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DETREMNENTS OF OPERATIONAL AND FINANCIAL SUSTAINABILITY OF THE MICRO FINANCE INSTITUTIONS (MFIs) in ETHIOPIA

BY

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Determinants of Financial and Operational Sustainability of Microfinance Institutions in Ethiopia

A Thesis submitted to Saint Mary University in partial Fulfillment of the requirements for the Degree of MBA in Accounting and Finance

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Statement of Declaration

I, Teninet Elias, declare that this study entitled “Determinants of Financial and Operational Sustainability of Microfinance Institutions in Ethiopia” is my own work. I have carried out independently the research work with the guidance and support of the research advisor. This study has not been submitted to any degree/diploma in this or any other institution. It is done in partial requirement of the MBA Degree in Accounting and Finance.

Teninet Elias:

Date: January 2020

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This is to certify that the thesis prepared by Teninet Elias, entitled: Determinants of Financial and Operational Sustainability of Microfinance Institutions in Ethiopia: An Empirical Evidence of Ethiopian Microfinance Institutions and submitted in partial fulfilment of the requirements for the Degree of Master of Business Administration in Accounting and Finance complies with the regulations of the university and meets the accepted standards with respect to originality and quality.

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Abstract

Poverty reduction and possible eradication is at the forefront of the development strategy of Ethiopia. Interventions through the delivery of microfinance services are considered as one of the policy instruments to eradicate poverty. The microfinance paradigms focus on reduction of poverty through improving access to finance and financial services to the poor. However, for sustainable poverty alleviation, the MFIs themselves should be operationally and financially sustainable. Given the relation between the well-being of the microfinance sector and the goal of poverty eradication, the purpose of this paper is to empirically investigate the determinants of operational and financial sustainability of microfinance institutions in Ethiopia where poverty is a serious problem. The study followed a quantitative research approach using a balanced panel data set of 110 observations from 10 MFIs over the period 2001-2012, excluding 2010 for which the researcher was unable to acquire data. The Study considers FSS and OSS as a proxy by taking more explanatory financial variables, Outreach and macroeconomic variables. Hence, this work is comprehensive on the determining factors for the sustainability of Ethiopian MFIs, by using proxies' financial self sufficiency and operational self-sufficiency. Therefore, it will help to unveil what was probably not unveiled in previous studies. The regression results reveal that macroeconomic variable Inflation rate and cost per borrower each affected MFIs' financial sustainability negatively and significantly. On the other hand, yield on gross loan portfolio and size of MFI positively affect sustainability and are significant. Deposit Mobilization, operating expense ratio and portfolio at risk are not statistically found to affect MFIs' financial self-sufficiency in Ethiopia. The econometric analysis also indicates that number of borrowers and average loan size per borrower positively and significantly affect the operational sustainability of MFIs in Ethiopia. For this particular study, debt to equity ratio and cost per borrower are found to be strongly and negatively affect the operational self-sufficiency of MFIs. On the other hand, the variables return on equity, loan per loan officer and percentage of female borrowers of MFIs are insignificant. Lastly this study found that MFIs in Ethiopia are operationally self-sufficient while they are not financially self-sufficient.

Key words: *FSS, OSS, Outreach, macroeconomic variables, Ethiopian MFIs*

Table of content

List of figures

List of Tables

List of Acronyms

AEMFI	Association of Ethiopian Microfinance Institutions
CPB	Cost per Borrower
CGAP	Consultative Group to Assist the Poor
DER	Debt to Equity Ratio
DLR	Deposit to loan ratio
DM	Deposit Mobilization
DW	Durbin Watson
FINCA	Foundation for International Community Assistance
FSS	Financial Self Sufficiency
GDP	Growth Domestic Product
INF	Inflation
MF	Microfinance
MFI	Microfinance institutions
MIX	Microfinance Information Exchange
NBE	The National Bank Of Ethiopia
NGO	Non-Governmental Organizations
OSS	Operational self-sufficiency
PAR	Portfolio at Risk
ROA	Return on Asset
ROE	Return on Equity
SDI	Subsidy Dependence
SNNP	Southern Nation and Nationalities People

Chapter One

1. Introduction

This chapter deals with the introductory part of the study. It includes: background information, statement of the problem, research hypotheses, objectives, significance, scope, limitation, conceptual framework and organization of the study.

1.1. Background of the study

A microfinance institution is an organization that offers financial services to low income populations. It gives loans to their members, and many offer insurance, deposit and other services. Microfinance is increasingly being considered as one of the most effective tools of reducing poverty. It has a significant role in bridging the gap between the formal financial institutions and the rural poor (Basu and Woller, 2004)

Microfinance institutions play a significant role in alleviating poverty in a country where the society has no or limited access to financial service provisions. Because of these and other important missions, they have attracted the attentions of different institutions especially donors which have missions to end poverty in the world. Donors and institutions want to evaluate the performance of an MFI weather they reach the poor society and are working towards achieving the mission for which they are established for. These institutions, to continue serving the poor societies, their profitability and sustainability should be measured, because they need to be operationally and financially sustainable. Among the available measures, operational self-sufficiency and financial self-sufficiency are the major profitability and sustainability measurement variables (Melkamu 2012).

Financial services generally include savings and credit; however, some micro-finance organizations also do provide insurance and payment services. The term microfinance could be defined as not simply banking; rather it involves making financial resources available to the productive poor. It must be pointed out that for microfinance to perform a creditable function as a poverty reduction and development tool, governance is of critical importance.

One of the main objectives of financial institutions is mobilizing resources especially, domestic saving and channeling them to be investors. This intermediation role of financial institutions takes different forms in different economic systems. Microfinance has become an important tool for poverty reduction in many parts of the world. Microfinance institutions (MFIs) target the poor through innovative approaches which include group lending, progressive lending, regular repayment schedules, and collateral substitutes (Kimando, et.al., 2012).While many factors contribute to poverty, its most obvious manifestation is insufficient household income. Increasing the access of poor households to microfinance is therefore being actively pursued worldwide.

Ethiopia is one of the poorest and most underdeveloped countries of the world. With more than 100 million residents, it has one of the largest populations in Sub Saharan Africa. Its economy is largely based on agriculture, productivity is generally very low. Because of this the numbers of poor in the country are very high. Ethiopia's formal financial sector is still underdeveloped and these institutions do not reach the urban poor, and even less the poor in rural areas. Commercial banks consider them as un-bankable due to their lack of collateral and information irregularities, so it is the microfinance institutions that provide them with small and short term loans, Ganka (2008).

Micro-finance is one of the ways of building the capacities of the poor who are often neglected by commercial banks and other lending institution and graduating them to sustainable self-employment activities by providing them financial services like credit, savings and technical support services. Microfinance institutions which encompass a wide range of financial service providers that vary in legal structure, mission, and methodology offer these financial services to clients who do not have access to mainstream banks or other formal financial service providers. Melkamu (2012), explained in his dissertation that, Microfinance institutions play a significant role in alleviating poverty in a country where the society has no or limited access to financial service provisions. Because of these and other important missions, they have attracted the attentions of different institutions especially donors which have missions to end poverty in the world. Donors and institutions want to evaluate the performance of an MFI weather they reach the poor society and are working towards achieving the mission for which they are established for. The MFIs need to be both operationally and financially sustainable in order to continue serving the society. Among the available measures, financial self-sufficiency and operational self-

sufficiency are the predominant profitability and sustainability measurement variables. This has been needed because mostly microfinance institutions rely on the funds which are obtained from donors (Melkamu, 2012). Sustainability refers to the ability to continue any given activity into the future within the likely existing resources of an organization, as part of its ongoing budgetary and management processes (Kimando, et al., 2012). Accordingly MFIs must struggle to have good financial and operational performance so that they can play a major role in the poverty reduction while achieving their primary objectives. Therefore, this study focuses on the determinants of financial and operational sustainability of microfinance institutions in Ethiopia.

1.2. **Statement of the Problem**

Several number of practical studies have led the experts to believe that the microfinance programs in various countries are playing significant role in changing the lives of the poor people by smoothing their consumption. The forefront objective of the development strategy of Africa is poverty reduction and elimination (Tilahun, 2013). Limited access to credit by the poor has been identified as one of the factors contributing to poverty. Microfinance institutions help in reducing poverty by providing the poor with sustainable credit facility to start a small business. Empirical evidence establishes that less than 15 percent of the population in developing countries has access to the mainstream financial services (Aryeetey, 1995); (Tilahun, 2013). The microfinance sector, apart from being a critical component of the financial system, is also regarded as a poverty reduction strategy for developing countries (Kyereboah-coleman, 2007).

Most of the MFIs in Ethiopia have mother NGOs, Government segment or subsidizers, as a source of fund (Ebisa Deribie, et al., (2013). What is the future of these MFIs when the donations and supports are completed? What is the future of these MFIs Finance plan?

A major problem facing MFIs is how to attain sustainability (operational and financial) (Shcreiner, 2000; Woller, 2000; Christian et al, 1995). Today many key players in the industry use sustainability as one core criteria to measure the financial and operational performance of MFIs besides the outreach and impact measures. This problem has attracted the attention of many researchers and as a result many strategies have been put to ensure that MFIs are sustainable (Shcreiner, 2000; Yaron, 1992). Moreover, different studies have also been conducted to

determine factors affecting the financial sustainability of MFIs using large and well developed MFIs in various countries. The level of significance of these factors in affecting the financial sustainability of MFIs, however, varies with studies. For instance, a study conducted by Cull et al., (2007) and Christen et al. (1995) showed that some of the determinants are found to be significant in one economy or applicable to a set of MFIs, some are not significant.

Along this line Randhawa and Gallardo (2003) posit that it does not seem likely that most MFIs will be able to sustain their operations without continued donor support for funding and technical assistance. This leaves the future of the microfinance institutions in doubt. Therefore an important question here is what should be done to make these MFIs sustainable and hence ensure sustainable provision of microfinance services and sustainable poverty reduction through outreach. The first step in doing this is to understand the factors affecting their operational and financial sustainability.

A large number of studies have been conducted to determine the factors affecting operational and financial sustainability of MFIs in many countries. However, the level of significance of these factors in affecting the operational and financial sustainability of MFIs varies with studies and countries. While some of the determinants are found to be significant in one country or economy or MFI, they may not be significant for others (Cull et al, 2007; Woller and Shcreiner 2002). One of the major problem MFIs facing is how to attain sustainability both financially and operationally. (Woller and Schreiner, 2002).

Tilahun (2013) research on the determinants of Financial Sustainability of Microfinance Institutions in East Africa, including Ethiopia, and he included Loan portfolio, size and management efficiency as significant determining factors for financial sustainability. This study clearly fails to include more determining factors for financial sustainability of MFIs in Ethiopia. A study made by Sileshi (2015) on determining factors for operational and financial self sufficiency of Ethiopian MFIs, he considered Yield, size, personnel productivity ratio, debt to equity ratio, cost per borrower, average loan per borrower and age of MFI as explanatory variables for the OSS. Yield, cost per borrower, liquidity ratio, number of active borrowers, operational expense ratio and age as the determining factors for FSS of MFIs in Ethiopia.

Other more empirical studies by Kereta in (2007), Asnakew (2012), Yirsaw (2008), Melkamu (2012), Yenesew (2014) and Sileshi (2015) have been done in various periods on different research topics of MFIs in Ethiopia. Most of these studies focused on MFI profitability, outreach and

sustainability with limited and internal explanatory variables and excluded the effect of macroeconomic variables and one of the outreach indicator, which is percentage of female borrowers.

