiding this study. It starts by explaining the meaning of key concepts, followed by the main theories used in this study to explain the determinants of financial sustainability of microfinance institutions in Ethiopia. It includes also the empirical studies related to the subject under study.

2.2. Concept of microfinance

Microfinance is the provision of small scale financial services to low income or unbanked people (Kyereboah-Coleman and Osei 2008; Karlan and Goldberg 2007); It is about provision of “a broad range of financial services such as deposits, loans, payments services, money transfers and insurance, to the poor and low-income households and their farm or non-farm micro-enterprises” (Mwenda and Muuka 2004, pp145).

From the above definitions, microfinance is more than just provision of small loans also known as microcredit (Karlan and Goldberg 2007). It is about provision of various small scale financial services. Thus for this study, consistent with the above definitions, we used the term microfinance to mean the provision of small scale loans, savings, deposits, and other financial services to the poor. Institutions that provide these small (micro) financial services are known as microfinance institutions (MFIs), also known as microfinance organizations (Mersland and Strøm 2008).

Microfinance institutions are considered as a tool for poverty alleviation through improving access to finance and financial services. According to Basu *et al* (2004) MFIs complement effectively the formal banking sector in providing financial services to the poor. The rationale of improving finance comes from the premise that empowerment of the poor through creating income generating capacity enables the poor to access all the development requirements to get out of multifaceted dimensions of poverty and reduce their vulnerability to unexpected events (LOGOTRI, 2006; Davis *et al* 2004; Demirgüç-Kunt and Levine 2004). To this end, microfinance institutions help in mobilizing financial resources through provision of savings facilities and loans

Microfinance institutions have helped the poor to increase buying and investing Capability (Hiatt and Woodworth 2006) alleviate micro business funding constraint (Hartarska and Nadolnyak 2008) and uplift them onto a higher economic status.

According to Steel *et al* (1997) and Cull *et al* (2006) microfinance institutions help to mobilize considerable resources required for economic development. Moreover, most of mature MFIs provide diverse products, such as housing loans, and pension. They also frequently provide social and business development services such as literacy training, education on health issues, training on financial management or accounting (Hishigsuren 2004).

2.3. Concept of sustainability of microfinance

Sustainability has been generally defined as permanence (Navajas et al 2000), also the ability to repeat performance through time (Schreiner 2000). It “allows the continued operation of the microfinance provider and the ongoing provision of financial services to the poor” (CGAP, 2004, PP1). This will depend on the sustainability of microfinance institutions themselves (also known as institution sustainability (CGAP 2004), sustainability of their market, sustainability of legal policy as an enabling environment, and sustainability of the impact they have on the poor.

Financial sustainability of microfinance institutions is probably the key dimension of microfinance sustainability. The financial sustainability of an MFI also can be defined as its capacity to cover all of its expenses by its revenue and to generate a margin to finance its growth. In other words, it is the capacity of an MFI to carry out its activities without the need for subsidies in the form of concessional loans or donations.

Nonetheless, a study by CGAP (1995) concludes that microfinance cannot be financially sustainable. It is generally believed that small loans are too costly to provide, and the resulting income is insufficient to ensure profitable operations. Brau and Woller (2004) corroborate this hypothesis by showing that unlike financial institutions in the formal sector; most MFIs are not financially sustainable. They add that many MFIs could not function without the subsidies that they receive from governments and other funders. This view is shared by Hermes and Lensink (2007), who contend that because of the high cost of providing microfinance products and services, most MFIs are not financially sustainable and are thus reliant on donor subsidies.

According to Meyer (2002), there are two kind of sustainability that we could observe in assessing MFIs performance: Operational self-sustainability and financial self-sustainability.

Operational self-sustainability is when the operating income is sufficient enough to cover operational costs like salaries, supplies, loan losses, and other administrative costs. And financial self-sustainability (which he referred as high standard measure) is when MFIs can also cover the costs of funds and other forms of subsidies received when they are valued at market prices. Meyer (2002) indicated, "Measuring financial sustainability requires that MFIs maintain good financial accounts and follow recognized accounting practices that provide full transparency for income, expenses, loan recovery, and potential losses." Regarding indicator of financial sustainability, Khandker et, al (1995) pointed out that loan repayment (measured by default rate) could be another indicator for financial sustainability of MFIs; because, low default rate would help to realize future lending.

2.3.1. The Schools of Thought on Microfinance Institutions' Sustainability

Unlike formal sector financial institutions, the large majority of MFIs are not self-sufficient, or "sustainable" as termed in the microfinance literature. Most MFIs are able to operate without covering their costs due to subsidies and gifts from governments and donors. Regarding the issue of sustainability of MFIs, there are two conflicting schools of thought: institutionalists and welfarirists. Those who hold the institutionalist view argue that an MFI should be able to cover its costs with its revenues. Institutionalists feel this self-sufficiency leads to long-term sustainability for MFIs, which will facilitate greater

poverty alleviation in the long-term. The institutionalist argument is consistent with Hollis and Sweetman (1998) who discuss six historical cases in an attempt to identify the institutional designs that facilitated success and sustainability for 19th century loan funds in the UK, Germany, and Italy. The authors conclude that subsidized loan funds were more fragile and lost focus more quickly than those that obtained funds from depositors. The institutionalist approach centers on “financial deepening” of building sustainability to serve those excluded from services of conventional banks. Achieving financial self-sufficiency and the number of clients served (in other terms breadth of outreach) are at the heart of the institutionalist approach. Institutionalists believe that the performance of a MFI should be assessed in terms of the institution’s success in reaching a financially self-sustainable position (Woller et al 1999) cited in (Obo 2009). According to Rhyne (1998, p. 7), “the sustainability group argues that any future which continues dependence on donor and governments is a future in which few microfinance clients will be reached”.

Welfarists are at odds with institutionalists over the issue of sustainability. Welfarists argue that, MFIs can achieve sustainability without the institutionalist definition of self-sufficiency (Woller, Dunfield, and Woodworth 1999). Welfarists argue that gifts (i.e., subsidies) from donors serve as a form of equity, and as such the donors can be viewed as investors. Unlike investors who purchase equity in a publicly traded firm, MFI donors do not expect to earn monetary returns. Instead, these donor-investors realize an intrinsic return. These donors can be compared to equity investors who invest in socially responsible funds, even if the expected risk-adjusted return of the socially responsible fund is below that of an index fund. These socially responsible fund investors are willing to accept a lower expected return because they also receive the intrinsic return of not

investing in firms that they find offensive.

The Institutionalists' view of self-sufficiency as a requirement for MFI sustainability seems unarguable until one realizes that there appears to be a trade-off between self-sufficiency and targeting. The primary issues in MFI targeting are the focus on lending to women versus lending to men and lending to the very poor versus lending to the marginally poor. Most MFIs that have proven self-sufficient have tended to loan to borrowers who were either slightly above or below the poverty line in their respective country (Navajas et al. 2000). These MFIs are able to capture economies of scale by extending larger loans to the marginally poor. Although there is still an open question, this evidence leads many to conclude that if MFI self-sufficiency is desired, then the very poor will not be reached by MFI services. That is, the MFI will not be able to achieve enough depth to reach those who need the credit the most.

Morduch (2000) terms the differing viewpoints of the institutionalists and welfarists as the microfinance schism. Welfarists often point out the success of the Grameen Bank and its ability to provide financial services even for the very poor of Bangladesh (Woodworth 2000). Morduch (1999) however, counters that even the flagship of MFIs, the Grameen Bank, depends on subsidies. He reports that in 1996, the Grameen Bank required subsidies of US\$ 26-30 million.

On the other hand Littlefield and Rosenberg (2004) argue that MFIs could cover all of their expenses if they would offer their services at adequate interest margins constantly strive for efficiency and apply an aggressive loan recovery policy. Morduch (2000) underlines the need to continue to serve the "poor" through financially sustainable MFIs,

by developing the institutional capacity and management of these MFIs and by encouraging new innovations and experimentation in the field of microfinance. Gibbons and Meehan (1999) point out those MFIs must adopt commercial for-profit strategies because as MFIs begin to free themselves from dependence on subsidies and abide by serious banking standards, they will become obliged to contain their costs. This will not only enhance the quality of services for borrowers but will also facilitate attainment of financial sustainability.

In the same vein, VonPischke (1996) notes that a compromise between financial sustainability, client outreach and social impact on the poor is possible. Navajas et al. (2000) emphasized that MFIs that are truly financially sustainable tend to target clients that are either slightly above and slightly below the poverty line, because they can benefit from economies of scale by extending their loans to marginally poor and non-poor clients. Moreover, Hollis and Sweetman (2001) show that microcredit institutions in Ireland in the 18th and 19th centuries were financially sustainable for more than a century because they adapted to their economic and financial environment. Patten et al. (2001) compared the performance of the Indonesian MFI Bank Rakyat and the formal banking sector during the financial crisis in East Asia. They showed that the Rakyat MFI exhibited superior performance in terms of repayment rates and other portfolio ratios.

2.3.2. Financial Sustainability and Interest Rates

Assuming a developing country with an enabling macro economy a reasonable level of political stability, suitable demographic conditions, and appropriate regulations and

supervision, one of the primary guidelines for a microfinance institution aiming at the sustainable provision of microfinance on a large scale is stated as follows.

“set a high enough interest rate on loans to cover both financial and nonfinancial costs, keep salary levels at not too high a multiple of GDP per capita: and establish a spread between lending and savings interest rates that enables institutional profitability”(Robinson 1996,pp158).

In his study, Robinson asked questions such as “Can the poor afford these interest rates? And he answered the question by himself; of course, the very poor (the hungry), the destitute, the old and ill cannot pay these interest rates. Their immediate needs are for government and donor supported poverty alleviation and employment programs, not financial services. However, for the working poor, institutional financial services can be of crucial importance in enabling enterprise growth and income improvement.

The institutionists’ or financial systems’ approach that has become increasingly dominant (at least officially) at the World Bank and in much of the donor community, exhorts microfinance providers to aggressively pursue sustainability through raising interest rates and lowering costs. In this view, as MFIs begin to wean themselves from a reliance on donor funds and subsidies and adopt the practices of good banking they will be compelled to further innovate and lower costs. Profits are viewed as being not only acceptable, but also quite essential because profits are expected to attract private investment to the sector. This suggests that commercial microfinance lenders ought to achieve much better leverage on their equity than subsidized micro lenders, allowing

them to greatly multiply the scale of outreach that is achieved from each extra dollar contributed by donors to equity in the sector (Conning 1999).

The Consultative Group to Assist the Poorest(CGAP), a donor consortium housed at the World Bank, and the United States Agency for International Development (USAID), have been particularly resolute in urging this approach in their guidelines and literature, and increasingly, by conditioning further grants and loan guarantees on the attainment of specific performance and sustainability targets.

From the borrower's point of view, the key words in microcredit are access and cost. Subsidized loans are low-cost, but not accessible by most lower-income people. Moneylenders provide access, but generally at a cost that precludes micro-enterprise growth. In contrast, institutions providing commercial micro finance make credit widely accessible at interest rates that enable enterprise growth. In addition, sustainable microfinance institutions make concerted efforts to make procedures simple, locations convenient, and staff trained and motivated to be helpful to clients; this keeps the transaction costs of clients low.

According to CGAP (2004), all of these elements justify interest rates that are generally higher than those of the banking sector, but below those of informal borrowers such as loan sharks. To attain financial sustainability, MFIs must apply high but not exorbitant interest rates. This was confirmed by Cull, Kunt and Morduch (2007), who show that for MFIs that grant individual loans, when the interest rates applied surpass 60%, the MFIs are no longer profitable because the demand for credit decreases. Moreover, MFIs that

apply the highest interest rates are the best performers. They are also most efficient and most financially sustainable. This assertion was confirmed by empirical studies (Robinson 1996) and (Conning 1999) that show that only the MFIs that generate profits are able to accumulate equity capital, a source of financing, to ensure their continuity and increase their reach among the poor. As MFIs' capital grows, so does their financing capacity, either in terms of debt or by accepting larger deposits from their clientele, which in turn broadens the reach of their actions, which reinforces financial sustainability. It follows that to attain financial sustainability; an MFI must set sufficiently high interest rates to cover its expenses because too low a rate would cause financial distress that may lead to the bankruptcy. In contrast, a needlessly high interest rate would penalize the clients, that the MFI could lose, which would then undermine its social mission.

2.3.3. Financial Sustainability and Quality of the Credit Portfolio

Micro-enterprises, the main clients of MFIs, do not generally supply material guarantees or reliable financial and accounting information when they seek microcredit. Thus, discriminating between micro-entrepreneurs without resorting to adverse selection is a crucial problem that MFIs must face to attain financial sustainability, as are very strong constraints on repayment. To identify micro-entrepreneurs with higher potential, MFIs can apply sequential loans (Chowdhury 2007). Fuelled by borrowers' hopes of obtaining subsequent credit to sustain the growth of their micro-enterprise, and by extension improve their social well being, this mechanism serves not only to separate micro-

entrepreneurs with dubious repayment possibilities from reliable ones, but also to improve the quality of the portfolio-at-risk.

This mechanism of discrimination of questionable micro-entrepreneurs from good ones can avert the phenomenon of perverse contagion that spreads among low risk borrowers that find that it is pointless to repay their credit when others are not doing so. This attitude consequently accelerates the deterioration of the portfolio quality and contributes to the erosion of the financial sustainability of MFIs. Aside from dynamic loans, several risk management methods are used. Examples include credit scoring (Schreiner 2003) and pre-default which is based on the possibilities of staggering the repayment of microcredit. Gibbons and Meehan (2000) maintain that the portfolio-at-risk rather than the loan repayment rate must be controlled to improve the quality of MFIs' portfolios because the chronological classification of payment debts allows loans in the portfolio to be ranked according to different risk levels for calculation of provisions for losses on MFI loans. Such information allows the managers to make fully enlightened decisions, particularly concerning the weaknesses of their institution, which may lead to a crisis situation if necessary corrections are not made. Moreover, group loans with joint guarantee are often used as a mechanism to minimize the risk of default in order to improve the MFI portfolio return and thus attain financial sustainability (Pitt and Khandker 1998), (Ghatak 1999). Armendariz de Aghion and Morduch (2000), Lensink and Mehrteab (2006) note that monitoring by the group leader, who possesses social ties and local knowledge, plays a determining role in improving repayment rates. In the same vein, Cull, Kunt and Morduch (2007) note that group loans have a positive impact on the quality of the credit portfolio of MFIs. They show that for most MFIs that grant

individual loans, the portfolio-at-risk increases according to the interest rates applied, and that beyond the threshold of 60% an increase in these rates is not associated with long-term profits, which is not the case for MFI that rely on a joint liability loan methodology. These results reinforce the idea that monitoring and control by peers to minimize moral hazard, together with the extent of social relations among the group members and the MFI employees (Woolcock 2001), contribute to the sustainability of MFIs.

2.3.3.1. Portfolio Quality Measures

The portfolio quality measures are generally a part of asset management measures with specific emphasis on how management makes and manages the loan portfolio.

That is, among others, how they select customers to minimize the effects of adverse selection, and how they make repayment follow-ups to enhance higher repayment rates, and, therefore, reduce the effects of ex-post and ex-ante moral hazards. The adverse selection refers to a situation where lender may make wrong risk estimation about the borrower and thus, ends up selecting a risky borrower (Hermes and Lensink 2007).

Armendáriz and Morduch (2007) define ex-ante moral hazard as the action taken by the borrower after loan disbursement but before realization on project returns, which may affect the probability of getting good return. While the ex-ante moral hazard occurs after the loan disbursement but before realization of project returns, the ex-post moral hazard, as the name suggests, occurs after realizing the project returns. In this case, the borrower may claim that his or her project was not successful, and thus, ask for extension or just disappear with the money (Armendáriz and Morduch, 2000 and Armendáriz and Morduch, 2007). That is, the borrower may not turn up to repay the loan. The effects of

both ex-post and ex-ante moral hazards are reflected in the quality of an MFI's portfolio.

The portfolio quality measures are: the portfolio at risk (PAR) ratio; write-off ratio; and risk coverage ratio.

a. Portfolio at Risk

According to CGAP (2003) the portfolio at risk is probably the most acceptable measure of portfolio quality. Microfinance literature indicates that, interest from loan is the main source of income to microfinance institutions (Telis and Seymour 2002). The amount of interest income to be received from loans will depend on the quality of loan portfolio. The quality of a loan portfolio indicates, among other things, the loan principal and interest repayment performance (Godquin 2004). It is, therefore imperative that, the management of a loan portfolio should be one of the key daily tasks of an MFI's management.

The longer the loan remains unpaid, the higher the risk that the same will not be repaid, thus, known as loan at risk. CGAP (2003, pp11) defines portfolio at risk as the "outstanding amount of all loans that have one or more installments of principal past due by certain number of days". The portfolio at risk measure is given by the value of the portfolio at risk, at a given number of days, divided by gross loan portfolio.

The higher portfolio at risk will indicate poor collection policy, and or that an MFI is not efficient in making collection. Sometimes the poor collection is an indication of adverse selection and or moral hazards (Armendáriz and Morduch 2007).

b. Write-off Ratio

Some loans never get repaid and thus, they are written-off as bad debts. The written-off ratio represents the proportion of loans that have been removed from the balance of gross loan portfolio because they appeared unlikely to be repaid (CGAP 2003).

When these debts are identified, they are written off as unrecoverable amount. The policy to write-off debts differs from one microfinance institution to another. The debts written-off as bad form part of the operating expenses of an MFI and, therefore, reduce its profitability. The written-off ratio is given by the value of loans written-off divide by average gross loan portfolio. An inefficient MFI will have high volume of unpaid debts and thus, higher write-off. That is, higher write-off indicates laxity of an MFI in debt collection. This could be a result of many factors among which are: poor loan payment and follow-up policies; untrustworthy personnel; and wrong loan assessment, all of which reflect a condition of an inefficient MFI.

c. Risk Coverage Ratio

Microfinance institutions need to take caution to cover any loss as a result of bad debts. The risk coverage ratio indicates how an MFI is prepared for such losses. Normally MFIs set aside part of their profits for this purpose to cover any unpaid amount beyond a certain period. Again, this differs from one MFI to another depending on the level of risk they are facing in the unpaid amount. The amount set aside for this purpose is known as loan-loss reserves (CGAP 2003). The longer the loan is unpaid, the higher will be the amount set aside to cover the loss when it happens. The risk coverage ratio is computed by dividing loan-loss reserve by the amount of portfolio at risk beyond a certain period

set by an MFI from their loan losses experience.

2.3.4. Financial Sustainability and Management

The research on financial sustainability dictates that MFIs should have modern and efficient employee management and should integrate new information technologies in their management that allow them to control operating costs and by extension their personnel costs, which are currently exorbitant. The integration of new information technologies in management can allow MFIs to monitor, analyze and control operations. An information system that generates precise data in a timely fashion allows managers to continually assess performance, better predict the need for liquidities, anticipate needs and quickly respond to crises. By using new information technologies adapted to the specific needs of MFIs, managers can offer their clients financial services at reduced costs. For example, an information system enabled the Indian MFI Spandana to compile reliable data and control the performance of its entire network of 45 branches (Mishra 1994). The use of new information technologies can not only reduce credit granting costs but can also increase the productivity of loan officers, allowing them to render high quality services to the poorest populations and contribute to increasing the financial sustainability of MFIs.

In addition to technological management, good employee management through continuous training plays a vital role in equipping MFIs with proven technical expertise in the field of microfinance. Well trained loan officers motivated by financial incentives that include a well adapted bonus system are indispensable to attain financial sustainability. Thus, MFIs that peg a portion of the wages to financial performance report

that they are satisfied with the results obtained (CGAP 2005). A staff with proven technical expertise in the field of microfinance is another prerequisite for the effective choice and monitoring of projects to finance.

In addition, in the quest for efficiency, cost reduction and optimization of means to attain financial sustainability, MFIs should increasingly adopt good management structures and incorporate existing efficient banking practices in their management, which notably entails emphasizing client relations and loyalty (Churchill 2000, and Norell 2001). These practices include creation of a marketing department and of audit and risk identification committees via an efficient internal control system. Management analysis reveals that good technological management combined with efficient human resources management should translate into a significant reduction in personnel costs.

2.3.4.1. Productivity Measures

The productivity measures indicate how well an MFI utilizes its assets and staff in general, and loan officers in particular in influencing loan repayment, enhancing increase in income, and reduction in overall microfinance expenditure. According to CGAP (2003) the productivity measures indicate how efficient an MFI is in using its resources. Efficiency of microfinance staff has a role to play in bringing about profitability and, therefore, sustainability of microfinance institutions. To measure staff efficiency, the following staff productivity measures are commonly used: loan officer productivity; personnel productivity; average disbursed loan size; average outstanding loan size; operating expenses ratio; cost per borrower or client; and other expenses ratios.

a. Loan Officer Productivity

Loan officers of an MFI are regularly involved directly in revenue generating activities of microfinance institution. Duties of the loan officers vary from one microfinance institution to the other. However, to most microfinance institutions, loan offices are the ones involved with finding clients, screening and selecting clients, and when loan is granted, making follow-ups for loan repayment. Their efficiency in this task then deserves to be measured.

The loan officer productivity measure is computed by dividing number of active borrower by number of loan officers (CGAP 2003). The loan officer productivity Measure indicates that, all things held constant, the larger the number of clients served by a loan officer, the efficient is the microfinance in utilizing the loan officers. However, this efficiency in utilizing the loan officers needs to be compared to what this large number of borrowers means to the overall revenue of an MFI.

b. Personnel Productivity

Apart from using loan officer's productivity measure alone, some microfinance institutions compute the productivity ratio based on total number of personnel. This is because some of duties of loan officers and other microfinance staff duties tend to overlap. According to CGAP (2003) the personnel productivity ratio measures how efficient an MFI is in utilizing its total human resources in managing its clients and thereby contributing to income for the microfinance institution.

The personnel productivity ratio is computed by dividing either number of active borrowers or number of active clients as numerator, by the number of personnel as denominator. When personnel productivity ratio is used, according to the Microfinance Consensus Guideline issued by CGAP (2003) most MFIs use the number of clients as numerator. This is probably because some of the staff may not be directly involved with borrowers; they may rather be involved with savers or clients for other services. Again, all things held constant, the higher the number of clients per staff would indicate microfinance efficiency in utilizing its staff.

c. Average Disbursed Loan Size

Although microfinance institutions have various products, the loan product is the most common one to most of them. The more loans are disbursed, all things being equal, the better the microfinance business or services. The average disbursed loan size measures the average loan size that is disbursed to clients (CGAP 2003). The average disbursed loan size is computed by dividing the value of loans disbursed in a period by total number of loans disbursed during the same period. All things being equal, the large the size of average disbursed loan, the efficient the MFI in selling loans.

d. Average Outstanding Loan Size

Microfinance institutions also use the average outstanding loan size to measure their efficiency. The average outstanding loan size is computed by dividing gross loan portfolio by number of loans outstanding. The average outstanding loan size ratio is expected to be significantly less than the average disbursed loan size (CGAP, 2003).

That is, the average outstanding loan size of an efficient microfinance institution will be significantly less than its average disbursed loan size. This indicates that, an MFI is efficient in making collections, as on average, what was disbursed is less than what is outstanding. The opposite of that will indicate inefficiency on part of an MFI.

e. Operating Expenses Ratio

According to CGAP (2003) the operating expenses ratio is the most commonly used measure of microfinance efficiency. It measures how an MFI's management has been efficient in reducing costs of operation at a given level of operation. The level of operation is measured by the average gross loan portfolio. The lower the operating expenses ratio will indicate efficiency in microfinance institutions' cost reduction strategy. That is, an MFI is operating at lower cost, which means, all things being equal, efficiency.