Therefore, to the best knowledge of the researcher, even though tremendous has been undertaken on the sustainability, efficiency, performance development and other topics in relation to of MFIs in Ethiopia, there is no comprehensive study on the determining factors for the sustainability of Ethiopian MFIs, by using proxies' financial self sufficiency and operational self-sufficiency.

The applicability of the findings of other studies for Ethiopia is not indicated when most of the institutions are government and NGO supported. This study is aimed to narrow the knowledge gap about the significant financial determinant factors of sustainability of Ethiopian MFIs by considering FSS and OSS as a proxy and by taking more explanatory financial variables and outreach indicators and macroeconomic variables.

1.3. Objectives of the Study

1.3.1. General Objective

The main objective of this study is to determine factors affecting operational and financial sustainability of microfinance institutions in Ethiopia.

1.3.2. Specific Objectives

- To assess the operational and financial sustainability of the microfinance institutions in Ethiopia;
- To assess the effect of outreach of microfinance institutions on operational and financial sustainability
- To assess the effect of efficiency of microfinance institutions on operational and financial sustainability
- To list factors affecting the operational and financial sustainability of microfinance institutions in Ethiopia

1.4. Research Hypotheses

In Oder to achieve the objectives of the study, a number of hypotheses were tested regarding the determinants of financial and operational sustainability of Ethiopian MFIs based on different empirical research and theoretical review made. There are thirteen hypotheses to be tested which are:

H1: There is a significant positive relationship on the average loan size per borrower of microfinance institutions with operational self-sufficiency.

H2: There is a positive significant relationship between number of borrowers of microfinance institutions and operational self-sufficiency.

H3: There is a positive significant relationship between debt to equity ratio and operational self-sufficiency.

H4: There is a negative significant relationship between cost per borrower of microfinance institutions with operational self-sufficiency and financial self-sufficiency.

H5: Percentage of female borrowers is positively related to operational self-sufficiency.

H6: There is a significant positive relationship between average loan balance per borrower and operational self-sufficiency.

H7: Return on equity a microfinance institution is significantly and positively related to operational self-sufficiency.

H8: There is a positive significant relationship between yield on gross loan portfolio of microfinance institutions and financial self-sufficiency.

H9: There is a positive significant relationship between Size of MFI and financial self-sufficiency.

H10: There is a negative significant relationship between macroeconomic variable Inflation rate with financial self-sufficiency.

H11: Deposit Mobilization is positively related to financial self-sufficiency.

H12: There is a significant negative relationship between portfolio at risk and financial self-sufficiency.

H13: Operating expense ratio of a microfinance institution is significantly and negatively related to financial self-sufficiency.

1.5. Significance of the study

The definite impact of microfinance institutions on the socio-economic prosperity of the poor can only be maintained if the institutions can succeed in realizing a good financial and operational performance. Worldwide, operational and financial sustainability of microfinance institutions has been one of the topics that has recently caught the interest of many researchers due to their importance in sustaining microfinance institutions.

As has been argued, "unsustainable MFIs could help the poor now, but they will not help the poor in the future because MFIs will be gone" (Schreiner, 2000). In addition, it has been described that it is better not to have an MFI than to have unsustainable (Ganka, 2010). This shows how crucial the sustainability of MFIs is, and it is imperative to study the stimuli that affect the sustainability of MFIs and how MFIs can become sustainable.

Hence, the ways to make these MFIs sustainable must be investigated so that they ensure maintainable provision of microfinance services and continually contribute to the reduction of poverty. The first step, therefore, is to be aware of the factors that have an effect on their financial sustainability. This work will provide / determine the factors that affect the financial and operational sustainability of MFIs in Ethiopia, where poverty is wide and deep. Therefore, the findings of the study are expected to be substantial in the following way: ·

- ✓ The study will provide the MFI's management with list of variables that have to be given more emphasis/weight so that the institution become sustainable.
- ✓ The study will also help the regulatory bodies and various stakeholders be aware of the determining factors of MFIs performance and let them to make an informed decision in all aspects of their engagement.
- ✓ Will also provide a guide for further studies in the are

1.6. Delimitation/Scope of the Study

Any discussion about the performance of microfinance in alleviating global poverty should measure both financial success of the organization along with the success in reaching the poorest of the poor and improving the lives of the borrowers, and hopefully, through a multiplier effect, the lives of many others in the community. However, due to certain limitations like constraints of time and higher cost of gathering primary data from the users, for instance to measure the impact of microfinance institutions on the lives of the poor, this study only focuses on determining the factors affecting the financial and operational sustainability of Ethiopian MFI. It excludes the outreach and its impact on the lives of the poor, and also comparison of the financial performance with the global peers and within themselves from investigation.

1.7. Limitation of the study

This research has purely dependent on the secondary quantitative data to test the financial determinants of sustainability of MFIs in Ethiopia. However, this study would be stronger, if it was supported by additional qualitative factors that affect the sustainability of the microfinance institutions.

1.8. Structure of the Paper.

This paper is organized in to five chapters. The first chapter presents, the back ground of the study, statement of the problem, objectives of the study, significance of the study, delimitation and limitation of the study. The second chapter deals with details of related and important literatures used in the study. The third chapter will deal with the methodology in general. It presents the data collection mechanism, data analysis tool, operational definition for the variables used in this study and the expected effects of the explanatory variables on the sustainability. The fourth chapter will present analysis, findings and discussions. It presents all the findings of the study with their implications. Finally, the last chapter will attempt to generalize the findings and make certain recommendations.

Chapter Two

2. Literature Review

This Chapter is grouped into eight sections. The first two parts deal with the introduction or general overview of MFIs and history and development of MFIs. Then, on the next three parts; MF in Ethiopia, the performance measure of MF and sustainability in the case of Ethiopian MFIs has been discussed. Under the last two sections the empirical evidence with regard to the determinants of microfinance sustainability in Ethiopia and the gap in the research has been discussed in detail.

2.1. Theoretical Literature

Lack of access to credit is generally seen as one of the main reasons why many people in developing economies remain poor. Usually, the poor have no access to loans from the banking system, because they cannot put up acceptable collateral and/or because the costs for banks of screening and monitoring the activities of the poor, and of enforcing their contracts, are too high to make lending to this group profitably. Since the late 1970s, however, the poor in developing economies have increasingly gained access to small loans with the help of so-called microfinance programs.

The field of microfinance institutions (MFIs) is still a fairly recent topic in economic research. The most important finding in the world of finance did not come from the world of the rich or the relatively well-off. More important than the hedge fund or the liquid-yield option note was the finding that the poor can save, can borrow (can indeed decide on loans to fellow poor), and will certainly repay loans. This is the world of microfinance (R Srinivasan and M S Sriram, 2013). Lack of access to credit is generally seen as one of the main reasons why many people in developing economies remain poor. Usually, the poor have no access to loans from the banking system, because they cannot put up acceptable collateral and/or because the costs for banks of screening and monitoring the activities of the poor, and of enforcing their contracts, are too high to make lending to this group profitably. Since the late 1970s, however, the poor in developing economies have increasingly gained access to small loans with the help of so called microfinance programs (Robinson M. 2001).

The term microfinance is commonly used issues related to poverty alleviation, financial support to gender development, micro-entrepreneurs etc. There is, however, no statutory definition of micro finance. Different authors and organizations have defined Microfinance institutions in different ways. But the spirit of the definitions are usually the same in which microfinance refer to the provision of financial services primarily savings and credit to the poor and low income households that don't have access to commercial banks.

Robinson (2001) defines it as small scale financial services primarily credit and saving provided to people who operate small enterprises or micro-enterprises where goods are produced; repaired or sold, recycled, who farm or fish or herd, who provide services; who work for wage and commission; who gain income from renting out small amount of land, vehicles, draft animals, or machinery tools; and other individual and groups at the local level of developing countries both rural and urban area. MFs is the provision of financial services (generally saving and credit) to low income clients Arsyad (2005) and Legerwood (1999, p1).

Microfinance, according to Otero (1999) is "the provision of financial services to low income poor and very poor self-employed people". These financial services include savings and credit but can also include other financial services such as insurance and payment services Ledgerwood (1999). According to Schreiner and Colombet (2001) microfinance define as "the attempt to improve access to small deposits and small loans for poor households neglected by banks." So, microfinance is understood in this study as involving the provision of financial services such as savings, loans and insurance to poor people living in both rural & urban settings who are unable to obtain such services from the formal financial sector.

Even though microcredit and microfinance are always used interchangeably, the difference arise from the fact that microcredit only provides loans whereas microfinance has a broader meaning as it comprehends also other financial services in addition to the provision of credit such as saving, insurance, pension and payment services (Okiocredit, 2005) .The taskforce on supportive policy and Regulatory Framework for Microfinance has defined microfinance as "Provision of thrift, credit and other financial services and products of very small amounts to the poor in rural, semi-urban or urban areas for enabling them to raise their income levels and improve living standards". The term "Micro" literally means "small". But the task force has not defined any amount. At the meantime, the narrower definitions try to equate microfinance with microcredit, following early

practice of NGO credit schemes. As mentioned by (Degefe Duressa Obo, 2009) and as cited by Sileshi (2015), Microcredit is the provision of small loans to poor households and small business operators with or without guarantee.

The above definitions shown that the clients of microfinance institutions are poor or have lower incomes and often have limited access to other financial services, therefore microfinance products tend to be for smaller monetary amounts than traditional financial services. Definitely, their services not only provide micro credit service for those who have lower incomes but also include loans, savings, insurance, and remittances. Therefore, these varied needs, and because of the industry's focus on the poor, microfinance institutions often use non-traditional methodologies, such as group lending or other forms of collateral not employed by the formal financial sector especially by banks.

2.2 History of Microfinance

According to (Helms, 2006) Small, informal savings and credit groups have worked for centuries across the world, from Ghana to Mexico, India and beyond. In Europe, as early as the 15th century, the Catholic Church founded pawn shops as an alternative to usurious moneylenders. These pawn shops spread throughout the urban areas in Europe throughout the 15th century.

Armendáriz de Aghion, et al., (2004) indicated that, the modern expression of the term “micro financing" has roots in the 1970s when organizations, such as Grameen Bank of Bangladesh with the microfinance pioneer Muhammad Yunus, were starting and shaping the modern industry of micro financing. Through Grameen Bank, the modern microfinance pioneer, Yunus, was able to offer access to very small amounts of capital with no collateral requirements and at a very low interest rate, which was almost unheard of when the loan is provided to the poor. In the meantime, experimental programs in Bangladesh, Brazil and a few other countries extended tiny loans to groups of poor women to invest in micro businesses.

In the early 1990s the term “microcredit” was replaced by “microfinance” which included not only credits but also other financial services for poor people (Elia, M. 2006). The introduction of the term microfinance followed the success of many microcredit programs around the world and in 1997, during the first Microcredit Summit, 2,900 delegates from 137 countries representing around 1,500 organizations gathered in Washington, D.C. During that occasion, the birth of the global

industry of microfinance was officially recognized. Since then the focus started to change and the provision of credit was considered to be important, to the need of becoming financially sustainable through the provision of a complete range of financial products and to reach more people (Sisay, 2016).