The operating expenses ratio is computed by dividing operating expenses by average gross loan portfolio. The operating expenses include all administrative and staff expenses. CGAP (2003) suggests the average total assets to be an appropriate denominator for microfinance institutions which have other products other than loan. This is because, when an average gross loan portfolio is used as denominator, comparative between loan-only MFIs and MFIs with other products like savings and deposits becomes biased and unfavorable.

f. Cost per Borrower and Cost per Client Ratios

Cost reduction is one of the efficiency parameter of an MFI. The cost per borrower and the cost per client ratio measure the efficiency of microfinance institutions in serving their client. They determine the average cost of maintaining a borrower or a client. The lower the cost per borrower or client will indicate the microfinance efficiency. This will also mean higher profitability and, therefore, financial sustainability. Cost per borrower ratio is computed by dividing operating expenses by average number of borrowers (CGAP 2003). Again, when an MFI has other non-loan products, the appropriate denominator is the average number of clients. This indicates the cost per client as a measure of how much it costs an MFI to maintain a client.

g. Other Expenses Ratio

Apart from the above expenses ratios, microfinance institutions may compute the expense ratios based on other expenses to allow them track the growth or decline of a particular expense over time or across a group (CGAP 2003). Ratios that can be computed under this category include: a ratio of administrative expenses as percentage of average loan portfolio; a ratio of salary expenses as a percentage of average loan portfolios; a ratio of total administration expenses over number of borrowers, indicating cost per borrower; staff costs per client, and administrative cost per client. Staff cost per borrower for example will indicate how efficient an MFI is in reducing staff costs at a given level of operation (number of borrowers). When the staff costs per borrower ratio is used, the lower the ratio the efficient will be the microfinance institution. For MFIs with other clients other than loan clients the appropriate denominator is number of client.

2.4. Profitability theory and financial sustainability

This part presents profitability theory and how it relates to the concept of financial sustainability of microfinance institutions. We discuss the concept of profit from both economists' and accountants' views. We then link these concepts with financial sustainability. That is, how profitability of an MFI can be used to indicate its financial sustainability.

2.4.1. Economic Concept of Profit

From John Hick's view of income (Hicks 1946), economists view income (also known as profit or earnings) as what a firm could spend or distribute during the period, and still have the same amount it started with at the beginning (Bodie *et al.* 2009). This definition calls for recognition of unrealized gains or losses in the market value of assets and liabilities.

2.4.2. Accounting Concept of Profit

Contrary to economists' view of income, accountants' view of income ignores unrealized gains or losses in the market value of assets and liabilities (Bodie *et al.* 2009). Thus, in accounting only the book values (not the market values) are considered when determining income. Moreover, while economists view income, earnings, and profit to be the same (Bodie *et al.* 2009; Backer 1966), the accountants make a distinction between income and profit or earnings. Stickney and Weil (2000) and Edmonds *et al.* (2000), for example, define profit as the excess of revenue over expenses for a transaction. That is, profit is

considered as a residual calculated as an excess of income over expenditure. Profits are what remain after costs of production have been paid for (Marriott *et al.* 2004)

2.4.3. Profit and Financial Sustainability

Microfinance profitability is linked to their financial sustainability. According to Woller and Schreiner (2002, pp2), financial self-sufficiency is the non profit equivalent of profitability. All things being equal, profits can be considered to be a key variable in measuring a firm's financial sustainability (Glautier and Underdown 2001). The Hicks definition of income explained above is based on the capital maintenance concept. The capital maintenance concept requires that profit be considered as a residual available for distribution once provisions have been made for maintaining the value of capital intact (Nikolai *et al.* 2009; and Glautier and Under down 2001).

Considering profit as residual, Hicks definition of income has been incorporated in financial accounts (Harvey and Keer 1983). Implementing the capital maintenance requirement, the development of accounting profession has gone hand in hand with recognizing the changes in value of assets and liabilities (Nikolai *et al.* 2009) Thus, with capital maintenance concept in mind, we can confidently link the financial sustainability of microfinance institutions with their profitability.

The economists' income (or accountants' profit) indicates, according to Hicks (1946) "the amount which a firm can spend or consume without impoverishing themselves. That reflects sustainability. According to Porwal (2001) the maintenance of capital by a firm is necessary in order to survive or become sustainable. Moreover, if profit is considered as a residual then profitability can be used as a proxy measure of financial sustainability

as it considers covering all costs incurred in earning income plus any costs necessary to at least maintain the current level of operation. Likewise, Larson *et al* (1999, pp775) define profitability as “the ability to provide financial rewards sufficient to attract and retain financing”. For microfinance institutions that depend solely on their own generated funds to keep their current level of operations, and yet be able to reach their desired level of growth, profitability can be considered as a measure of financial sustainability.

2.5. Microfinance Income

Income of a microfinance institution is made up of all of its own generated income including fees and charges, fines, and interest earned on loans (Armendáriz and Morduch 2007, and Shankar 2007). The interest rate earned on loans is the key source of self generated income to microfinance institutions (Tellis and Seymour 2002). The total amount of interest income to an MFI will depend on the rate of interest charged, the amount of loan and the loan repayment rates. These are explained here under.

a. Interest rate

This is the rate charged by microfinance institutions on its outstanding loan portfolio.

The higher the interest rate, the higher the microfinance income, and all things being equal, the higher the profit. Because the interest income is the major source of income to microfinance institutions, the interest rate should be set at a level where an MFI will be able to cover all its costs (both administrative and financing) and be able to earn a certain amount as target profit (Shankar 2007).

The amount of interest revenue and, therefore, all things being equal, the amount of profit will depend on the amount of loans made and the interest rate charged thereon. This means that the MFIs should charge interest high enough to cover their total costs to ensure that they earn profit. The higher the interest charged, all being equal, the higher the income and profitability of microfinance institutions.

b. Amount of Loan

Amount of loan (outstanding loan portfolio) is the amount of loaned funds that remain unpaid at the end of the period on which the interest amount is charged. The loan amount is the function of loan size and number of borrowers (clients), all of which are parameters of microfinance outreach. The loan size reflects the nature of clients and their poverty level (Morduch and Haley 2002; Woller 2002). It is generally assumed that, the smaller the loan size, the more poor clients will be reached by microfinance. The loan amount can be increased by either, increasing the loan size or increasing the number of clients, or both.

Schreiner (2001) suggests seven aspects of loan size which have to be considered when measuring outreach. These are term to maturity; dollars per installment; time between installments; number of installments; and dollar-years of borrowed resources in addition to dollars disbursed and average balance.

1. Term to Maturity

Term to maturity refers to the time remaining for a loan to fall due. Instruments with longer maturity are more risky than who is with short maturity (Brake 2000 and

Hutchinson 1998). Schreiner (2001) comments that, longer loans signal greater profitability but less outreach. Longer maturity would mean higher profitability to lenders because usually lenders charge higher interests to reflect the risk associated with longer maturity.

According to Conning (1999) longer loans signal shallower outreach because the most creditworthy (wealthier) clients usually get the longest loans. On the other hand, as Schreiner (2001) has asserted, longer loans are more risky and could lead into more delinquency costs.

2. Dollars Disbursed per Loan

The dollars disbursed is also an aspect of loan size used to measure depth of outreach. The larger the amount of dollars disbursed will represent the largest possible purchase from the loan proceeds. The dollars disbursed can affect both profitability and outreach. First, on profitability, the larger the amount disbursed would imply larger interest income. On the other hand, it means the maximum possible loss due to default.

The larger loans (all things being equal) would represent longer duration and lower average cost of evaluation and disbursement, as their costs are mostly fixed. Longer duration would also mean higher per-dollar variable costs because lenders take care due to greater risk exposure (Schreiner 2001). Second, the dollars disbursed will also affect outreach. According to Schreiner (2001) smaller disbursements would imply greater average depth of outreach, as poorer borrowers are likely to take smaller loans than less-poor borrowers.

3. Average Balance

The average balance is another common measure of loan size. It measures the level of resources typically held in terms of loan, without consideration for length of the term to maturity. Poorer borrowers will have smaller average balances. All being equal, the loans with large average balances are more profitable but are associated with less depth of outreach (Schreiner 2001). The average balance depends on the term to maturity, size, timing, and number of installments. However, Schreiner (2001) argues that the computation of average balance ignores the term to maturity and other aspects of loan size, and so it is an imperfect measure.

4. Time between Installments and Number of Installments

Time between installments, also known as moratorium, may affect both outreach and profitability. Schreiner (2001) comments that more frequent installments would mean less time to accumulate cash for repayment and thus, increase cost to borrowers. For lenders, frequency of repayment or installments could have mixed results. On one end, as Schreiner (2001) argues, frequent installments are associated with high possibility of default as borrowers can easily fall into arrears. It would also mean higher transaction costs as a result of frequent payment processing. All these mean reduced profitability. Moreover, poorer borrowers generally have fewer installments as the number of installments tends to increase the loan size. Thus, a shorter time between installments could imply less profitability to lenders and also less outreach.

On the other end, Armendáriz and Morduch (2007) suggest that high frequency of repayment if matched with borrowers timing for income or cash-inflows could lead to high repayment rates and, therefore, reduce default. The reduced defaults in turn would lead to an increased income and, therefore, profitability.

Term to maturity and number of installment determines the time between installments. The term to maturity and number of installments were not used in previous studies because of unavailability of disaggregated data. This study, using disaggregated data directly obtained from MFIs, documents an empirical evidence of the effects of term to maturity and number of installments on MFI's profitability.

5. Dollars per Installment

This is another measure of outreach in terms of loan size. The dollars per installment is useful measure of outreach because poorer borrowers are less likely to be able to pay large installments. On the other hand larger installments would mean increasing profitability to the lender as it dilutes fixed costs of the cash transactions. Fewer dollars per installment would mean higher depth outreach as this reflects poorer clients. The minimum loan and the number of installments determine the dollars per installment

6. Dollar-years of Borrowed Resources

Schreiner (2001) asserts that the "dollar-years of borrowed resources" measure is probably the best summary measure of loan size. The dollar-years indicate the average balance that the borrower would obtain if the loan would have had a one year maturity. His assertion is based on the fact that "dollar-years of borrowed resources" accounts for

time, and incorporates all other six aspects of loan size. The loan size increases with dollar-years of resources from a loan. It measures the “purchasing power provided by the loan and time through which borrowers control this purchasing power” (Schreiner, 2001, pp29). While more dollar-years mean higher profitability to lenders, it implies less depth of outreach as the same will have longer time to maturity, larger loan, and, therefore, larger loan size. Compared with the traditional measure of loan size, the dollar-years measure reports lower loan size as it takes, as numerator, the outstanding annual average of the loans.

The “dollar-years of borrowed resources” are obtained by dividing the average annual dollars outstanding by the number of loans disbursed in a year. The average in the annual dollars outstanding takes into account the average maturity. Its measurement is on dollar-years per loan instead of dollars per loan as used in the traditional average balance measure of outreach. It is better than the average balance measure in that the dollar-years considers the time to maturity and number of installments all which affect the profitability and outreach.

The dollar-years measure of outreach however, still has average loan weakness in that it does not consider the composition of poorer clients in a portfolio. The measure is also inconsistent in that, while the numerator includes all current and previous loans the denominator only includes the number of loans disbursed in the year. This has an effect of overestimating the loan size. Although it claims to recognize the number of installments in its computations, two loans of the same maturity and same loan amount but different number of installments will end up reporting the same loan size. Moreover,

as Schreiner (2001) has noted, the measure tends to overestimate the loan size when there is a growth in the loan portfolio. All withstanding, it is not easy to use the dollar-years measure as the data required for its computation (like maturity of each individual loan) may not be readily available to researchers who are external to an MFI.

c. Loan Repayment Rate

Higher interest rates and large loan amount alone may not earn much interest income for microfinance institutions if the loan repayment rates are low. Thus, higher loan repayment rates are also required to earn higher income. According to Schreiner (2000) the sustainability of MFIs is linked to effective loan repayments and profitability. The repayment rate will depend on the nature of microfinance products, whether demand or supply driven, and its efficiency in implementing its collection policy (Evers *et al.* 2000).

The efficiency of microfinance institutions in collecting loans from its clients will lead to higher repayment rates and all things being equal, higher profitability (Schreiner, 2000). The repayment rate may be affected by the MFI's delinquency management policy, lending type, number of and efficiency of loan offices, clients "investment opportunities, and consideration of the incentive constraint in setting the interest rates (Armendáriz and Murdoch 2007). A detailed discussion on the efficiency of microfinance and its empirical theory is made in Chapter 6, which links the efficiency of microfinance institutions with their financial sustainability.

d. Other Income

Microfinance institutions also earn income from other activities in their operations. The activities include, sale of passbooks, application forms, and return from other products or services offered by the microfinance institution. The amount of other income to be collected by an MFI will depend on its product diversity and return expected from these products. Microfinance institutions need to be creative in introducing demand driven products to increase income from these products. However, to do it effectively there should be an enabling operating environment set by the governments to enable the MFIs to introduce new products.

2.6. Microfinance Expenses

Microfinance expenses are the second item used to determine profitability and, therefore, financial sustainability. The MFIs' expenses can be categorized into three main categories namely: operating expenses; administrative expenses and financing expenses. These are explained in the next subsections.

a. Operating Expenses

Operating expenses are costs required to run the daily operations of MFIs. The operating costs of microfinance institutions include transaction costs and loan losses as a result of bad debts. According to Shankar (2007) transaction costs are a function of a number of groups that an MFI serves, and field workers compensation. Personnel expense is one of the most important elements of transaction costs. The personnel Expense Ratio enable managers to compare quickly personnel expenses to the MFI's yield on the gross loan

portfolio. For this reason, the Personnel Expense ratio is frequently referred to as the *efficiency ratio*. Monitoring this trend is an easy way to observe if the MFI is increasing its efficiency as it grows its loan portfolio.

The lower the ratio, the more efficient the MFI is. MFIs should strive for a downward trend in this ratio even when portfolio growth is flat until they are convinced that no more efficiency can be found. This ratio may fluctuate from month to month, but it should decline from year to year. Although commercial MFIs and credit unions should have higher operating costs due to the savings services, they have proven themselves extraordinarily efficient in maintaining low operating costs relative to other noncommercial MFIs (CGAP 2009).

The transaction costs are affected by the cost per transaction and the number of transactions. The number of transactions may depend on the number of clients and or the repayment frequencies, all of which relate to microfinance outreach. While repayment frequencies may help to improve or increase repayment rates the same also increases the total transaction costs and, therefore, may reduce profitability (Armendáriz and Morduch 2007; Evers *et al*, 2000). As there is a trade -off between the two, microfinance institutions should strike a balance between costs and benefits the increasing transaction costs and repayment rates. An appropriate product design and delivery methodology with flexible repayment schedules could help do this (Park and Ren 2001; Ledgerwood 1999).

The transaction costs may also be affected by the nature of costs and how they relate to changes in the number of clients (that is whether the costs are fixed costs or variable costs); type of clients (poor, average poor or non poor) and the loan size.

The fixed costs are those which remain unchanged in total when the number of clients changes (Brock and Herrington 2007). The variable costs, on the other hand, represent the costs which remain unchanged per client, although they do change in total given the change in the number of clients. The way the microfinance product is designed, its delivery, and collections arrangements will affect the transaction. This is another area in which MFIs need to show their efficiency.

Another component of operating expenses is loan losses as a result of bad debts. According to Meyer (2001) loan losses could be a result of poor product design, inappropriate lending types, ineffective microfinance policy with regard to loan follow ups, inefficient and corrupt loan officers. Poor delinquency management is reported to be the major cause of high loan losses and low repayment rates (CGAP 2008; and CGAP 2004b).

Under few cases the loan losses are a result of poor targeting where MFIs target a certain geographical area only which eventually is struck by natural disasters (Pantoja 2002).

Another reason which may lead to low repayment rate and, therefore, high loan losses is inconvenient repayment structure, for example, where borrowers are given a very long time to repay by which time they have spent almost everything they earned on their investments (Armendáriz and Morduch 2007). Thus, matching clients earning time pattern with the repayment time and frequencies is crucial.

One of the possible causes of low repayment rate is moral hazard. This occurs when the borrower fails to meet the repayment commitment as agreed in contract because of either poor realization of project income or just decides not to make repayment. Efficiency with which the MFIs select their customers and the use of appropriate lending technology (also known as lending type) will reduce exposure to moral hazards, and, therefore, reduce loan losses and overall operating expenses. It has been reported that group lending can mitigate the moral hazard (Armendáriz and Morduch 2007). Incentive based lending approaches have been suggested to help improve repayment rates and thereby reduce the loan losses that result from defaults (Armendáriz and Morduch 2007).

b. Administrative Expenses

The second element or category of microfinance expenses is administrative expenses. These are expenses incurred in running the organization. The expenses include staff salary, office running expenses; staff visits expenses, costs of running client training, transportation expenses, and costs incurred in setting-up and running a branch or collection centre. According to Woller and Schreiner (2002) salaries are the largest element of the administrative expenses. The administrative expenses or costs can be categorized as fixed and variable costs. Variable administrative costs are those varying in total with the number of clients (Horngren *et al.* 2006; Drury 2005).

That is, their increase or decrease depends on increase or decrease in number of clients respectively. For these kinds of costs the total costs will increase with the increase in microfinance outreach as measured by the number of clients.

Most of microfinance administrative expenses are fixed in nature. That is, their total volume does not depend on the number of clients (within a certain relevant range).

Fixed costs of microfinance institutions may include staff salaries, office rent, and costs of running a branch. With these kinds of costs microfinance may increase the number of clients (outreach) at the same level of costs. Thus, all things held constant, the MFI's outreach will increase profitability as total fixed costs remain constant while the marginal income increases.

c. Financing Expenses

Microfinance institutions incur financing costs when sourcing their capital. The costs paid to providers of capital are known as costs of financing (Brealey *et al.* 2006; CGAP 2003). Sources of capital for microfinance institutions include owners shares (share capital), loans (both from capital market and concession loans), donations, and client savings and deposits. All factors held constant, higher financing costs, lead to lower profitability of an MFI.

A combination of cheap sources of capital will reduce the overall financing expenses and, therefore, increase profitability. However, this will depend on the existence of a legal and policy enabling environment. That is, whether MFIs are allowed to mobilize their capital from various sources of finance, and the costs related to complying with the rules and regulations in using these sources of funds. An efficient microfinance institution will operate at a reduced financing and overall MFI expenses. The same will also increase profitability and, therefore, lead to its financial sustainability.

2.7. Review of Empirical Studies on Financial Sustainability of Microfinance Institutions

A review of the literature surrounding financial risks facing MFIs provide many different articles and books. There are a number of empirical studies on the determinants of risk in the loan portfolios of MFIs. At the same time, several reviews of the success or failure of different institutions were located. For example, Bhatt and Shui-Yan (2001) report on the studies of the Grameen Bank, widely considered the first MFI. The authors point to recent studies showing that the bank has helped to increase significantly household incomes, productivity, labor force participation, and rural wages, and that the level of absolute poverty is 75% lower where the bank operates than in villages without such a program. The authors also point out that the Grameen Bank is not entirely financially self-sufficient. Therefore, despite success at reducing poverty through the employment of a group-lending methodology, MFIs face considerable risks if they are to continue operations since they may not always be able to rely on government or donor assistance.

One of the well done studies in the global microfinance industry is the study by Cull et al (2007). In his study he has used data from 124 MFIs from 49 developing countries. He has not compared the performance of the MFIs with a benchmark but the result of his studies can be summarized as follow: the average Financial Self Sufficiency (FSS) is found to be 1.035 meaning MFIs are becoming financially self sufficient, OSS is a bit greater 1.165, whereas Adjusted ROA is negative (-0.027). The adjusted ROA shows that most MFIs have no positive return on their investment. Depth of outreach indicators such as average loan size per GNI per capita is 0.676 and percentage of women borrowers is

found to be 64.9%. Lastly he found that Average interest rate around as high as 35% and GLP to assets of 68.9%.

While in another study, Luzzi Giovanni Ferro and Weber on their paper “Measuring the performance of Micro Finance Institution” use factor analysis to construct performance indices based on several possible associations of variables without posing too many a priori restriction. The base variables are thus combined to produce different factors, each one representing a distinct dimension of performance. Then they use the individual scores ascribed to each MFI on each factor as the dependent variables of a simultaneous equation model and presents new evidence on the determinants of MFIs performance.

Zeller (1998) looked at the determinants of repayment performance for group lending in Madagascar using data from a random sample of 146 groups in six different lending programs. The study’s key findings are that groups consisting of members facing homogenous risk exposure do not have higher repayment rates, but that repayment rates significantly improve when groups have some type of social cohesion, informal or not. This result suggests that group lending can significantly improve repayments and therefore reduce risks in loan portfolios. The large cross-sectional study here seeks a stronger test of this hypothesis.

Two studies on MFIs that directly reflect on the questions under study here look at factors affecting financial sustainability and macroeconomic risks facing MFIs. First, Woller (2000) reviews the financial viability of village banking using data for nine institutions by studying the relationship between the return on the institution’s loan portfolio and various operation cost measurements. Despite the difficulty of making

strong conclusions from the small sample, the study found three strong indicators of financial health – portfolio yield (return), the interest spread, and number of borrowers. A clear implication of this result is that MFIs must charge a reasonable rate of interest on their loans to insure continuing operations and that scaling up operations will protect the institution in the long-term. A key finding in the study is that many efficiency variables were uncorrelated with the return on the portfolio.

Second, a case study by Opportunity International shows that high or hyper-inflation economic conditions severely reduce the ability of microenterprises to repay loans. Weele and Markowich (2001) study the experience of two different microfinance institutions. In both cases, the loans to clients were indexed to the U.S. Dollar and as the countries experienced high inflation, and the resulting devaluation of their currencies, most, if not all clients were unable to make complete payments on their results. This case study shows, not surprisingly, that macroeconomic conditions affect the risks in the portfolio. In the study conducted here macroeconomic factors are controlled for when looking at the determinants of risk in MFI loan portfolios.

Tiwari Piyush and Fahad S.M in their paper Microfinance Institutions in India discusses conceptual framework of a microfinance institution in India. The successes and failures of various microfinance institutions around the world have been evaluated and lessons learnt have been incorporated in a model microfinance institutional mechanism for India. Author finds that the poor repay their loans and are willing to pay for higher interest rates than commercial banks provided that access to credit is provided. Secondly, the poor save and hence microfinance should provide both savings and loan facilities. These two

findings imply that banking on the poor can be a profitable business. However, attaining financial viability and sustainability is the major institutional challenge. Deposit mobilization is the major means for microfinance institutions to expand outreach by leveraging equity. In order to be sustainable, microfinance lending should be grounded on market principles because large scale lending cannot be accomplished through subsidies.

Mahajan Vijay and Nagasri G, BASIX in September, 1999 in their paper “Building Sustainable Microfinance Institutions in India” tries to examine what comes in the way of making Indian MFIs sustainable and what can facilitate this. An attempt has been made in this paper to look at sustainability from multiple dimensions such as demand, mission, legal and regulatory framework, ownership, governance and human resources and financial sustainability. The paper asserts that India is the largest emerging market for microfinance. However, the demand needs to be organized and converted into effective demand. MFIs should offer sustainable financial services and reach a stage of high access and high sustainability, which is the desired level. There is emerging price competition from mainstream banks as they are able to cross-subsidize their micro-credit operations and charge interest rates below cost.

Ethiopian Scenario

The quality literatures on the Ethiopian MFIs industry sustainability and outreach are not as such available. However the study by Kereta (2007), on which we have accessed to, is worth mentioning. He studied the industry's outreach and financial performance using simple descriptive analysis using graphs and percentage growth rates. The result of his study showed that in terms of breadth of outreach, MFIs are serving an increasing number of clients in each year from 2003-2007. The industry's growth rate in terms of number of clients is 22.9%. In terms of depth of outreach measured by average loan size Ethiopian MFIs have a loan size which is on average nearer to the standard \$150. So they can be considered pro-poor. However he indicated that the MFIs reach to the disadvantaged particularly to the poor is limited (38.4%). From sustainability angel, the MFIs are operationally sustainable as measured by ROA and ROE and the industry's profit performance is improving overtime. Dependency ratio as measured by the ratio of donated equity to capital decline and the ratio of retained earnings to total capital is rising letting the industry to be financially self sufficient. The study also found that portfolio at risk; PAR is at 3.2% for the period from 2005-2007 which is in comfort zone.