2.3 Microfinance Institutions and their development in Ethiopia

After 1984/85 severe drought and famine, many NGOs begin to offer micro credit along with their relief activities even though this was on a limited scale and not in a sustained manner (Alemayehu, 2008). But, the micro-credit sector in Ethiopia has been strictly regulated since 1996. Following an assessment of revolving funds managed in the framework of NGO development projects, a piece of law was circulated with the aim of professionalizing the sector by reducing imprudent lending practices, lenient financial discipline and distortions due to unrealistic interest rates (Sisay, 2016). Formal microfinance in Ethiopia started in 1994/5. In particular, the Licensing and Supervision of Microfinance Institution Proclamation of the government during 1996 encouraged the spread of Microfinance Institutions in both rural and urban areas as it authorized them among other things, to legally accept deposits from the general public, to draw and accept drafts, and to manage funds for the micro financing business.

Following the beginning of formal micro-finance service in Ethiopia in 1994/5, the Licensing and Supervision of Microfinance Institution Proclamation of the government during 1996 encouraged the spread of Microfinance Institutions in both rural and urban areas as it authorized them among other things, to legally accept deposits from the general public (hence diversify sources of funds), to draw and accept drafts, and to manage funds for the micro financing business (Sisay 2016)

Although the development of microfinance institutions in Ethiopia started very recently, the industry has shown a remarkable growth in terms of outreach particularly in number of clients. Since the issuance of Proclamation 40/1996, which provides the establishment of microfinance institutions, thirty six microfinance institutions (MFIs) have been legally registered by the National Bank of Ethiopia (NBE) and started delivering services (Sileshi 2015).

The figures published by the AEMFI showed that as Ethiopia has more than 100 million inhabitants of which 30% are considered as economically active, the penetration rate of the sector is 7%. The main MFIs in the country are all linked to regional governments and represent 83% of

this figure. The sector is divided in three main types of organizations. Firstly, the large MFIs that are linked to the regional governments (Oromia, Amhara, Tigray and SNNP) and benefit from their support and they represent the most important players. Secondly, the mediums and thirdly, the fully private MFIs which are smaller in size and have often been created by NGOs implementing development projects. All of them belong to the AEMFI, a national professional association of MFIs. Since 2005, the federal government has been more flexible concerning the maximum amount of loans granted to a single borrower. A ceiling of 500 Euros had been initially fixed for normal loans and 20% of the aggregate disbursement may exceed this ceiling. The idea was to ensure that most of the customers indeed came from the poorest sectors of the population. This amount should now be raised in order to better meet the funding needs of small and medium enterprises and urban companies.

2.4. Performance Measure of Microfinance

Performance of an institution shall be measured not only from the objectives of the organization angel, but also from the industry average. Microfinance goal is to eradicate poverty. In the early days when MFI started, they were financed by donor funds that have a poverty eradication goal. As explained by (Sileshi, 2015), hence the performance of the MFI was measured on how much MFI reach to the poor (outreach) and impact (how far the lives of those who get financial services are changing as compared to those who don't get these services).

However, those days, the performance of microfinance institutions is being measured by different measures. For example Richard Rosenberg (CGAP) has indicated Core performance indicators of microfinance institutions written for staffs who design or monitor projects that fund microfinance institutions (MFIs). He offers basic tools to measure performance of microfinance institutions in a few core areas: Breadth of Outreach, number of clients being served, Depths of Outreach, poverty level of the clients, Collection performance: performance of an MFI in collecting its loans, Financial sustainability: profitability to maintain and expand services without continued injections of subsidized donor funds, Efficiency; performance in controlling the administrative costs. These are general are in which the performance should be considered and these can be further elaborated in detail based on Ledgerwood (1999) ways of measuring the performance of MFI. These are:

2.4.1 Financial Viability Indicators

Financial viability refers to the ability of the MFI to cover its costs with earned revenue. A financially viable MFI will not rely on donor funding to subsidize its operation. Common indicators here include financial spread, Operational Self Sustainability (OSS), Financial Self Sustainability (FSS) and Subsidy dependence index (Ledgerwood, 1999).

In addition, many authors mentioned that the common financial viability indicators used in past studies are Financial Self-Sufficiency (FSS), Operational Self-Sufficiency (OSS), and even the profitability ratios such as Return on Asset (ROA), Return on Equity (ROE). Transition to viability is from operationally unviable (unable to cover operational costs from operational revenues) to operationally viable (able to cover operational costs from operational revenues) to financially viable (able to cover operational costs without subsidy).

2.4.2 Profitability Indicators

These indicators measure the MFI net income in relation to the structure of its balance sheet. Common measures include Return on Equity, Return on Assets, and Return on Business. Most widely used indicators of Sustainability and Profitability includes: Operational self-sufficiency, financial self-sufficiency, Adjusted return on equity and Adjusted return on assets.

2.4.3 Portfolio quality indicator

Portfolio quality for MFIs are often measured by Portfolio at Risk (PaR), which measures the portion of the loan portfolio "contaminated" by arrears as a percentage of the total portfolio. A loan is considered to be at risk if the payment on it is more than 30 days late. In 14 addition to Portfolio at Risk, we can also use Write-Offs, Provision Expenses and Risk Coverage as portfolio quality indicators (Micro Rate & Inter American Development Bank, 2003).

2.4.4 Efficiency and Productivity ratio

To measure efficiency and productivity we can use Operating Expenses, Cost per Borrower, Personnel Productivity and Loan Officer Productivity as indicators (Micro Rate & Inter American Development Bank, 2003). The performance of an MFI can also be measured by the number of borrowers per staff. This is a ratio of borrowers to staff indicating staff productivity. All things

being equal the larger the number of borrowers a staff serves the higher will be his or her productivity (CGAP, 2003). The efficiency refers to the ability to produce maximum output at a given level of input, and it is the most effective way of delivering small loans to the very poor in microfinance context (Woller, 2000).

2.5 Perspectives of performance measure

The different perspective on which the MF performance is to be measured has created two opposing but having the same goals school of thought about the MF industry: the Welfarists and the Institutionists approach. The movement has come to be divided by two broad approaches, or opposing camps, regarding the best way to help the poor through access to financial services. Jonathan Morduch (1999): as sited by Sileshi , (2015) refers to this division as the microfinance rupture. The irony is that while the worldviews of each camp are not inherently incompatible, and in fact there are numerous microfinance institutions that appear to embrace them both, there nonetheless, exists a large rift between the two camps that makes communication between them difficult. Here under the ideologies of the two schools of thought are discussed.

2.5.1 Welfarist

Welfarists argue that MFIs can achieve sustainability without achieving financial sustainability. They contend that donations serve as a form of equity and as such donors can be viewed as social investors. As per the idea of Basu and Woller (2004), unlike private investors who purchase equity in publicly traded firm, social investors don't expect to earn monetary returns. Instead these donor investors realize a social intrinsic return.

Basu and Woller (2004), believes that Welfarists tend to emphasize poverty alleviation, place relatively greater weight on depth of outreach relative to breadth of outreach and gauge institutional success according to social metrics. This is not to say that neither breadth of outreach nor financial metrics matter. Welfarists feel these issues are important, but they are less willing than Institutionist to sacrifice depth of outreach to achieve them.

In general, Welfarists emphasize depth of outreach. They are quite explicit in their focus on immediately improving the well-being of participants. They are less interested in banking persons than in using financial services as a means to alleviate directly the worst effects of deep poverty

among participants and communities, even if some of these services require subsidies. Their objective tends to be self- employment of the poorer of the economically active poor, especially women, whose control of modest increases of income and savings is assumed to empower them to improve the conditions of life for themselves and their children. The center of attention is the "family." The most prominent examples of Welfarists institutions are the Grameen Bank in Bangladesh and its replicates elsewhere, and FINCA-style village banking programs in Latin America and, more recently, in Africa and Asia.

2.5.2 Institutionist

On the contrary, Institutionist argue that unless we build sustainable MFI that are capable of running independent of subsidies, the promise of MFI of eradicating world poverty will not be met. They argue that sustainable MFI helps to expand outreach and reach more poor people.

Hence even if the two schools of thought seem contradictory, they are actually not. Their goal is eradicating poverty. Their difference lies on how to go about it (the approaches to alleviate poverty). Welfarists say we have to target the very poor and profitability shall be secondary. They prefer to charge subsidized and low interest rates by relying on donor funds. On the other way round, institutionist argues that donor funds are unreliable and MFI must by themselves generate enough revenues to reach more poor people in the future. They favor marginally poor customer. They charge higher interest rates and focus on efficiency of MFIs to generate profit and reach more poor.

The debate between the two schools of thought is endless and today many players in the MF industry use both the Welfarists and Institutionist perspective to assess the performance of MFIs. For many years the MFI industry was operating with subsidy from donors and governments but there is now a pressure on these organizations to be financial sustainable. However, it seems that serving the poor and being financially self-sufficient seems contradictory. Various arguments are forwarded: the poor can't pay high interest rate, if the poor consume it has no collateral, there is big transaction cost in serving the poor. But these assumptions are falsified in the last 20 years and the poor is seen as capable of paying high interest as ROI of small projects are larger than large projects, the poor don’t consume the money rather use it for financing his/her business, transaction cost barriers are mitigated by the creation of group lending, absence of physical collateral is

mitigated by social capital. Hence contrary to the expectations the MFI industry has shown significant repayment rate although high repayment rates can't be translated into financial sustainability. However, there seem many unresolved problems. Many MFI can't reach a significant portion of the world poor; they can't be free from subsidies. Mixed results are read on the impact of the micro-credit on lives of the poor. Can we serve the poor but still financially self-sufficient? Is the MFI model correct? If so what are hindering them to achieve the targets set? What optimal solution is available for the MFI in reaching the poor and being financially self-sufficient?

2.6. Sustainability

Sustainability is loosely defined as the ability of a MFI to cover its operating and other costs from generated revenue and provide for profit. It is an indicator which shows how the MFI can run free of subsidies (Sileshi, 2015).

As mentioned by (Rao, 2001) and as cited by (Kimando, et al., 2012) in micro-finance, sustainability can be considered at several levels of institutional, group, and individual and can relate to organizational, managerial, and financial aspects. However, the issue of financial sustainability of microfinance institutions has attracted more attention in mainstream analysis for its contribution to poverty reduction. This change in emphasis has created a different perspective on the analysis of performance of the MFIs. Today many key plays in the industry use sustainability as one core criteria to evaluate the performance of MFI besides the outreach and impact measures described earlier.

Pollinger, Outhwaite, and CorderoGuzmán (2007) defined sustainability as the ability to cover annual budgets including grants, donations, and other fundraising. Sustainability is the way that a rural financial institution is sustainable if it is willing and able to provide self-reliantly and permanently financial services to the rural poor without external assistance or after assistance by donors or government has ended.

As mentioned by Meyer, (2012) and as cited by (Sileshi 2015), there are two kind of sustainability that we could observe in assessing MFIs sustainability: financial self-sufficiency and Operational self- sufficiency.

Financial self-sustainability is when MFIs can also cover the costs of funds and other forms of subsidies received when they are valued at market prices. It is measure by dividing business revenue excluding grants for operating expenses. One of the greatest challenges facing non-profit organizations in developing countries is that of obtaining critical funds to carry out the necessary activities to fulfil their mission. These challenges exist at the local or national, and the international level.