The study by Kidane (2007) on one of the largest MFIs in Ethiopia Amhara Credit and Saving Institution (ACSI) shows that ACSI has served more than half a million clients. Over 1.6 million loans have been disbursed worth Birr 1.5 billion. By 2005, the institution was operationally and financially self sufficient at 119.9% and 115.3% respectively. ACSI is among a few MFIs that are able to achieve the highest efficiency at

the lowest cost per borrower. The operating cost was as low as five cents in 2005. ACSI also has a high portfolio quality, as delinquency rates are around 1.9%.

Having no or few number of researches on financial sustainability of microfinance institutions in Ethiopia, this research attempts to assess factors that affect the financial sustainability of MFIs based on the theory and empirical findings of different researchers that are discussed in the literature above. The study was meant to test the relationship between dependant variable (financial sustainability) and independent variables by making the following hypotheses.

Hypotheses: At the starting point of the analysis, we hypothesize that an MFI that is financially sustainable is better posited to provide quality financial services to the poor that will have a profound impact on poverty alleviation. To make this working hypothesis testable, we now develop more specific hypotheses. Basically the hypotheses say that good financial and managerial governance are the epitome of MFIs' financial sustainability. Following my in-depth literature review we paid particular attention to the following testable hypotheses.

Interest Rates

This is the rate charged by microfinance institutions on its outstanding loan portfolio. The higher the interest rate, the higher the microfinance income, and all things being equal, the higher the profit. Because the interest income is the major source of income to microfinance institutions, the interest rate should be set at a level where an MFI will be able to cover all its costs (both administrative and financing) and be able to earn a certain

amount as target profit (Shankar, 2007). The application of interest rates that generate a profit margin should significantly contribute to attainment of MFIs' financial sustainability.

Hypothesis 1: We posit a direct relationship between the interest rate and financial sustainability.

Portfolio at risk

The longer the loan remains unpaid, the higher the risk that the same will not be repaid, thus, known as loan at risk. CGAP (2003:11) defines portfolio at risk as the “outstanding amount of all loans that have one or more installments of principal past due by certain number of days”. The portfolio at risk measure is given by the value of the portfolio at risk, at a given number of days, divided by gross loan portfolio. The higher portfolio at risk will indicate poor collection policy, and or that an MFI is not efficient in making collection. Sometimes the poor collection is an indication of adverse selection and or moral hazards (Armendáriz and Morduch 2007).

Hypothesis 2: Good control over the portfolio-at-risk increases MFIs' profits and consequently has a positive impact on financial sustainability of MFIs. We predict an inverse relationship between the portfolio-at-risk and financial sustainability.

Age of MFI

There is a thought that as MFIs mature, and thus acquire experience in their sector; they increase their likelihood of attaining financial sustainability. This can be explained by the fact that MFIs gradually improve their control over all operations related to issuance of microcredit. In other words, MFIs that have considerable experience in the microfinance sector have diligently applied credit risk management and general efficient management techniques to attain financial sustainability (Ayayi, 2010).

Hypothesis 3: we expect direct relationship between the age of an MFI and financial sustainability of an MFI.

Percentage of Women Borrowers

The commonly held belief is that women are more hard-working, more reliable and are better re-payers of microcredit than men. This belief is grounded in the argument that the majority of women are in the most disadvantaged margin of MFI operations, and that they consequently must be helped to launch activities that generate subsistence income for their families in order to directly reduce poverty. Moreover, given that women's activities tend to be small scale and intended to generate income to attain food self-sufficiency, and therefore are not conducive to the accumulation of wealth in the form of savings, it is quite understandable that the percentage of women borrowers has a negative impact on financial sustainability owing to possible repeated bankruptcies of these micro-activities.

Hypothesis 4: there is an inverse relationship between percentage of women borrowers and financial sustainability of MFIs.

Productivity and Efficiency

Good management through investment in human and technological resources, together with financial incentive mechanisms, should increase the quality and profitability of loan officers, lower personnel costs and heighten loan officer productivity.

Hypothesis 5: We anticipate an inverse relationship between the ratio of personnel expenses and financial sustainability, along with a direct relationship between the number of borrowers per loan officer and financial sustainability.

Chapter Three

3.1. Research Methodology

The study was conducted by applying the quantitative approach to identify the determinants of financial sustainability of microfinance institutions in Ethiopia. Quantitative research approach is a means for testing objective theories by examining the relationship among variables. These variables, in turn can be measured, typically on instruments, so that numbered data can be analyzed using statistical procedures. The final written report has a set structure consisting of introduction, literature and theory, methods, result and discussion (Creswell 2009). The quantitative research approach is useful where quantitative data are generated from large samples to test applicability of the existing theory using statistical analysis (Collis and Hussey 2003)

3.2. The Sample

According to Collis and Hussey (2003) in a survey, a sample of subjects is drawn from a population and studied to make inferences about the population. In this study, a sample of MFIs in Ethiopia was studied using analytical survey approach. The analytical survey is used where the intention is to determine whether there is any relationship between different variables (Collis and Hussey 2003). A study sample was used in this study to make inferences about the population because it is time consuming and expensive to collect data about every individual in the population. However, where the selected sample can reliably represent the population the sample can still be used to make inferences about the population (Ghauri and Grønhaug 2005; Collis and Hussey 2003). In this study

a list of microfinance institutions in Ethiopia those which are in operation at least for last six(6) years were taken as a sampling frame from which the sample of twelve(12) microfinance institutions(MFIs) were derived. The sample selection was based on the availability of all the necessary data related to the variables which are considered to be the determinants of financial sustainability of microfinance institutions in Ethiopia.

The Data

This study was meant to determine factors affecting financial sustainability of MFIs in Ethiopia. Based on the reviewed literature and the conceptual framework developed, the data required for both dependent and independent variables which include outreach and financial performance related data as recorded by the microfinance institutions in financial statements and other official documents were collected from the Association Ethiopian Microfinance Institutions (AEMFI). Specific data required and their respective measurements are explained in the following sections of this chapter.

Data analysis technique

Survey data collected from AEMFI were rearranged and organized in one format (ratios) to enable enter the data in to a spread sheet before analyzing them using Eviews econometric computer software. The rearrangement was necessary because these MFIs had different reporting formats. Thus, the rearrangement facilitated easy tracking of key variable information required for this study. However, this was carefully done as not to affect the original financial performance results.

The Eviews software was selected following its ability to help researchers to analyze research easily and efficiently (Brooks 2008). Moreover, the Eviews software has a range of advanced tool for panel analysis that a researcher needs to organize and manage their data and then obtain and analyze statistical results

3.3. Description of Variables

3.3.1. Dependent variable

For the analyses we used financial sustainability (FSS) as the dependent variable. We could thus evaluate the financial performance of MFI over time because when the financial revenue continuously exceeds the total expenses ($FSS > 100$), we can deduce that the MFI can forgo subsidies and turn to financial markets if necessary. MFIs obtain financial revenue from loans and other financial services in the form of interest, penalties and commissions. The financial revenue also includes income from other financial assets such as investment income. MFIs' expenses include operating expenses, cost of credit and provisions for probable losses on loan default. In contrast with Cull, Deminrgüç-Kunt and Morduch (2007), who, in addition to financial sustainability, used operational self-sufficiency (OSS) and adjusted return on assets (ROA), we concentrate uniquely on financial sustainability because our objective is to examine economic profit in the sense of creation of value, rather than accounting profit, which is more similar to operational self-sufficiency.

3.3.2. Independent variables

The first independent variable is the Portfolio-at-risk at 30 days (Par>30). This risk and liquidity ratio allows us to measure the impact of the portfolio-at-risk measured at a specific period on credit granted in the following period. In effect, the functioning of MFIs is characterized by revolving credit logic, i.e. that loanable funds are derived almost entirely from credits. Under these conditions we anticipated that the portfolio-at-risk will have a negative influence on MFI performance. In other words, MFIs that have high Par>30 on a period would have fewer funds to lend and would therefore be obliged to ration credit, which would have a negative influence on their financial performance.

Concerning our second independent variable-interest rate applied by MFIs-we use the financial revenue ratio (FRR). This ratio that result from operating revenue enables us to take into account the interest rates MFIs charge their clients because the financial revenue of MFIs consists mainly of interest charged on loans and other financial services offered to clients.

Moreover, given that good management can contribute to the improvement in and enduring growth of MFIs' financial sustainability, we have chosen as our third independent variable the operating expense ratio (OCR) and the ratio of personnel costs (PCR), both of which can capture good management. Conceivably, a well managed MFI that applies best banking practices can effectively control its operating expenses. Moreover, the personnel cost ratio can also illustrate human resources management, specifically with respect to training, customer relations and motivation. These factors can play an important role in the financial performance of MFIs. Given that good

management is an element that can boost productivity and therefore improve financial sustainability, we have chosen as the fourth independent variable the two productivity ratios, i.e. number of loans per staff member (LPF) and number of borrowers per loan officer (BPLF) to see which of the two contributes most significantly to financial sustainability. Lastly, to assess the impact of institutional indicators and the client outreach on financial sustainability of MFIs, we retain as the remaining independent variables a set of measures of client outreach, namely: the percentage of women borrowers (PWB) and the average loan balance (ALB), and as institutional indicators the staff members and age of MFIs (AGE).

Table3.1. Description of variables

S/N	Variable Standard Name	Proxy (measures)	Variable name in Regression model	Expected effect
1	Portfolio at risk at 30 Days	The Percent of total loan that has overdue by more than 30 days.	Par>30	-
2	Financial Revenue Ratio	Adjusted financial revenue divided by total assets	FRR	+
3	Personnel Costs Ratio	Total personnel expenses /number of personnel	PCR	-
4	No of borrowers per loan officer	No of borrowers per loan officer	BPLF	+
5	Average loan balance	A ratio of outstanding loan portfolio over number of active borrowers	ALB	+
6	Age of MFIs	Age of MFIs	AGE	+
7	percentage of women borrowers	Percentage of female served	PWB	-

3.4. Regression model

The study made use of panel data model (multiple regression model) to explain the relationship between dependent and independent (explanatory) variables. Panel data or longitudinal data are data sets containing repeated observations of the same individuals (MFIs) collected over a number of periods (Johnson and Dinardo 2007; Baum 2006; Wooldridge 2006). In essence, panel data is a combination of cross-section and time series data (Gujarat 2003). That is, cross-section data collected from the same individuals over a time.

Panel data relates to individuals (MFIs) over time, and, therefore, is bound to be heterogeneous in these individuals. The techniques in panel data estimation can take such heterogeneity explicitly into account by allowing for individual-specific (MFI specific) variables (Gujarat 2003). In this study where it is expected to establish the relationships between dependent and independent variables, a panel data model is an ideal one for consideration.

The panel data model is selected because it can better detect and measure effects that simply cannot be detected in pure cross-section or pure time series data (Wooldridge, 2006; Gujarat, 2003). Moreover, panel data give “more informative data, more variability, less multicollinearity among variables, more degree of freedom, and more efficiency” (Gujarat 2003, pp637).

The general panel data regression model used is of the form: $Y_{it} = \alpha_i + \beta * X_{it} + \varepsilon_{it}$. Where: Y_{it} is the value of dependent variable (measure of financial sustainability) for cross-section unit i at time t , where $i = 1 \dots n$ and $t = 1, \dots, T$; α_i is a heterogeneity or individual

effect. It contains a constant term and set of individual or group specific variables which may be observed, such as type of MFIs, lending type, MFI zone, and so on, or unobserved such as MFI specific characteristics (like skills of MFI personnel or preference and so on), which are taken to be constant over time (Greene, 2003); β_j measures the partial effect of X_{it} in period t for the unit i ; X_{it} represents the j^{th} explanatory variable for unit i at time t . There are K explanatory variables indexed by $j = 1 \dots K$ and, therefore, X_{it} is a K – dimensional vector; and ε_i is the error term (Verbeek 2004; Greene 2003).

The model that is retained in this study intended to estimate the impact of the interest rate charged by MFIs, portfolio-at-risk, the financial revenue ratio, the personnel expense ratio, the age of MFIs, the average loan balance, the percentage of women borrowers and the number of borrowers per loan officer on the financial sustainability of MFIs. The empirical model to estimate these impacts can be expressed as:

$$FSS = \beta_0 + \beta_1 * Par > 30 + \beta_2 * FRR + \beta_3 * PCR + \beta_4 * AGE + \beta_5 * ALB + \beta_6 * PWB + \beta_7 * BPLF + \varepsilon_{it}$$

Where: β_0 to β_8 are the coefficients of the variables and μ is the random error term.

FSS: represents financial sustainability

Par>30: stands for portfolio at risk

FRR: stands for financial revenue ratio

PCR: stands for ratio of personnel cost

AGE: is age of microfinance

ALB: is average loan balance

PWB: is the percentage of women borrowers

BPLF: Number of borrowers per loan officer

Chapter Four

4. Data Analysis and Discussion

This chapter deals with data analysis and interpretation. The chapter has the following sections. The first section is the descriptive statistics; the second section is about correlations analysis among the variables i.e., determinants of financial sustainability of microfinance institutions in Ethiopia, the third section presented model misspecification tests (tests for the Classical Linear Regression Model assumptions), and finally presentation of panel data regression analysis and discussion of results.

4.1. Descriptive Statistics

In this section we present the results based on the descriptive statistics for both dependent variable, the financial self-sufficiency (FSS), and independent variables discussed in chapter three over 6 years. Table 4.1 provides a summary of the descriptive statistics of the dependent and independent variables.

As discussed in the literature review part, the financial sustainability (FSS) indicates the ability of an MFI to cover all of its operating costs and costs of capital without depending on subsidies. It is a ratio of total microfinance income from operations over total costs incurred to earn the same.

For the FSS (financial self sufficiency) variable, the mean of 107%, i.e. greater than 100%, shows that our sample is made up of financially sustainable MFIs. The standard deviation for this variable is slightly high (0.29), an indication of the existence of

dispersion in the sustainability of microfinance institutions studied. In addition to this, the minimum of 54% shows that there are MFIs that, although transparent, cannot be considered financially sustainable. Regarding the variable $Par > 30$, the higher its value, the riskier the credit portfolio, which can have a negative influence on the financial sustainability of the MFI. For our sample, the mean of 4.6% and the maximum of 26% imply that the credit portfolio of some MFIs in the sample is fairly risky.

The higher the variable FRR (financial revenue ratio) is, the more the MFI earns from the products and services it offers its clients. For the sample, the mean is 15.4% with a maximum of 26.6%, which is 4.433 times the minimum. This clearly illustrates the disparity of rates of return earned by MFIs. Regarding the variable PCR (personnel cost ratio), the higher its value, the greater the personnel expenses, which could have a negative impact on financial performance of MFIs if there is no improvement in productivity. Within our sample, control of personnel expenses varies considerably, from a maximum of 21.9% to a minimum of 0.80%, with a mean of 7.1%. Moreover, the variable ALB (average loan balance) exhibits extreme values, from a minimum of 408 to a maximum of 3333, for a mean of 1418. The PWB (percentage of women borrowers) variable, with a mean of 48.8%; a minimum of 22% and a maximum of 81%, shows that the MFIs in our sample have almost equal balance between women and men borrowers. Concerning the BPLF (number of borrowers per loan officer) variable, values obtained illustrate diversity in the productivity of MFIs in our sample.

Table4.1. Summary Statistics for Variables in the Regression Model

Variable Name	Mean	Median	Maxim	Minim	Std.dev
FSS	1.068	1.011	1.68	0.54	0.291
FRR	0.154	0.158	0.266	0.06	0.051
PCR	0.071	0.063	0.219	0.008	0.043
BPLF	465.1	397.5	1840	141	273
PWB	0.488	0.462	0.81	0.22	0.165
PAR	0.046	0.03	0.26	0.001	0.051
ALB	1418	1229	3333	408	613
AGE	8.083	8.000	12.00	4.000	2.095

Source: Eviews 6 output

4.2 Correlations Analysis between the Dependent Variable and the Independent Variables; and Diagnostic Test for Multicollinearity Problem between Pairs of Independent Variables

Before running the regression analysis, we performed pair wise correlation analysis. The analysis was meant to first, indicate whether variables were correlated or not. If variables are not correlated then using several simple regressions or one multiple regression models could give the same results (Dougherty 2006). The correlation analysis helped us to determine whether there exist variables which are highly correlated and that could cause multicollinearity problem in our model.

Multicollinearity condition exists where there is high, but not perfect, correlation between two or more explanatory variables (Cameron and Trivedi 2009; Wooldridge 2006). According to Churchill and Iacobucci (2005) when there is multicollinearity, the amount of information about the effect of explanatory variables on dependent variables decreases. As a result, many of the explanatory variables could be judged as not related to the dependent variables when in fact they are.

How much correlation causes multicollinearity however, is not clearly defined. While Hair *et al.* (2006) argue that correlation coefficient below 0.9 may not cause serious multicollinearity problem, Kennedy (2008) suggests that any correlation coefficient above 0.7 could cause a serious multicollinearity problem leading to inefficient estimation and less reliable results.

In this study, as in Kennedy (2008) we considered correlation coefficient above 0.7 to be high enough to warrant further investigation. Table 4.2 below depicts a correlation matrix of the variables. It shows the relationship between the dependent variable and independent variables as well as the relationship among independent variables.

Table 4.2 Correlations Matrix

	FSS	FRR	PCR	BPLF	PWB	ALB	PAR	AGE
FSS	1.0000							
FRR	0.1273	1.0000						
PCR	-0.4826	0.54166	1.0000					
BPLF	0.4405	-0.26398	-0.5123	1.0000				
PWB	-0.1494	0.3384	0.485762	-0.26544	1.0000			
ALB	0.64417	-0.34874	-0.47858	0.437687	-0.0274	1.0000		
PAR	-0.37622	0.176968	0.203342	-0.22911	-0.2075	-0.32621	1.0000	
AGE	0.144733	-0.22123	-0.38008	0.233474	-0.2908	0.413236	0.12273	1.0000

Source: Eviews 6 output

Financial sustainability is positively correlated with the financial revenue ratio, at a statistically significant level. This correlation is anticipated in that the application of interest rates that integrate real costs and a profit margin that reflects the cost of services rendered customarily have a positive impact on the financial sustainability of MFIs . Financial sustainability and the portfolio-at-risk at 30 days are negatively correlated and statistically significant. This finding is compatible with the argument whereby the gradual increase in volume of unpaid loans is detrimental to the financial sustainability of MFIs.

Financial sustainability is negatively correlated with the personnel expense ratio but positively correlated with the age of MFIs and the number of borrowers per loan officer. Moreover, the percentage of women borrowers is negatively correlated with financial sustainability at a statistically significant level. Although women are by far the

predominant consumers of microcredit, the nature of the activities that they undertake (mainly intended to satisfy primary needs on the small scale) does not generate additional profits that would allow MFIs to apply interest rates that could contribute significantly to their financial sustainability. The positive and statistically significant correlation of the average loan balance, a variable of client outreach, with financial sustainability appears to corroborate the theory that the massification of microcredit reinforces the financial sustainability of MFIs (Ayayi 2009).

The financial revenue ratio is positively correlated with the personnel expense ratio and is statistically significant. This corresponds with the concept of incentive wage in that the increase in financial revenue reflects the increase in employee productivity, which should translate by an increase in wages, which in turn is manifested by an increase in personnel expenses. Further, the positive and negative correlations between independent variables analyzed in pairs are weak. Accordingly, we do not observe collinearity between the explanatory variables. Kennedy (2008) stated that multicollinearity problem exists when the correlation coefficient among the variables are greater than 0.70, but in this study there is no correlation coefficient that exceeds even close to 0.70.

4.3. Tests for the Classical Linear Regression Model (CLRM) Assumptions

a. The Errors have zero mean ($E(\epsilon) = 0$)

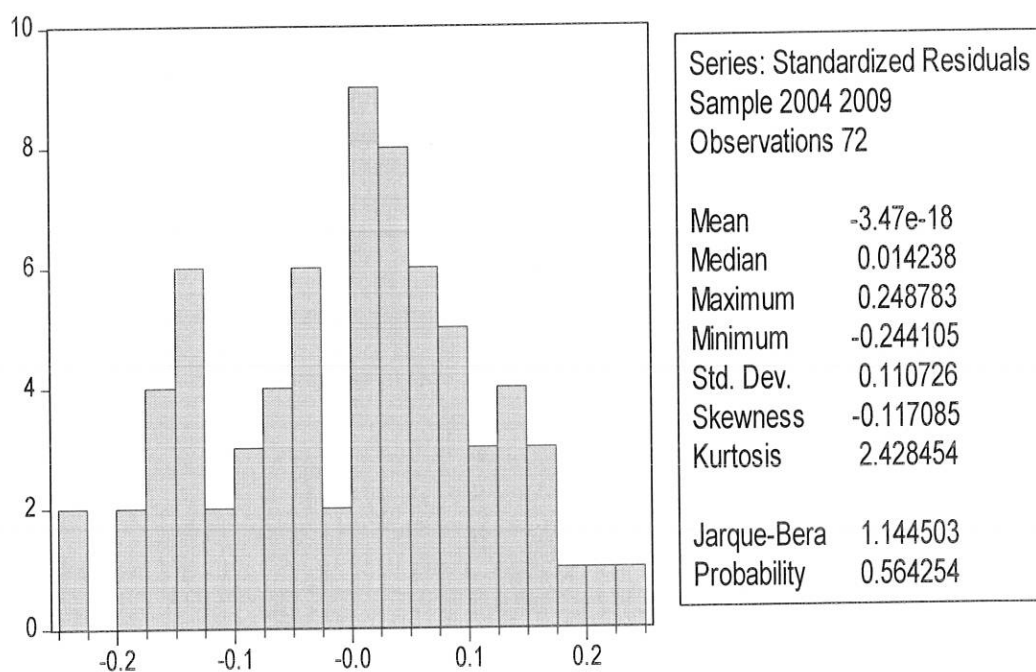
According to Brooks (2008), if a constant term is included in the regression equation, this assumption will never be violated. Thus, since the regression model used in this study includes a constant term, this assumption does not need to be tested.

b. Normality Assumption

According to Brooks (2008), if the residuals are normally distributed, the histogram should be bell-shaped and the Bera-Jarque statistic would not be significant. This means that the p-value given at the bottom of the normality test screen should be greater than 0.05 to not reject the null of normality at the 5% level. A normal distribution is not skewed and is expected to have a coefficient of kurtosis of 3. Bear-Jarque formalizes this by testing the residuals for normality and testing whether the coefficients of skewness and kurtosis are zero and three respectively.

Therefore, the normality tests for this study as shown in figure 4.1 below, the coefficient of kurtosis is close to 3, and the Bera-Jarque statistic has a P-value of 0.564 implying that the data were consistent with a normal distribution assumption.

Figure4.1. Normality Test for Residuals



Source: Eviews 6 Output

c. Homoscedasticity assumption (variance of the errors is constant)

We tested for existence of heteroskedasticity across the range of explanatory variables using Breusch-Pagan test, which tests the null hypothesis that there is no heteroskedasticity (that is there is constant variance or homoscedasticity) across the range of explanatory variables. The p-value of the F-statistic in the test for the variables in the regression mode was statistically significant at 5% significant level, as shown in Table 4.3. And, therefore, we reject the null hypothesis of constant variance. The result implies that there is heteroskedasticity problem.