Operational self-sufficiency (OSS) requires MFIs to meet all administrative costs and loan losses from operating income. It is computed by dividing operating income by operating expenses. It is suggested, based on international experience, that successful MFIs should be able to achieve operational self-sufficiency within three to seven years. OSS is computed as the ratio of operating income to the sum of administrative expenses, loan losses and interest expenses. A firm is operationally sustainable if its OSS is 100% or more.

Thus, as mentioned by AEMFI, (2014),financial sustainability is MFIs' ability to cover all costs on adjusted bases and indicate its capability to operate without ongoing subsidies including soft and grants. The adjustment goes to inflation, loan loss provisioning and cost of capital. Meyer, (2012) believed that financial self-sufficiency is a high standard measure of sustainability and brings long term perspectives for MFI operations than operational self-sufficiency. According to him the poor needed to have access to financial service on long-term basis rather than just a one-time financial support. Microfinance is said to be an effective instrument discovered in 21st century to mitigate rural poverty in the world (Ramanaiah and Mangala, 2011).

2.7. Determinants of Sustainability

In the following section we will discuss on the research result on the variables that determines the sustainability (operational and financial) of microfinance institutions which are conducted by different researchers all around the world. Different studies by different authors, specifically on the determinants of financial sustainability, found different results developing empirical evidence for the independent variable that the researcher think may affect the operational and financial sustainability of microfinance institutions in Ethiopia.

2.7.1. Yield (Yield on Gross Loan portfolio)

Portfolio yield is a percentage that shows the average gross returns as a proportion of the portfolio outstanding. Generally speaking, Portfolio Yield is the initial indicator of an institution's ability to generate revenue with which to cover its financial and operating expenses. It measures how much the Microfinance Institution (MFI) actually received in interest payments from its clients during the period. It also provides an insight into portfolio quality. If the MFIs use cash accounting here, the Portfolio Yield will not include the accrued (interest and fee) income that delinquent loans should have generated, but did not. For Portfolio Yield to be meaningful, it must be understood in the context of the prevailing interest rate environment the MFI operates in.

The yield on gross loan portfolio (yield) indicates the efficiency of microfinance institutions in generating cash revenue from their outstanding portfolio. It measures all interest and fees charged on loans outstanding over a period (the measure of average interest rates on loans to customers).

In order to remain sustainable, Nadiya (2011) suggested MFI managers shall set the interest rates of the MFIs, such that it covers its total cost; comprising of cost of funds, transaction cost and default costs. Therefore, the sustainability of microfinance depends on how much interest income they earn from their operation.

The research finding by Cull (2005) indicates that the coefficient for real gross portfolio yield (the measure of average interest rates on loans to customers) is positive and significant across all three profitability indicators (financial self-sufficiency, operational sustainability, and return on assets), indicating that individual-based lenders tend to be more profitable when their average interest rates are higher. However, the same result indicates that the result does not hold true for village banks or solidarity group lenders. The yield coefficients for both types of lenders are insignificant (except for village banks in the ROA specifications) and negative. When summed, the coefficients for yield and the village bank yield interaction are not significantly different from zero. Thus, for village banks there is not a significant relationship between yields and profitability. The same pattern also holds for solidarity group lenders while the evidence indicates a strong positive association between interest rates and financial performance only for individual-based lenders.

The finding by Ganka (2010) indicates that there is a significant positive relationship between the yield on gross loan portfolio and financial sustainability. This provides evidence that the efficiency

of microfinance institutions in generating cash revenue will positively affect their financial sustainability. The econometric result on the relationships of both interest rate and the amount outstanding (measured by the average loan outstanding) indicates that both interest rate and outstanding loans are significantly affecting the financial sustainability. According to this study both variables are positively and statistically significant at 1 percent significance level.

A study by Rombrugghe, Tenikue and Sureda (2007) as sited for the purpose of this study indicates; the yield affects the financial self-sufficiency (FSS) of a microfinance institution. It has indicated that the relation between yield and FSS is immediate and positive through interest and fee revenues. On their research of determinants of financial self-sufficiency, Woller and Schreiner, have indicated that the real portfolio yield were robustly statistically significant in affecting the financial self-sufficiency of microfinance institutions.

Rombrugghe et al (2007) concluded that interest rates charged to borrowers affect the financial performance of microfinance institutions‟ overall sustainability (Financial self-sufficiency or Operational self-sufficiency) this is also supported by the study of Conning (1999) that the financial sustainability is associated with higher interest rate However, the result of a study by Cull (2005) shows that raising interest rate is associated with improved financial performance for individual-based lenders only.

Adongo and stork (2005) on their findings on Namibia‟s microfinance institutions, found that for the period captured by the dataset all the selected microfinance institutions in the report were financially unsustainable. The reason is, according to the study, they were not charging interest rates that were high enough to cover all financial and non-financial costs, and risks of their operations. From this we can conclude that, even though it is not supported statistically, interest rate is a major determinant for the financial self-sufficiency of microfinance institutions.

2.7.2. Portfolio at Risk (PAR)

The portfolio at risk (PAR) measures indicates how an MFI is efficient in making collections. The higher the PAR indicates low repayment rates, as indication of inefficient microfinance institution. The higher the PAR, the more inefficient the microfinance will be and, therefore, the less financially sustainable.

As per the econometric result by Ganka (2010) indicates, there is a negative relationship between PAR and financial sustainability of microfinance institutions. This shows that the less efficient the microfinance institution is (higher PAR) the less will be its financial sustainability.

2.7.3 Inflation (INF)

Inflationary environment displayed by double digit trends were reflected in MFIs performance indicators (AEMFI, 2009). The increased inflationary trends may have a negative effect by eroding the real value of MFIs' equity. And inflation will also indirectly affect the MFI by influencing the repayment levels. Studies show that repayment levels are usually weak and low in the presence of higher inflation rates (Weele K. V., & Markowich P., 2001).

2.7.4 Loan per loan officer (Prodvty)

Loan portfolio per loan officer measures the productivity of a loan officer in terms of number of active loans handled by him/her. The loan portfolio per loan officer is given by the number of active loans divided by number of loan officers. It is a combination of outreach and efficiency; it is often measured in terms of loan per loan officer. However, serving a loan client can be more labor intensive and costly than serving a depositor; because it implies a series of interviews and site visits before the loan can be disbursed. The higher number of loans per loan officer would indicate efficiency of MFI staff, as they comparatively handle more borrowers. Studies show that, Anne-Lucie et al. (2010) found that MFIs in Africa are among the most productive in terms of borrowers (143) per staff member compared with the global averages (139) borrower per staff member. According to CIDA (1999) as staff members gain experience, the ratio should increase to a standard which does not compromise quality of client relations per credit assessment and monitoring. All things being equal the larger loan per loan officer, the more efficient and productive the staff is considered to be. However, it should be remembered that too many loans per loan officer can decrease the overall efficiency and portfolio quality.

2.7.5 Deposit Mobilization (DM)

Deposit mobilization represented by deposits as a percent of loans measures the portion of the MFIs portfolio funded by deposits. The higher the ratio, the greater is the MFIs' capability to fund and execute its task from deposits. MFIs which can mobilize higher commercial sources (savings)

for financing their loan can acquire a cheaper source of funds than debts to finance their loans so that they can reduce the need of subsidies.

2.7.6 Return on Equity

Return on Equity indicates of how profitable a company is relative to its total equity. It is calculated by dividing net income after taxes and excluding any grants and donation by period equity. It gives us an idea as to how efficient management is in using its equity to generate earnings. Return on Equity is a measure of how well the institution uses all its equity and an overall measure of profitability reflecting both the profit margin and the efficiency of the institutions (Ledgerwood, 1999). Mohd et al (2014), have made a study on the determinants of performance and financial self-sustainability of Microfinance Institutions (MFIs) in Bangladesh. The study showed that ROE has a positive effect on Operational self-sufficiency. According to Wolday (2013), return on equity is the most common measure of profitability in banks and other commercial institutions. Rosenberg (2009) also stated that return on equity reflects that organizations' ability to deploy its equity profitably. Many scholars indicated that is an institution best in use of its equity to earn profit, and efficient it is said to be financially viable and operationally sustainable.

2.7.7 Number of Active Borrowers

Crombrugghe et al (2007), on their study confirms the fact that increasing the number of borrowers per MFI would lower the average operating cost and would raise total operating costs less than proportionately with the number of borrowers. This is a clear indication for an increasing the number of borrowers per field officer would raise the sustainability indicators in FSS and OSS. In the Indian context, according to these researchers, serving one more borrower costs nothing to the MFIs in the sample, but that offering larger loans to the MFIs borrowers could eventually raise costs more than profits.

They have also indicated on their finding that increasing the number of borrowers per field officer seems to be the most promising way to reduce costs, especially in group based delivery models. This would not hurt repayment despite a likely lightening of the monitoring. If scale economies can be found, it is thus primarily by extending the „width" of the coverage (number of borrowers),

not by abandoning the „depth" of the coverage, i.e. not by abandoning the focus on the poor. Therefore, the number of active borrowers influences the operational and financial sustainability of microfinance institutions positively according to this finding.

Another result by Mersland and Storm (2007), on the impact of the number of active borrowers indicates there is a notion that implies the existence of positive relationship between the active number of borrowers and the sustainability of microfinance institutions.

However, this has not been clearly indicated on the research finding by these researchers. However, the econometric result by Ganka (2010) indicated that the number of borrowers per staff was negatively related to financial sustainability of microfinance institutions. This indicated that an increase in the number of borrowers per staff affected negatively the financial sustainability of microfinance institutions in Tanzania. That is microfinance staff for rural MFI in Tanzania are not efficient, as a result they fail to manage the borrowers when their number grows causing the microfinance institutions to suffer poor repayment rates, and therefore, become less financially sustainable.

Therefore, based on these literatures it can be hypothesized that the number of active borrowers in an MFI has a positive and significant influence on both the operational and financial self-sufficiency of microfinance institutions.

2.7.8 Cost per Borrowers

The finding by Ganka (2010) indicates that there is a negative coefficient but statistically insignificant relationship between cost per borrowers and financial sustainability of microfinance institutions in Tanzania. The insignificant effect of the staff cost per borrower on the financial sustainability is contrary to the findings by Woller and Schreiner (2002) and Christen et al (1995) which shows that salary levels significantly determines financial sustainability of microfinance institutions. The finding by Cull et al also strengthen the significance effect of staff cost per borrowers on the financial sustainability of microfinance institutions. Based on these Ganka (2010) on his finding concluded that the higher staff pay, all things remain constant, could lead them to more leisure than in doing more work for the MFIs" main business especial where facilitation for field visit is very low. This can also help to explain why possibly the administrative expenses are positively related with financial sustainability.

2.7.9 Operating Expense Ratio

The operating expense ratio is the ratio of total operating cost to outstanding loan portfolio. The lower the ratio, all things being equal, will imply efficiency. According to the finding of Ganka (2010) the operating expenses ratio strongly affects the financial sustainability of microfinance institutions. The econometric result of this finding shows that the coefficient for the variable is negative and statistically significant at 1 percent significance level. This indicates that, the more MFIs are efficient in reducing operating costs at a given level of outstanding loan portfolio, the more profitable they become and, therefore, financially sustainable.

On his research of the determinants of operational self-sufficiency of microfinance institutions in Sri Lanka, Dissanayake (2012) stated that there is strong significant negative correlation in Operating Expense Ratio to Operational Self Sufficiency Ratio. This indicates that, change in Operating Expense Ratio, is negatively contributing towards changes in Operational Self Sufficiency Ratio significantly. The 38 finding of the research concludes that the Operating Expense ratio is a statistically significant predictor variable in determining operational self sufficiency of the Sri Lankan microfinance institutions.

2.7.10 Average Disbursed Loan Size (Depth of outreach)

The average loan size (defined as the average gross loan portfolio divided by the number of active borrowers) is a proxy for depth of outreach. Smaller loans are generally taken to indicate greater depth of outreach. This variable measures the efficiency of microfinance institutions in selling loans.

Adongo and Stork (2006) found that profitability is related to selling bigger loans. The finding by Ganka (2010) indicates that the coefficient for the average loan size is positive and statistically significant. The finding concludes that microfinance profitability is associated with higher loan size. The finding also added that the amount of outstanding loan improves financial sustainability more that the interest rate. The findings by Gonzalez (2007) and Gregoire and Tuya (2006) concluded that larger loans are associated with higher cost efficiency and, therefore, profitability.

However, the above two findings contradict with that of Cull et al (2007) for which the finding indicates that institutions that makes smaller loans are not less profitable on average compared to

those making bigger loans. Not only this, but also in his 2005 study he concluded the same indicating the average loan size variable are not strongly linked to the financial performance indicators. Even institutions that make smaller loans are not less profitable on average as compared to those making higher loans.

The study by Nadiya (2011) on the relationship of the average loan size and Operational self-sufficiency indicates a negative relationship between the two but statistically significant. This variable is considered to see if Indian MFIs are improving their sustainability levels by increasing their loan size, however, the negative relationship shows that poorer the clientele better the sustainability.

The finding by Rombrugghe et al (2007) shows the size of loans or average loan per borrower affects financial self-sufficiency (FSS) of microfinance institutions. Woller and Schreiner found that depth of outreach is inversely associated with financial selfsufficiency. Perhaps the most notable finding was that depth of outreach, as peroxide by the average loan to GNP per capita, is inversely associated with financial selfsufficiency. This finding demonstrates that among poverty lenders, deep outreach and financial self-sufficiency can be complementary, assuming the adoption of appropriate policies.

2.7.11 Size of an MFI

Another factor that can affect the financial performance of an MFI is its size. The size of an MFI is measured by the value of its assets (Mersland and storm, 2009; Hermes et al, 2008; Mersland and storm, 2008; Bogan et al, 2007; Hartarska, 2005). According to Cull et al (2007) the size of an MFI is significantly positively linked to its financial performance. He also concluded the same in his research of 2005, that an institutions size is significantly positively linked to financial performance across all three indicators, meaning that financial self-sufficiency (FSS), operational selfsufficiency (OSS).

While Hartarska (2005) found that the size of an MFI did not significantly affect its financial sustainability, recent studies by Mersland and storm (2009) and Bogan et al (2007) have reported that the size of an MFI is associated with its financial sustainability. Furthermore, the size of microfinance could also imply that large microfinance institutions have large capital and, therefore, can reach a relatively bigger number of clients than small microfinance institutions. A

study by KyereboahColeman and Osie (2008) supports this. In their study on outreach and profitability of microfinance institutions in Ghana Kyereboah et al (2008) found that the size of an MFI had a significant positive impact on profitability.

Ganka (2010) found that the size of an MFI significantly affects its financial sustainability in opposed to the study conducted by Hartarska et al (2005). But it is in line with that of Mersland and storm (2009); Bogan et al (2007); Cull et al (2007); and Robinson (2001).

Rombrugghe et al (2007) confirm this by adding beyond the size of the loans, the size of the MFI itself may matter the size of the MFIs can be measured by the total value of the portfolio or its average value over a year, or by the number of borrowers or of members. Economies of scale can occur through the size of the portfolio or through the number of active customers or both. If they occur mainly at the portfolio level, this will be captured by the size of the loans.

With regard to operational sustainability, Hartarska and Nadolnyak (2007) examine operational-self-sufficiency and find positive significant impacts from the size of the MFI. This study investigates the effect of the size of an MFI on its financial sustainability (FSS) and operational sustainability (OSS).

2.7.12 Debt to Equity Ratio

The composition of the various source of capital to an MFI is known as capital structure (Bodie et al 2009; Brealey eta al 2006; Martin et al 1991; Puxty et al 1990). That is, the different source of capital makes a capital structure of an MFI. This can be debt/equity (leverage).

There are different sources of capital from which an MFI may tap. According to Bogan et al (2007); Fehr and Hishigsuren (2006); Kyereboah et al (2007); Farrinton and Abraham (2002); and Woller and Schriener (2002), these includes loans, savings, deposits, and shares. Woller and schriener (2002) Perceived savings to be a more stable source of long-term than donation and, that its demand exceeds that of loan.

Studies have been conducted to explain whether the capital structure determines the sustainability of microfinance institutions. Kyereboah Coleman (2007) for example, found that highly leveraged microfinance institutions have higher ability to deal with moral hazards and adverse selection than their counterparts with lower leveraged ratio. This states that high leverage and profitability are

positively correlated. Bogan et al (2007) conducted a study to ascertain whether capital structure affects the financial sustainability of an MFI. They found that microfinance institutions‟ capital structure were associated with their financial sustainability.

The study by Ganka (2010) indicates that there is a positive correlation coefficient between the capital structure and financial sustainability of microfinance institutions. The more an MFI is equity financed compared to other sources of finance, the more the improvements in its sustainability in other words, although how the capital has been structured affects the financial sustainability (Bogan et al, 2007) having different source of capital does not improve the financial sustainability of microfinance institutions.

The results of a study by Hartarska and Nadolnyak (2007) show that financial performance is affected by the capital ratio, less leveraged MFIs have better operational self-sufficiency (OSS), perhaps, suggesting a link between donors' willingness to provide equity to MFIs that do well and prefer to extend loans to those MFIs that slack off. Thus, the result conforms to the notions that MFIs with bigger endowments would be more efficient because they do not need to adjust their mission in order to get additional capital. The research result by Dissanayake (2012) states that, there is strong significant negative correlation in Debt/Equity Ratio (capital structure) to Operational Self Sufficiency Ratio. This indicates that, change in Debt/Equity Ratio (capital structure) is negatively contributing towards changes in to Operational Self Sufficiency Ratio significantly. In conclusion the researched postulate Debt/Equity is a statistically significant predictor variable in determining operational self-sufficiency and the correlation value between the variables indicates that, the change in the capital structure, negatively contribute towards changes in the operational self-sufficiency significantly. With this finding in mind, this study seeks to analyze the relationship between capital structure and financial sustainability of microfinance institutions in Ethiopia.

2.7.13 Percentage of Female Borrowers

The Percentage of female borrowers, which is a measure of ratio of female clients to total clients. The MFI literature suggests that female clients relate to higher repayment rate (Makombbe et al 2005; Kabeer 2001) and therefore operational sustainability. Various studies (Makombbe et al

2005; Kabeer 2001) tends to suggest that female clients are positively related to operational sustainability.

2.8 Empirical studies and research gap in Ethiopia

The Ethiopian microfinance sector is characterized by its rapid growth, an aggressive drive to achieve scale, a broad geographic coverage, a dominance of government backed Microfinance Institutions (MFIs), an emphasis on rural households, the promotion of both credit and savings products, a strong focus on sustainability and by the fact that the sector is Ethiopian owned and driven (Ebisa et al. 2013).Therefore, most large and medium MFI in Ethiopia are attached and supported by the regional government as well as national and international NGOs. The question is what is the future of these MFIs when the donations and supports are over? Regarding this concept and issue, Randhawa and Gallardo (2003) posit that it does not seem likely that most MFIs will be able to sustain their operations without continued donor support for funding and technical assistance.

This leaves the future of the microfinance institutions in uncertainty. Thus an important question here is what should be done to make these MFIs sustainable and hence ensure sustainable provision of microfinance services and sustainable poverty reduction through outreach. The first step in doing this is to understand the factors affecting their operational and financial sustainability (Sileshi, 2015).

Several studies have been conducted to determine the factors affecting financial and operational sustainability of MFIs in different countries. However, the level of significance of these factors in affecting the operational and financial sustainability of MFIs varies with studies and countries. While some of the determinants are found to be significant in one country or economy or MFI, they may not be significant for others (Cull et al, 2007; Woller and Shcreiner 2002; Christian et al, 1995).

Even though, the topics, scopes, comprehensiveness and depth vary, of Empirical studies have been conducted in Ethiopia in relation to the microfinance industry. To mention few of the researches conducted on the area of MFIs,: Tilahun (2013) has done his research on the determinants of Financial Sustainability of Microfinance Institutions in East Africa, by including the Ethiopia, and he included Loan portfolio, size and management efficiency as significant

determining factors for financial sustainability of East African MFIs including Ethiopia. This study clearly fails to include more determining factors for financial sustainability of MFIs in Ethiopia.

A study made by Sileshi (2015) on determining factors for operational and financial self-sufficiency of Ethiopian MFIs, he considered Yield, size, personnel productivity ratio, debt to equity ratio, cost per borrower, average loan per borrower and age of MFI as explanatory variables for the OSS. Yield, cost per borrower, liquidity ratio, number of active borrowers, operational expense ratio and age as the determining factors for FSS of MFIs in Ethiopia. The study found that average loan balance per borrower, size of a MFI, cost per borrowers and yield on gross loan portfolio affects the operational sustainability of Ethiopian MFIs significantly and cost per borrower, number of active borrowers and yield on gross loan portfolio affect their financial sustainability.

Other more empirical studies by Kereta in (2007), Asnakew (2012), Yirsaw (2008), Melkamu (2012) , Yenesew (2014) and Sileshi (2015) have been done in various periods on different research topics of MFIs in Ethiopia. Even though, few exceptions exist, most of these studies focused on MFI profitability, outreach and sustainability with limited explanatory variables and by excluding the effect of macroeconomic variables on Ethiopian MFIs sustainability.

Kereta (2007) studied the industry's outreach and financial performance using descriptive analysis, using graphs and percentage growth rates. The result of his study showed that in terms of breadth of outreach. The same study noted that MFIs are operationally sustainable as measured by ROA and ROE and the industry's profit performance is improving 38 overtime. The use of these proxies (ROA and ROE) by Kereta (2007) and others for sustainability measurement were contrary to earlier studies made on MFIs sustainability such as, Mohd (2014);Gibson (2012); Bogan (2009); Kimando et al.(2012); Rahman & Mazlan(2014) and other scholars who used financial self-sufficiency , and operational selfsufficiency ratios which are described as adjusted revenues as a percent of adjusted expenses and the ratio of financial revenue as financial expense, impairment expenses and all other operating expenses respectively better explains financial sustainability of MFIs than ROE and ROA due to their long term perspective in measurement of sustainability.

Yenesew (2014) studied determinants of financial performance on selected micro finance institutions in Ethiopia and tried to incorporate different variables from different perspective which is wider analysis of the MFIs performance than the earlier ones. But, the research mainly focused

on profitability rather than sustainability by taking ROA as a dependent variable which is contrary to proxies used by many researchers as mentioned above.

Sileshi (2015) has excellent analysis of MFIs by using proxy of financial and operational sustainability, however he entirely focused on internal factors such as loan size and number of active borrowers leaving crucial variables in the case of Ethiopia such the influence as of some components of MFIs' funding sources (subsidies) and the number of borrowers and the impact of macroeconomic variables such as GDP and inflation.