Table 4.3. Heteroskedasticity Test: White

F-statistic	1.969656	Prob. F(35,36)	0.0232
Obs*R-squared	47.29969	Prob. Chi-Square(35)	0.0802
Scaled explained SS	57.20697	Prob. Chi-Square(35)	0.0103

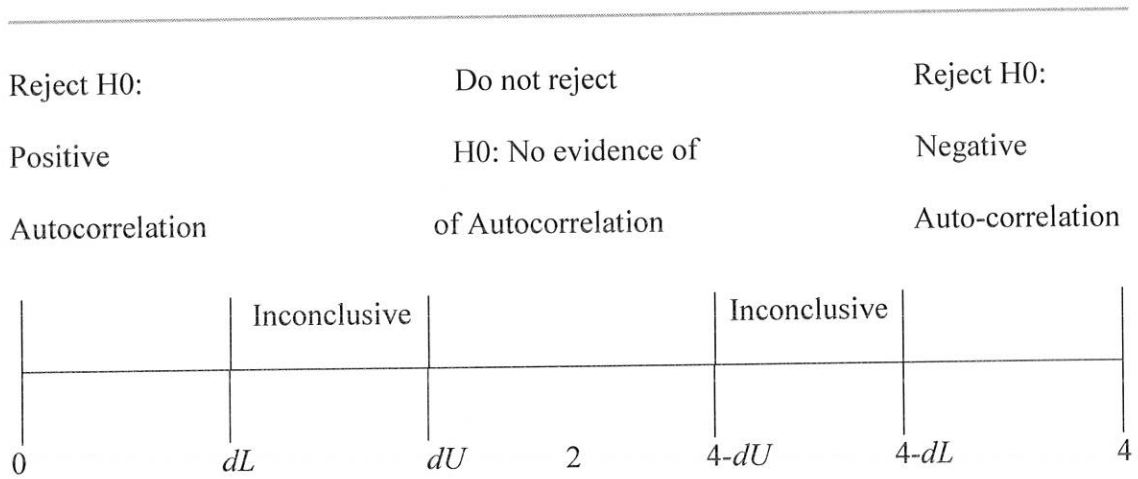
Source: Eviews 6 software output

Wooldridge (2006) argues that heteroskedasticity does not affect the consistency of the estimator, and it is only a minor trouble for inference. Even in the presence of heteroskedasticity, more efficient estimation is possible. Thus we ran the model with heteroskedasticity robust standard errors as suggested in econometric literature (Cameron and Trivedi 2009) and Wooldridge 2006).

d. Test for Assumption of Autocorrelation

This is an assumption that the errors are linearly independent of one another (uncorrelated with one another). If the errors are correlated with one another, it would be stated that they are auto correlated. To test this assumption, the DW stat value in the main regression table should be considered.

Figure 4.2: Rejection and Non-Rejection Regions for DW Test



According to Brooks (2008), DW has 2 critical values: an upper critical value (dU) and a lower critical value (dL), and there is also an intermediate region where the null hypothesis of no autocorrelation can neither be rejected nor not rejected. The rejection, non-rejection, and inconclusive regions are shown on the number line in figure 4.2 above. So, the null hypothesis is rejected and the existence of positive autocorrelation presumed if DW is less than the lower critical value(dL); the null hypothesis is rejected and an existence of negative autocorrelation is presumed if DW is greater than 4 minus the lower critical value($4-dL$); the null hypothesis is not rejected and no significant residual autocorrelation is presumed if DW is between the upper critical value (dU) and 4 minus the upper limits($4-dU$); the null hypothesis is neither rejected nor not rejected if DW is between the lower(dL) and the upper limits(dU), and between 4 minus the upper and 4 minus the lower limits.

Coming back to the case of this study, the DW test statistic value in the multivariate regression result table is 2.07. There are 72 yearly observations in the regression. The relevant critical values for the test are $dL= 1.25$, $dU = 1.68$, and $4 - dU = 4-1.68=2.32$; $4 -$

$dL = 4 - 1.25 = 2.75$. The DW test statistic of 2.07 is clearly between the upper limit (dU) which is 1.68 and the critical value of 4- dU i.e. 2.32 and thus the null hypothesis of no autocorrelation is within the non- rejection region of the number line and thus there is no evidence of presence of autocorrelation.

4.5. Random Effect versus Fixed Effect Models

This study used panel data models where the random effect and fixed effect models could be used to estimate the relationships among variables and thereby taking care of the omitted variables. Deciding on whether the random effect (RE) model or fixed effect model (FE) was an appropriate model for this study depended on whether the individual effect were fixed or random. According to Cameron and Trivedi (2009) if the effects are fixed the random effect model estimators are inconsistent and fixed effect model should be used and vice versa.

To check which of the two (RE or FE) models provide consistent estimates; we employed the standard Hausman test suggested in the econometric literature (Hsiao, 2007; Baltagi 2005; Greene 2003). The Hausman tests the null hypothesis that RE provides consistent estimates compared to FE model. The test results for the model used to estimate the determinants of financial sustainability of MFIs were statistically significant at 5% significance level. Thus, we could reject the null hypothesis that RE provides consistent estimates (see Table 4.4 below). The rejection of the null hypothesis i.e. the RE mode provides consistent estimates compared to FE model, led us to employ the fixed effect model to estimate the relationship between the dependant variable (FSS) and the independent variables listed in the regression model.

Table 4.4. Correlated Random Effects - Hausman Test

	Chi-Sq.		
Test Summary	Statistic	Chi-Sq. d.f.	Prob.
Cross-section random	16.080458	7	0.0244

Source Eviews 6 output

4.4. Findings on the Regression

This section presents the empirical findings from the econometric results on the factors affecting the financial sustainability of microfinance institutions in Ethiopia. The section covers the operational panel data regression model used and the results.

Operational Model: The specific or operational panel regression model used to study the determinants of financial sustainability was:

$$FSS = \beta_0 + \beta_1 * Par > 30 + \beta_2 * FRR + \beta_3 * PCR + \beta_4 * AGE + \beta_5 * ALB + \beta_6 * PWB + \beta_7 * BPLF + \varepsilon_{it}$$

Table4.5. Regression Results for Determinants of Financial Sustainability of Ethiopian Microfinance Institutions

Variables	Coefficient	Std. Error	-Statistic	Prob.
C	-1.273996	0.468660	-2.71837	0.0088***
FRR	2.549498	0.714858	3.566441	0.0008***
PCR	-0.447235	0.541022	-0.826647	0.0021***
BPLOF	0.167121	0.041388	4.037929	0.0002***
PWB	-0.248425	0.182294	-1.362767	0.1787
PAR	-1.848905	0.519299	-3.560390	0.0008***
ALB	0.162516	0.060884	2.669278	0.0101**
AGE	0.003481	0.011587	0.300473	0.7650
R-squared	0.655997			
Adjusted R-squared	0.607091			
F-statistic	17.50270			
Prob (F-statistic)	0.000000			
Durbin-Watson stat	2.075936			

***significant@ 1%

**significant@5%

Source: Eviews Output

4.6. Discussion of the Results and Conclusions

Financial Revenue Ratio and Average Loan Balance

The coefficient of the financial revenue ratio (FRR) is positive and statistically significant even at one per cent significance level. This confirms hypothesis No.1 and hence the argument that the higher the interest rates, the higher the chances of MFIs' attaining financial sustainability. Further, the fact that the coefficient is statistically significant indicates that MFIs should apply sufficiently high interest rates to generate financial revenue that lets them cover all their expenses while generating a profit to ensure their financial sustainability. The finding on the effects of interest rate (FRR) on the financial sustainability of MFIs confirms the findings by Conning (1999) that the financial sustainability is associated with higher interest rates. Higher profitability, however, could lead MFIs to selling larger size loans which is an indication of a mission drift.

The coefficient of average loan balance (ALB), an indicator of client outreach, is positive and statistically significant. This indicates that, microfinance profitability (financial sustainability) is associated with higher loan size. This finding confirms the claims in Morduch (2000) on mission drift where MFIs serve relatively non poor clients. The finding is also in line with Adongo and Stork (2006) that profitability relates to selling bigger loans. However, the finding contradicts the one by Cull *et al* (2007) that institutions that make smaller loans are not less profitable on average compared to those making bigger loans. This also provides evidence that profitability and the depth of outreach cannot be attained simultaneously. It also confirms the findings by Gonzalez (2007) and Gregoire and Tuya (2006) that larger loans are associated with higher cost

efficiency and, therefore, profitability.

The sustainability of microfinance depends on how much interest income they earn from their operations. The income depends on the amount of loan outstanding and the interest rate applied on it. The econometric result on the relationships between both interest rate and the amount of loan outstanding (measured by the average loan balance outstanding) indicate that both interest rate and outstanding loan are significantly affecting the financial sustainability. They both have positive coefficients and are strongly statistically significant at 1 percent significance level.

Portfolio-at-risk at 30 Days (Par>30)

The coefficient of the portfolio-at-risk at 30 days is negative, as expected, and statistically significant. This confirms our second hypothesis, namely that a significant reduction in the portfolio-at-risk at 30 days in the portfolio should have a positive impact on the MFI's financial sustainability. In other words, a high portfolio-at-risk would limit the revenue derived from microcredit operations and therefore decrease the amount of lendable funds.

This would lead to the rationing of credit and ultimately the inability to sustainably supply quality services to the clientele, and have a negative impact on MFIs' financial results and hence their financial sustainability. The negative value of the coefficient of -1.849 of the portfolio-at-risk, which is statistically significant at 1% significance level, clearly illustrates this problem.

The portfolio at risk (PAR) measure indicates how efficient an MFI is in making collections. The higher the PAR implies low repayment rates, an indication of inefficient MFI. The higher the PAR, the more inefficient the MFI will be and, therefore, the less financially sustainable. The econometric results indicate a negative relationship between PAR and financial sustainability. This shows that, the less efficient the MFI is (higher PAR) the less will be its financial sustainability.

Another adverse consequence of the inverse relation between financial self sustainability and the portfolio-at-risk is that a decrease in financial sustainability that leads to a rationing of credit hinders the MFI's ability to increase its client outreach, which results from the massification of microcredit intended to substantially reduce poverty.

Thus, adjustment measures must be taken because beyond this worrisome situation, persistent financial distress could lead to bankruptcy and consequently the cessation of the MFIs' activities.

Moreover, the coefficient of the portfolio-at-risk at 30 days is the second highest regression coefficient in absolute value. It shows that the portfolio-at-risk ($Par > 30$) is the most determining indicator of the financial sustainability of MFIs. This finding reinforces our second hypothesis, which states that a high quality credit portfolio is instrumental to the financial sustainability of MFIs. In other words, to be financially sustainable MFIs must undertake preventive risk management to build a quality credit portfolio. Accordingly, to increase their financial sustainability, MFIs must engage in risk management planning by assessing their capacity to anticipate problems of recovering

outstanding credit to prevent risks of perverse contagion among the borrowers. In a context of under-mobilization of savings and shrinkage of external financing possibilities, only a weak $Par > 30$ underlies the sustainability of MFI. This inevitably leads to a professionalization of MFIs as they must exhibit effective management of their credit risk.

Personnel Cost Ratio (PCR)

The coefficient of the personnel cost ratio (PCR) is negative as expected, and statistically significant at one percent (1%) significance level, which is compatible with the argument that *ceteris paribus*, the increase in personnel costs causes a decrease in financial sustainability. Accordingly, to attain sustainability, MFIs must significantly decrease personnel expenses. This can only be achieved by emphasizing employee training and financial motivations to augment productivity. In addition, they must put in place and thoughtfully use new technologies and efficient information systems to facilitate the attainment of financial sustainability.

Number of Borrowers per Loan Officer (BPLF)

The econometric result for NPLF shows positive and statistically significant relationships between financial sustainability and the number of borrowers per loan officer. That is, the higher the number of borrowers per loan officer, all things being equal, implies higher loan officer productivity, which affects the financial revenue in two ways. First, it would imply higher repayment rates, which improve the earnings, and second, low costs as a result of reduced default.

As it is shown in the regression results, the coefficient of the number of borrowers per loan officer (BPLF) is positive. This result is consistent with the argument that higher employee productivity is associated with a stronger likelihood of an MFI's attaining financial sustainability. Nonetheless, the low value of the coefficient, i.e.0.167, implies that gains in productivity are not proportionate with the increase in the number of loan officers, or simply that the increase in the number of borrowers is more proportionate with the increase in the number of loan officers. This result also indicates that beyond financial sustainability, MFIs are heavily inclined to grant microcredit to a large number of poor people to significantly increase the client outreach of their actions.

Age of MFIs (AGE)

The age refers to the period that an MFI has been in operation since its initial inception. Concerning this variable, the age of MFIs (AGE) coefficient is positive but not statistically significant. The positive relationship between age and financial sustainability implies that as MFIs mature, and thus acquire experience in their sector; they increase their likelihood of attaining financial sustainability. This can be explained by the fact that MFIs gradually improve their control over all operations related to issuance of microcredit. In other words, MFIs that have considerable experience in the microfinance sector have diligently applied credit risk management and general efficient management techniques to attain financial sustainability.