Therefore, to the best knowledge of the researcher, even though tremendous has been undertaken on the sustainability, efficiency, performance development and other topics in relation to of MFIs in Ethiopia, there is no comprehensive study on the determining financial factors for the sustainability of Ethiopian MFIs, by using proxies' financial self sufficiency and operational self-sufficiency. As described by various parts of this research and explained by many researchers, the researcher uses OSS and FSS to measure the sustainability of Ethiopian MFIs, and used YGLP, OER, CPB, INF, DM, PAR, and SIZE as independent explanatory variable for FSS. On the other hand, the researcher considered DER, CPB, BREADTH, DEPTH, PFEMB, PRODVTY and RE as explanatory variables for OSS. Therefore, this study is aimed to narrow the knowledge gap about the significant financial determinant factors of sustainability of Ethiopian microfinance institutions by considering FSS and OSS as a proxy and by taking more explanatory financial variables and macroeconomic variables.

2.9 Conceptual Framework of MFIs sustainability

The Ethiopian microfinance sector is characterized by its rapid growth, an aggressive drive to achieve scale, a broad geographic coverage, a dominance of government backed Microfinance Institutions (MFIs), an emphasis on rural households, the promotion of both credit and savings products, a strong focus on sustainability and by the fact that the sector is Ethiopian owned and driven (Ebisa, 2013). There has been a recent paradigm shift in the micro-credit industry, from subsidized credit delivery programs to financially self-sufficient institutions providing commercial microfinance. Therefore, given the broad role and objectives of MFIs, the MFIs themselves should exist sustainably. As a result, in order to eradicate poverty, microfinance institutions should be sustainable. On the other hand, to achieve sustainability, they should identify those factors

contributing to their sustainability. Therefore, the following conceptual framework will help the MFIs to understand on the financial determining areas for their sustainability.

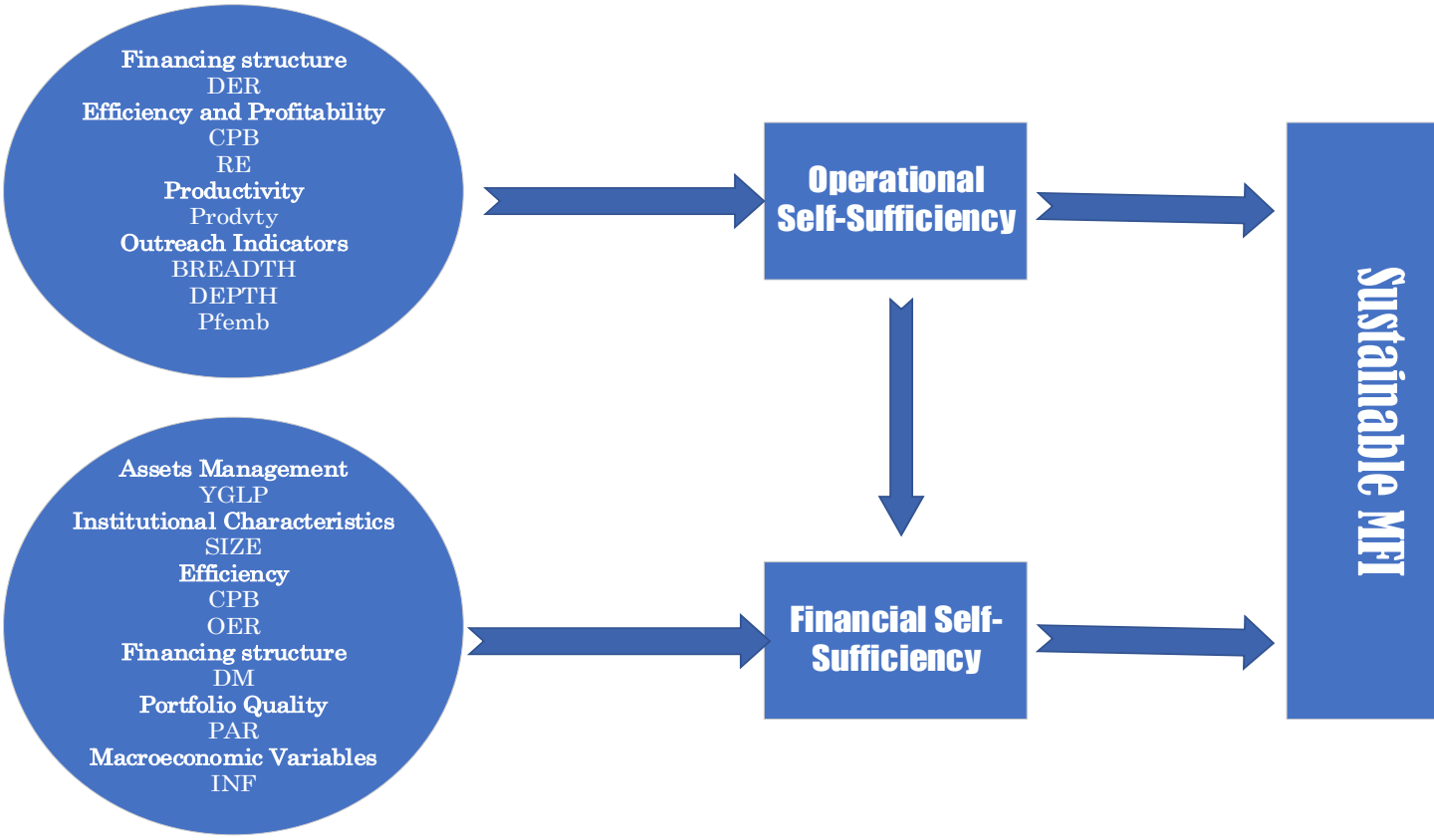

Figure 2.1 Conceptual framework of the study

Source: From the researcher and Ganka (2010)

Chapter Three

3. Research design and methodology

This chapter deals with the type of research, research design, target population, the sample size and sampling technique, data source and methods of collection. It starts with a description the research design used and followed by research methodologies. Then lastly variables definition, model specification and presents the econometric analysis approaches used for the regression.

3.1 Research type and design

As it is mentioned and clearly noted, the objective of this study is to provide factors affecting the financial and operational sustainability of Ethiopian MFIs. Since data is generated from large samples to check applicability of currently available theory by means of statistical analysis, the researcher used the quantitative research approach. Hence with the aim of assessing factors affecting the financial and operational sustainability, this study is a quantitative research by its nature.

10 MFIs that have a complete data from 2001 onwards up to 2012 have been selected. Therefore, based on the sample size and the time coverage, the sample consists of 110 observations.

The nature of data used in this study enables the researcher to use panel data model which is deemed to have advantages over cross section and time series data methodology. It involves the pooling of observations on a cross-section of units over several time periods. A panel data approach is more useful than either cross-section or time-series data alone. As Brook (2008) states the advantages of using the panel data set; first it can deal with a broader range of problems and solve more complex problems. Besides, by combining cross-sectional and time series data, one can increase the number of degrees of freedom, and thus the power of the test. It can also help to mitigate problems of multicollinearity among explanatory variables that may arise if time series are modeled individually. Moreover, repeated cross section of observations with a range of years is of a better fit to study the dynamic of change of variables, detect and measure effects that are simply difficult to be observed in pure crosssection or pure time series data.

3.2 Research methodology

To weigh the significant determining factors of financial and operational sustainability of Ethiopian MFIs, a multiple regression models have been employed. Operational Self-Sufficiency and Financial Self-Sufficiency ratios have been used as the dependent variables to gage the self-sufficiency (sustainability) of microfinance institutions in Ethiopia.

To be consistent with former investigations and establish the finding in the Ethiopian context and to carryout comparison of results with past empirical studies of different countries, measures affecting determinants of financial and operational sustainability were taken by going through former researches. This work develops on previous studies (Kyereboah and Osei, K. 2008, Ganka, D. 2010, A., Woller G. and Schreiner M. 2002, Tilahun A. 2013, Sileshi M. 2015) methodology that analyzed some aspects of financial sustainability of MFIs using multiple regression. Hence, the researcher extracted various predictor or explanatory and independent variables from different studies to determine the financial and operational sustainability of MFIs in Ethiopia. Therefore, by including and adding more variables and using relatively large number of observations the study is more likely to add the explanatory ability of the equations/ the models.

Consequently, seven predictor /independent or explanatory variables, namely; yield on gross portfolio, operating expense ratio, size of MFI, cost per borrower, deposit mobilization ratio, rate of inflation of Ethiopia and portfolio at risk ratio of MFIs have been used in the model to measure and predict the financial self-sufficiency of MFIs in Ethiopia. On the other hand, in order to measure the operational self-sufficiency predictor variables, seven independent explanatory variables namely: debt to equity ratio (DER), number of borrowers of an MFI (BREADTH), cost per borrower (CPB), average loan size per average borrower (DEAPTH), loan per loan officer (Prodvty), percentage of female borrowers (Pfemb) and return on equity ratio (RE) of an MFI has been considered.

3.3 Data type and Source

Since most MFIs do not have organized information before 2001, after 2012 and 2010 the data used for this work is purely secondary taken from the national bank of Ethiopia, MIX Market

website and from annual reports of the Association of Ethiopian Micro Finance Institutions (AEMFI) over the period of 2001-2012, excluding 2010.

3.4 Target Population

As per the National Bank of Ethiopia database, there are nearly 30 MFIs in Ethiopia. In view of that, the target population taken into consideration for this research is all the 30 microfinance institutions, which are providing the microfinance service currently.

3.5 Sample size and sample selection

A sample of a subject is taken from the total population to make inference about the population because it is time consuming and expensive to collect data about every individual institution in the population. However, the sample can still be used to make inferences about the population, where only the chosen sample can reliably represent the population (Collis and Hossey, 2013).

The main criteria used by the researcher for choosing among the MFIs were based on three factors. The first was the availability and quality of data for the time period of 11 years (2001-2012), second priority was to have representation for generalizability and the last but not least was samples taken should be representative to all microfinance institutions in Ethiopia given their size geographical location and age. Form the total of 30 MFI in Ethiopia; around 22 MFIs makes financial reports to the mix-market. But, these data for the 22 MFIs were incomplete and 12 of them did not report the full report starting from 2001. Based on this, 10 MFIs that have a complete data from 2001 onwards have been selected. Therefore, based on the sample size and the time coverage, the sample consists of 110 observations.

The data were provided by the "Mix Market" web site which is known as the Microfinance Information Exchange (MIX), which is a non-for profit organization. Although the total number as per the National Bank of Ethiopia database are nearly 30, the researcher has access to only data's of 10 Ethiopian MFIs from the MIX market website. To calculate the financial and operational sustainability of the remaining 20, the study was unable to get the required information.

Therefore, the sample size for this study reduced to 10. For generalizability a ratio of number of observations to number of variables should never fall below 5:1. This means five observations are required for each independent variable (Hair et al., 2006). Moreover, (Hair et al. 2006 and

Schikorski T, Stevens CF 1997) states that although the minimum is 5:1, the desired level is between 15 to 20 observations for each independent variable to be representative. Considering this general rule of thumb as a necessary requirement (i.e. between 15:1 and 20:1); between 105 and 140 observations are needed for this study. With 11 years' data from each MFI, the above required a minimum of 10 study units or microfinance institutions. The planned sample with 10 MFIs will provide 110 observations. Hence, considering 10 MFIs as a sample does not violate the general rule of thumb for generalizability.

The samples taken are believed to be representative to all microfinance institutions in Ethiopia given their size and age. It has been tried to include MFIs in the study from all categories of size (large, medium and small) and age (old, medium and young). Based on this, ACSI represent the largest and oldest microfinance institutions, Eshet, AVFS, and Gasha represent the smallest and youngest microfinance institutions while the rest Bussaa Gonnofa, Metemamen, Wasasa, PEACE, VF Ethiopia and SFPI represent the medium MFIs.

3.6 The Data and Means of Collection

The main objective of the study is to assess the significant determinants of operational and financial self-sufficiency in Ethiopian microfinance institutions. In other words, this study is dedicated to examine an existing theory based on collected data and available means. Hence, the study looks forward to build on secondary data by means of annual reports of individual MFIs. This work therefore, purely based on secondary data taken from the mix-market database for 11 years. As it is mentioned on the above section, it is considered for 10 selected MFIs from the mix-market data base. since No detailed information using informal or qualitative means was collected, this research basis on reported behaviors not observed behaviors.

3.7 Operational Definition

This section explains the variables used as dependent and independent (explanatory) variables in this study. There are some important issues that need to be dealt with in specifying an empirical model. These involve selection of appropriate outcome and predictor variables and means of measurement of these variables. The definitions/measurements used for these variables are described and summarized under the following table.

3.7.1 Dependent Variables

The dependent variables are the sustainability of microfinance institutions which is measured by proxy using the operational self-sufficiency and financial self-sufficiency. (Bogan 2009) stated that financial self-sufficiency measured as the ratio of adjusted financial revenue to adjusted operating expenses and the operational self-sufficiency computed as the ratio of unadjusted operating income to operating expenses (i.e. the ratio of operating income to the sum of administrative expenses, loan losses and interest expenses). This is summarized in the following table for clarity.

Variables Name	Measurement (Formula)
Operational Self-Sufficiency (OSS)	Financial revenue/ (Financial expense+ Impairment losses + Operating expenses)
Financial Self-Sufficiency	Adjusted Financial revenue/ (Financial expense+ Loan

Table 3-1 Variable Description (Dependent Variables)

3.7.2 Independent Variables

The independent variables for financial self-sufficiency used for this study includes yield on gross loan portfolio, cost per borrower, liquidity ratio, number of active borrowers, operating expense ratio and age of microfinance institutions. The independent variables used as a determinant factors affecting operational sustainability are the yield on gross loan portfolio; size of an MFI, personnel productivity ratio, debt to equity ratio, cost per borrower, average loan balance per borrower and age of microfinance institutions. The following table presents the description of the independent variables or explanatory variables used in this study for both the FSS and OSS dependent variables. Some of the variables are presented in their log form for regression purpose.

S.N	**Variable Standard Name**	**Description**	**Variable name in regression model**	**Variable Description as used in regression model**	**Expected effect**

1	Yield on Gross loan Portfolio (Nominal)	Adjusted financial revenue from Loan Portfolio/Adj. average GLP	YGLP	Financial Revenue as a percentage of GLP	+
2	SIZE	Asset of an MFI	SIZE	Natural logarithm of asset	+
3	Cost Per Borrower	Adj. Operating Expense/Adj. Av. No. of Active Borrowers	CPB	Natural logarithm of the cost per borrower	_
4	Average Loan Balance per Borrowers	Adj. GLP/Adj. Number of Active Borrowers	DEAPTH	Natural logarithm of the average loan balance per borrower	+
5	Productivity Ratio	Average loan per loan officer	Prodvty	Natural logarithm of Average loan per loan officer	+
6	Number of Active Borrowers	Number of active borrowers with loans outstanding	BREADTH	Natural logarithm of the number of active borrowers	+
7	Percent of female borrowers	Ratio of average female borrowers to average total borrowers	Pfemb	Number of active female borrowers / Number of Active Borrowers	+
8	Operating Expense Ratio	The ratio of operating expense to the gross loan portfolio	OER	Operating expense ratio	_
9	Portfolio at risk > 30 days	portfolio overdue > 30 Days + renegotiated portfolio / Gross Loan Portfolio	PAR	portfolio overdue > 30 Days + renegotiated portfolio / Gross Loan Portfolio	_
10	Debt to Equity Ratio	Adj. Total Liabilities/Adj. Total Equity	DER	Debt as a percentage of Equity	-

11	Deposit Mobilization	Deposit to average loan	DM	Deposit as a percentage of Loan	+
12	Inflation Rate	The inflation rate of the country	INF	The inflation rate as a percentage	-
13	Return on equity	Return on equity ratio of an MFI	RE	Return as a percentage of Equity	+

Table 3-2 Variable Description (Independent variable)

Therefore, the yield on gross loan portfolio, size of microfinance institutions, productivity ratio, average loan balance per borrower, deposit mobilization, return on equity, percent of female borrowers and number of active borrowers are expected to have positive significant impact on sustainability. Debt to equity ratio, Portfolio at risk > 30 days, cost per borrower, Inflation Rate and operating expense ratio, on the other hand, are expected to have negative significant impact on sustainability of microfinance institutions in Ethiopia.

3.8 Model Specification

This section provides the operational panel data regression model used for this work. The study assessed the relationship between independent and dependent variables by ordinary least square (OLS) reduced-form equations due to the size of the sample.

$$Y_{it} = \beta_0 + \beta_i X_{it} + \varepsilon_{it} \quad \ldots\ldots(1)$$

Where:

Y_{it} is the value of the dependent variable for cross section unit i, at time t, where i = 1… N;

β_0 is a heterogeneity or individual effect. It contains a constant term and set of individual or group specific variables which may be unobserved, such as lending type, type of MFIs, MFIs zone or MFIs specific characteristics (like preference or skill of MFI personnel and so on) which are taken to be constant over time.

X_{it} is the explanatory variable with a coefficient β_i, and

ε_{it} is the error term.

Observations are made at the MFI level, and do not characterize individual borrowers. The independent variables are potential determining factors of financial and operational sustainability and the dependent variables are always an indicator of sustainability.

To determine factors affecting the operational sustainability of MFIs in Ethiopia using the above model is explained as follows. The model is adopted from different studies conducted on the same area. Therefore, the operational model for the empirical investigation used in this study is given as:

$$OSS_{it}=\beta_0+\beta_1 DER_{it}+\beta_2 CPB_{it}+\beta_3 BREADTH_{it}+\beta_4 Prodvty_{it}+\beta_5 RE_{it}+\beta_6 Pfemb_{it}+\beta 7 DEAPTH_{it}+\varepsilon_{it}\ldots\ldots..(2)$$

Where:

OSS_{it} is the operational self-sufficiency ratio of microfinance i at time t (which is the dependent variable); α_i is a constant term;

β_0 is a constant term;

$\beta_{1\text{-}n}$ measures the partial effect of independent or explanatory variables 1-n for period t,

DER_{it} is the debt to equity ratio of an MFI i at time t,

$BREADTH_{it}$ is the natural logarithm value of number of borrowers of an MFI i at time t,

CPB_{it} is the natural logarithm value of cost per borrower of an MFI i at time t,

$DEAPTH_{it}$ is the natural logarithm value of average loan size per average borrower of an MFI i at time t,

$Prodvty_{it}$ is the natural logarithm value of the loan per loan officer of an MFI i at time t,

$Pfemb_{it}$ is the percentage of female borrowers of an MFI i at time t,

RE_{it} is the return on equity ratio of an MFI i at time t,

ε_{it} is the error term.

The variables, both dependent and independent, are for cross-section unit i at time t, where i = MFI (1 to 10), and t = 1 to 11.

The operational panel data for the regression to uncover the factors affecting the financial self-sufficiency of MFIs is presented as follows.

$$FSS_{it}=\beta_0+\beta_1 YGLP_{it}+\beta_2 INF_{it}+\beta_3 PAR_{it}+\beta_4 DM_{it}+\beta_5 OER_{it}+\beta_6 CPB_{it}+\beta_7 SIZE_{it}+\varepsilon_{it} \quad \text{.....(3)}$$

Where:

FSS_{it} is the observed financial self-sufficiency of an MFI i at year t,

β_0 is the constant term showing the value of FSS, when all the coefficient of the independent variables are zero,

$YGLP_{it}$ is Yield on gross portfolio of an MFI i at time t,

OER_{it} is the Operating expense ratio of an MFI i at time t,

$SIZE_{it}$ is the natural logarithm of asset of an MFI i at time t,

CPB_{it} is the natural logarithm of cost per borrower of an MFI i at time t,

DM_{it} is the Deposit Mobilization ratio of an MFI i at time t,

INF_{it} is the rate of inflation in percentage of Ethiopia assigned to an MFI i at time t, and

PAR_{it} is the Portfolio at risk ratio of an MFI i at time t,

βs are the partial effect of independent variables in period t.

ε_{it} is the error term of an MFI i at time t.

The variables, both dependent and independent, are for cross-section unit i at time t, where i = MFI (1 to 10), and t = 1to 11.

3.9 Data analysis

The analysis was set to indicate, which of the factors reported in the literature are significantly affecting the financial and operational sustainability of Ethiopian's MFIs. The data needed were ratios for both the dependent and independent variable. However, some of those variables were not kept in ratios. To measure the changes in variables over time, the researcher has transformed these variables into their natural logarithm. Therefore, the panel data collected from the AEMFI

annual bulletins, and MIX market are managed in the form of ratios, percentages and natural logarithmic forms.

These panel data have been regressed and interpreted by using multiple regression method and descriptive statistic. Assumptions that have to be fulfilled before running the analysis are checked and tests have been done before interpretation of the results as part of the requirement for proper employment of Multiple regressions. The assumptions underlying the multiple regression are normality; referring to the probability distribution function curve of the variables to be Gaussian due to the central limit theorem, absence of correlated errors and homoscedasticity, which requires that dependent variables have equal level off variance across the range of explanatory variables; (Hair et. Al 2006). Therefore, the researcher checked whether the proposed empirical model is free from these assumptions of normality, multicollinearity, autocorrelation and heteroskedasticity. A violation of key assumption of OLS regression occurs if any one of those assumptions turns out to be present. Choosing the best unbiased estimator was conducted through the standard Hausman test and the Breusch and pagan Lagrangian multiplier test for random effects as it is suggested in the econometric literatures (Greene 2008 and Brook 2008). From the tests result the researcher rejected the null hypothesis that there were no random effects. This indicated that the pooled OLS regression would have not been appropriate. Therefore, this study decided to use the RE panel models. Eviews8 software has the ability to help researchers to analyze their research data easily and efficiently. Hence, as recommended by Brooks (2008) the researcher used Eviews8 software to analyze and interpret the given panel data.

Chapter Four

4. Data Presentation, Analysis and Discussions

This chapter deals with the findings of this study in two sections. The first section is about the descriptive statistics of both the dependent and independent variables. Then later on the second section, the econometric result in which the explanatory variables are checked whether they can determine or not the sustainability.

4.1. Descriptive Result

This part will present the descriptive statistics of both the dependent and independent variables. As it was mentioned earlier this analysis is done for 11 years (2001 up to 2012); i.e. excluding 2010 for which the researcher was unable to get appropriate data. The descriptive statistics analysis is done separately for the dependent and independent variables.