This result is in conformity with a number of studies. Studies indicate that the MFIs' age relates to their efficiency and growth in terms of outreach especially in the early years of operations (CGAP, 2009; Cull *et al*, 2007). Based on Micro-banking Bulletin data

(MBB), Robinson (2001) found that experienced microfinance institutions (those with age above six years) were 102 percent financially self sufficient. Those which were in 3 to 6 years of age were 86 percent financially self sufficient, while it was 69 percent for those in operation for less than 3 years. The findings by Robinson (2001) imply that the age of microfinance can affect its financial sustainability level. Robinson (2001) also reports that mature MFIs can achieve substantial outreach to the poor. Moreover, Bogan *et al* (2007) and Cull *et al* (2007) also found that the age of a microfinance institution relates to its financial sustainability.

Percentage of Women Borrowers (PWB)

The coefficient of the percentage of women (PWB) is negative and statistically non-significant. The negative relationship confirms our hypothesis. This result leads us to reject the commonly held notion that women are more industrious, more reliable and are better re-payers of microcredit than men. This belief is grounded in the argument that the majority of women are in the most disadvantaged margin of MFI operations, and that they consequently must be helped to launch activities that generate subsistence income for their families in order to directly reduce poverty. Moreover, given that women's activities tend to be small scale and intended to generate income to attain food self-sufficiency, and therefore are not conducive to the accumulation of wealth in the form of savings, it is quite understandable that the percentage of women borrowers has a negative impact on financial sustainability owing to possible repeated bankruptcies of these micro activities.

4.7. Summary of Actual Results and the Expected Ones

Table 4.6 below summarizes the comparison of the test result for determinants of financial sustainability of Ethiopian Microfinance Institutions with the hypothesized expectations. As shown in the table, the test result of the variables is consistent with the hypothesis formulated in the study

Table 4.6 Comparison of the Test Result with the Expectation

Variables	Expected Relationships between Dependent variable and the Independent variables	Actual Results
FRR	+	+
PCR	-	-
BPLF	+	+
PWB	-	-
ALB	+	+
PAR	-	-
AGE	+	+

Chapter Five

5.1. Summary and Implications of the Discussions and Conclusions Made

5.1.1. Summary

Microfinance is often portrayed in the literature as a mechanism that allows individuals excluded from the formal financial system to gain access to sources of financing, i.e. as a means of combating exclusion and poverty. Determining the most pertinent indicators of financial sustainability of MFIs was the main objective of this study. To attain this objective we began by reviewing the literature, and then identified indicators of financial sustainability that could apply to the empirical data. After collecting these data, we formed a basic sample of 12 MFIs operating throughout Ethiopia. The data cover six years period of operation (2004-2009). Subsequently, we processed and analyzed the data gathered to test our model and clarify the determinants of financial sustainability of MFIs in Ethiopia.

Due to the increasing interest in the long term sustainability for microfinance institutions, this study attempts to address one basic question: which factors influence the financial sustainability of microfinance institutions? An empirical approach to answer the question is used. Based on the sample taken, we find that the answer is given by different parameters

Based on the empirical evidence obtained from the econometric results in Chapter 4, we generally conclude that financial sustainability of microfinance institutions is highly affected by the interest rates applied on loan. Our results also show that the application of

sufficiently high interest rates that generate a profit, together with quality management that integrates good expense control, the application of effective banking practices and the implementation of an adequate information system are indispensable for financial sustainability of MFIs.

Among the other significant variables we find the influence of the indicator of portfolio performance (PAR > 30 days). Institutions with low PAR are in a better position because their repayment rates are higher and it also means a good repayment culture with no delays and prompt payments.

The results show that the quality of the credit portfolio resulting from good credit risk management is the determining factor in the financial sustainability of MFIs. In all our regressions, the variable Par>30 had the second highest coefficient in absolute value, thus confirming our hypothesis that credit risk management that ensures a quality portfolio is the determining factor of financial sustainability of MFIs. Further, our results show that the client outreach of microfinance programs i.e. average loan balance can affect the financial sustainability of MFIs even at 1% significance level. The age of MFIs and the percentage of women among the clientele do not significantly influence the MFIs' attainment of financial sustainability.

5.1.2. Implications of the Discussions and Conclusions Made

The discussions and conclusions made in the previous chapter imply that, to be financially sustainable, microfinance institutions in Ethiopia should first, charge interest rates high enough to enable them to cover not only the operating costs but also to cover for the possible losses as a result of loan default. This however, should be done with caution considering the impact of increasing the interest rate on repayment and breadth of outreach.

Regarding the average loan balance, selling higher volumes of loans alone may not improve financial sustainability. It should be accompanied by effective follow-ups to ensure higher repayment rates. This means, microfinance institutions should keep their yield from the gross portfolio higher, strive to keep low the portfolio-at-risk, all things equal, have high liquidity level to meet any outstanding obligations to support smooth running of the operations, ensure that staff productivity goes in hand with the increase in number of borrowers, and strive to operate at relatively lower operating costs.

To be financially sustainable MFIs need to undertake preventive risk management to build a quality credit portfolio. Accordingly, to increase their financial sustainability, MFIs must engage in risk management planning by assessing their capacity to anticipate problems of recovering outstanding credit to prevent risks of perverse contagion among the borrowers.

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APPENDECES

Appendix -I

Tests for the regression model

Heteroskedasticity Test: White

F-statistic	1.969656	Prob. F(35,36)	0.0232
Obs*R-squared	47.29969	Prob. Chi-Square(35)	0.0802
Scaled explained SS	57.20697	Prob. Chi-Square(35)	0.0103

Test Equation:

Dependent Variable: RESID^2

Method: Least Squares

Date: 02/23/12 Time: 04:19

Sample: 1 72

Included observations: 72

Variable	Coefficient	Std. Error	t-Statistic	Prob.
C	-4.288233	3.445258	-1.244677	0.2213
FRR	6.069752	5.634179	1.077309	0.2885
FRR^2	-4.400483	4.208339	-1.045658	0.3027
FRR*PCR	-8.626366	9.987104	-0.863751	0.3934
FRR*BPLF	-0.220404	0.479831	-0.459336	0.6488
FRR*PWB	-1.076107	2.018175	-0.533208	0.5972
FRR*ALB	-0.035546	0.736294	-0.048276	0.9618
FRR*PAR	-7.561405	9.613708	-0.786523	0.4367
FRR*AGE	-0.239142	0.125612	-1.903812	0.0650
PCR	31.81389	15.14936	2.100015	0.0428
PCR^2	-7.570609	9.842670	-0.769162	0.4468
PCR*BPLF	-0.505032	0.977461	-0.516678	0.6085
PCR*PWB	2.964185	2.997205	0.988983	0.3293
PCR*ALB	-4.129727	1.645040	-2.510411	0.0167
PCR*PAR	8.951176	13.25106	0.675507	0.5037
PCR*AGE	0.120882	0.205152	0.589231	0.5594
BPLF	0.092931	0.609056	0.152582	0.8796
BPLF^2	0.084989	0.039240	2.165869	0.0370
BPLF*PWB	0.170180	0.163041	1.043788	0.3035
BPLF*ALB	-0.183026	0.075448	-2.425845	0.0204
BPLF*PAR	-0.977472	0.780067	-1.253062	0.2183
BPLF*AGE	0.019053	0.012637	1.507643	0.1404
PWB	-1.149560	2.216765	-0.518575	0.6072
PWB^2	-0.525583	0.563303	-0.933039	0.3570
PWB*ALB	0.037224	0.313558	0.118714	0.9062
PWB*PAR	-2.355665	3.244689	-0.726006	0.4725
PWB*AGE	0.063217	0.045882	1.377823	0.1768
ALB	0.654811	0.903309	0.724902	0.4732
ALB^2	0.064500	0.064834	0.994856	0.3264
ALB*PAR	3.547066	0.942423	3.763773	0.0006
ALB*AGE	-0.046549	0.013120	-3.548046	0.0011
PAR	-16.01031	6.575368	-2.434893	0.0200
PAR^2	11.22531	4.298414	2.611500	0.0131
PAR*AGE	-0.360185	0.162934	-2.210625	0.0335

AGE	0.245930	0.130257	1.888035	0.0671
AGE^2	-0.000164	0.001925	-0.084950	0.9328
R-squared	0.656940	Mean dependent var		0.035373
Adjusted R-squared	0.323410	S.D. dependent var		0.062326
S.E. of regression	0.051266	Akaike info criterion		-2.796714
Sum squared resid	0.094616	Schwarz criterion		-1.658381
Log likelihood	136.6817	Hannan-Quinn criter.		-2.343540
F-statistic	1.969656	Durbin-Watson stat		1.807360
Prob(F-statistic)	0.023234			

Hausman Test for Random vs. Fixed Effects

Correlated Random Effects - Hausman Test

Equation: Untitled

Test cross-section random effects

Test Summary	Chi-Sq. Statistic	Chi-Sq. d.f.	Prob.
Cross-section random	16.080458	7	0.0244

Cross-section random effects test comparisons:

Variable	Fixed	Random	Var(Diff.)	Prob.
FRR	2.699492	2.108476	0.174749	0.1574
PCR	-0.548959	-1.154313	0.130461	0.0937
BPLF	0.165055	0.140067	0.000164	0.0511
PWB	-0.245778	-0.241436	0.008574	0.9626
ALB	0.160862	0.205026	0.000611	0.0740
PAR	-1.819879	-1.536959	0.070056	0.2851
AGE	0.003561	-0.004674	0.000019	0.0606

Cross-section random effects test equation:

Dependent Variable: FSS

Method: Panel Least Squares

Date: 02/23/12 Time: 05:01

Sample: 2004 2009

Periods included: 6

Cross-sections included: 12

Total panel (balanced) observations: 72

Variable	Coefficient	Std. Error	t-Statistic	Prob.
C	-1.270168	0.481561	-2.637606	0.0109
FRR	2.699492	0.685223	3.939579	0.0002
PCR	-0.548959	0.830609	-0.660912	0.5115
BPLF	0.165055	0.042481	3.885332	0.0003
PWB	-0.245778	0.189662	-1.295878	0.2006

ALB	0.160862	0.061315	2.623546	0.0113
PAR	-1.819879	0.553364	-3.288753	0.0018
AGE	0.003561	0.011875	0.299847	0.7655

Effects Specification

Cross-section fixed (dummy variables)

<i>R-squared</i>	0.855333	<i>Mean dependent var</i>	1.068167
<i>Adjusted R-squared</i>	0.806201	<i>S.D. dependent var</i>	0.291115
<i>S.E. of regression</i>	0.128157	<i>Akaike info criterion</i>	-1.049723
<i>Sum squared resid</i>	0.870479	<i>Schwarz criterion</i>	-0.448936
<i>Log likelihood</i>	56.79004	<i>Hannan-Quinn criter.</i>	-0.810548
<i>F-statistic</i>	17.40879	<i>Durbin-Watson stat</i>	2.073293
<i>Prob(F-statistic)</i>	0.000000		

Test results for the Hypotheses

Dependent Variable: FSR
Method: Panel Least Squares
Date: 02/08/12 Time: 05:12
Sample: 2004 2009
Periods included: 6
Cross-sections included: 12
Total panel (balanced) observations: 72

Variable	Coefficient	Std. Error	t-Statistic	Prob.
C	-1.273996	0.468660	-2.718379	0.0088
FRR	2.549498	0.714858	3.566441	0.0008
PCR	-0.447235	0.541022	-0.826647	0.0021
BPLOF	0.167121	0.041388	4.037929	0.0002
PWB	-0.248425	0.182294	-1.362767	0.1787
PAR	-1.848905	0.519299	-3.560390	0.0008
ALB	0.162516	0.060884	2.669278	0.0101
AGE	0.003481	0.011587	0.300473	0.7650

Effects Specification

Cross-section fixed (dummy variables)

<i>R-squared</i>	0.655997	<i>Mean dependent var</i>	1.068167
<i>Adjusted R-squared</i>	0.607091	<i>S.D. dependent var</i>	0.291115
<i>S.E. of regression</i>	0.127862	<i>Akaike info criterion</i>	-1.054326
<i>Sum squared resid</i>	0.866481	<i>Schwarz criterion</i>	-0.453540
<i>Log likelihood</i>	56.95575	<i>Hannan-Quinn criter.</i>	-0.815151
<i>F-statistic</i>	17.50270	<i>Durbin-Watson stat</i>	2.075936
<i>Prob(F-statistic)</i>	0.000000		