4.1.1. Descriptive Result of the Dependent Variables

Sustainability can be defined as a program's ability to remain financially viable in the absence of any kind of subsidies. Michael Tucker also stated that, sustainability includes generating sufficient profit to cover expenses while eliminating all subsidies. From these basic definitions of sustainability, two types of sustainability indicators (operational self-sustainability and financial self-sustainability) can be studied in assessing MFIs performances. Hence, these proxy indicators of sustainability have been used as dependent variables in this study. Operational self-sufficiency (OSS) requires MFIs to meet all administrative costs and loan losses from operating income which is measured by dividing operating income by operating expenses. On the other hand, financial self-sufficiency (FSS) is a ratio which measures the sustainability of an MFI in terms of the financial capacity. It is a ratio of the adjusted financial revenue to the financial and operational expense as well as the loan loss provision and expense adjustments.

The difference between these two indicators is that the later (i.e. FSS) considers financial adjustments since many MFIs receive subsidies in different forms. Donors may offer grants, in-kind donations (technical assistance, rent subsidies, etc.), and subsidized funds. Typically, when surveying an MFO's balance sheet, such subsidies may not be readily noticeable. In order to perform significant financial analysis, it is necessary to modify financial indicators so that what is

being measured is the real, unsubsidized profit or loss of an institution. Adjustments include: In-kind donation adjustments, which are financial statements are adjusted to eliminate the subsidy and Inflation adjustments: the value of fixed assets is adjusted upwards and the value of equity is adjusted downwards. The researcher made inflation adjustment and considered its effect on FSS.

The ratio one and above for both variables (OSS and FSS) indicates that the microfinance institutions are operationally and financially self-sufficient and the value below this point indicates they are not sustainable. The following table indicates the descriptive statistics for the dependent variables: operational self-sufficiency (OSS) and financial self-sufficiency (FSS).

	FSS
Mean	0.885806
Maximum	2.426642
Minimum	0.049000
Std. Dev.	0.386210
Observations	110

Table 4-1 Descriptive Statistics of FSS

from Table 4.1 the Analysis of descriptive statistic revealed that the mean, the maximum, minimum and the standard deviations of Ethiopian MFIs' FSS for 110 observations are 88%, 242%, 4% and 38% respectively.

Taking the agreed international requirement for an FSS ratio of 100%, the mean score of 88% showed that most of Ethiopian MFIs are not financially self-sufficient. It is difficult for these MFIs, with an FSS ratio below 100%, to cover all costs and to operate without ongoing subsidy. Such case, will lead to reduction of equity due to losses, force them to be dependent on grants or concessional loans from external sources. Instead, those successful MFIs with maximum score of 242% could reduce the need for subsidies from donors and concessional loans of low interest rates and become sustainable. The standard deviation (38%) obtained in this analysis was low as compared to other related works. To mention some, Bogan (2009) study FSS ratios of MFIs had standard deviation of above 45%. Lower standard deviation is a good indication that most of the observations are concentrated around the mean.

If Comparison is made between the FSS ratio of Ethiopian MFIs with that of African and sub region average, which is shown by MixMarket (2012), the mean of African MFIs FSS was 98%. This clearly shows that it is relatively higher than the mean score of Ethiopian MFIs. The same source indicated that MFIs operating in eastern African and southern African regions had a mean

score of an FSS ratio of 99.1% and 97.6% respectively and indicating that they are out-performing Ethiopian MFIs. Yet Still on the average none of the MFIs in this region are financially sell sufficient as their mean score was marginally below 100%.

As it is mentioned on the above paragraph, the operational self-sufficiency (OSS) indicates that the sufficiency of operating income to cover operational costs like salaries, suppliers, loan losses, and other administrative costs. From table 4.2 the mean, maximum, minimum and standard deviation of Ethiopian MFIs OSS is 115%, 242%, 5% and 48% respectively for the total number of 110 observations. This shows that, on average the operational sustainability of Ethiopian MFIs under consideration is 115%. This is more than the threshold for sustainability.

	OSS
Mean	1.151746
Maximum	2.426500
Minimum	0.054000
Std. Dev.	0.475295
Observations	110

Table 4-2 Descriptive Statistics of OSS

Thus, we can deduce that Ethiopian microfinance institutions are operationally sustainable.

An operational self- sufficiency of 1 (100%) is the first stage that an institution should reach in its way to long term financial viability (Berne, 2005). According to Berne, if an MFI does not reach that, eventually its equity will be reduced by losses or must be compensated by grants. But this is not the case as per this figure for mean. The standard deviation for this variable is (48%), indicating that the variation in the operational sustainability of microfinance institutions under consideration is 48%. Therefore, as the variation or dispersion of the sustainability indicates, all of the microfinance institutions under consideration are somewhat close to average. Based on this we can infer that the result for the population that the operational self-sufficiency of Ethiopian microfinance industry on average is 115%, which is beyond the requirement.

4.1.2 Descriptive statistics for the explanatory variables

Under this section the descriptive statistics of the explanatory variables are presented. All the independent variables, expected to have an impact on the financial self-sufficiency and operational self-sufficiency, have 110 numbers of observations in total.

	BREADTH	CPB	DEAPTH	DER	DM	INF	OER	PAR	Pfemb	Prodvty	SIZE	YGLP	RE
Mean	9.70	18.49	4.55	1.60	0.29	0.14	0.24	0.06	0.57	5.80	14.66	0.24	-0.022928
Median	9.49	16.00	4.64	1.27	0.29	0.12	0.16	0.03	0.60	5.81	14.39	0.22	0.030300
Maximum	13.56	66.00	5.92	9.43	0.63	0.44	1.99	0.37	0.93	6.82	19.49	0.48	0.364200
Minimum	6.41	6.00	2.75	0.01	0.01	-0.08	0.03	0.001	0.09	4.43	11.43	0.10	-3.991000
Std. Dev.	1.48	10.33	0.51	1.63	0.14	0.14	0.32	0.075	0.17	0.37	1.65	0.07	0.550238
Observations	110	110	110	110	110	110	110	110	110	110	110	110	110

Table 4-3 Descriptive analysis for both explanatory variables of FSS and OSS

4.1.2.1 Debt to Equity Ratio (DER)

Debt to equity ratio is the simplest and best-known measure of capital adequacy because it measures the overall leverage of the institution (AEMFI, 2014). The mean value of DER of Ethiopian MFIs remained at 1.6 during the study periods. Moreover, as AEMFI (2014) pointed out, traditionally MFIs' ability to borrow from commercial lenders has been somehow limited. The average score of DER attained by MFIs of Central Africa, Eastern Africa, western Africa and the entire continent of Africa 4, 3.14, 2.15 and 2.41 respectively (Mix Market, 2012). Given the average DER scored by these sub African regions, Ethiopian MFIs appeared to score below DER but still managed to score above the recommended threshold of 1.50(AEMFI, 2012). However, the maximum DER scores of Ethiopian MFIs 9.43 appeared to look very high, indicating that debt financing is more considered instead of having proportional financing structure, therefore highly leveraged.

4.1.2.2 The average loan size (DEPTH)

The average loan size indicates the depth of outreach. The average balances of outstanding loans are proxy indicators used to indicate a client's socioeconomic level. According to the Micro Banking Bulletin (2008), among reporting African MFIs the weighted average outstanding loan per borrower is USD 307. In absolute terms, these loans are somewhat larger than those offered by MFIs in the regions of East Asia and Pacific, and South Asia but significantly smaller than those offered in the Eastern Europe and LAC regions. However, the mean for this variable is USD 95 which is low end depth of outreach under the MIX bench mark methodology (average loan size <USD 150). The highest average loan size USD 372 is an indication of serving relatively non poor clients. These statistics tend to suggest that MFIs in Ethiopia perform better in the depth of outreach reflected in their lower average loan size than the MIX bench mark.

4.1.2.3 Cost per borrower

Cost per borrower provides a meaningful measure of efficiency, showing the average cost of maintaining an active borrower of an MFI. As demonstrated so far cost per borrower, the most popular measure of MFIs efficiency, is calculated by dividing all expenses related to the operation of MFIs (including all administrative and salary expenses, depreciation and board fess) by average number of active borrowers. Since the size of the loans is not the part of the denominator, institutions with larger loans do not automatically appear to be more efficient. For instance if the cost per borrower ratio takes loan amounts rather than average number of active borrowers, it could bias smaller MFIs which offer smaller loans and savings accounts to appear less efficient AEMFI (2014).

The descriptive statistic in table 4.3 revealed that the mean value, the maximum value and the minimum values of the cost per borrower were found to be USD 18.5, USD 66, USD 6. This indicated that the average MFIs incurred a cost of USD 18.5 to maintain a single borrower. While the most efficient MFIs incurred a cost per borrower of USD 6, inefficient MFIs incurred a cost per borrower as high as 66 USD during the study period.

A handful of studies indicated that the average Ethiopian MFIs appeared to look more cost efficient than MFIs in the rest of the world. For instance, Nawaz (2010) has found that the mean score of cost per borrower of 179 MFIs worldwide was $131. The maximum score of cost per borrower of Ethiopian MFIs revealed in this study was also well below the maximum score revealed in Nawaz's study ($1694). On the other hand Bogan (2009) operated panel data on MFIs in Africa, East Asia, Eastern Europe, Latin America, the Middle East and South Asia during the year 2003 through 2006 and revealed that the mean score of cost per borrower of MFIs in these regions was $178 indicating that Ethiopian MFIs on the average are more efficient than MFIs in these regions. MixMarket (2012) revealed that the average cost per borrower for MFIs in Central Africa, Eastern Africa, Southern Africa, Western Africa and the whole Africa were found to be $15, $149, $182, $103 and $137 respectively making Ethiopian MFIs more efficient in maintaining a single borrower.

Lower cost per borrower for Ethiopian MFIs may point to the fact that the difference in macroeconomic environment among regions may also play an important role. For example, clients of MFIs in countries of higher GNI per capital may require better, quality and additional services which could increase operating expenses.

4.1.2.4 Inflation (INF)

The mean value of inflation is found to be 12.3 and it is higher than the average of the entire African continent which was 9% in Mix Market's report (2012). This inflationary environment displayed by double digit trends were reflected in MFIs performance indicators (AEMFI, 2009). The increased inflationary trends may have a negative effect by eroding the real value of MFIs' equity. And inflation will also indirectly affect the MFI by influencing the repayment levels. Studies show that repayment levels are usually weak and low in the presence of higher inflation rates (Weele K. V., & Markowich P., 2001).

4.1.2.5 Loan per loan officer (Prodvty)

It is a combination of outreach and efficiency; it is often measured in terms of loan per loan officer. However, serving a loan client can be more labor intensive and costly than serving a depositor; because it implies a series of interviews and site visits before the loan can be disbursed. The higher number of loan per loan officer would indicate efficiency of MFI staff, as they comparatively handle more borrowers. The descriptive statistics shows the mean number of loan per loan officer for Ethiopian MFIs was 330. The minimum and maximum 81.5 and 897.8 respectively. Anne-Lucie et al. (2010) found that MFIs in Africa are among the most productive in terms of borrowers (143) per staff member compared with the global averages (139) borrower per staff member. Ethiopian MFIs staffs were more productive even above the African average productivity over the study periods.

4.1.2.6 Deposit Mobilization (DM)

Deposit mobilization represented by deposits as a percent of loans measures the portion of the MFIs portfolio funded by deposits. The higher the ratio, the greater is the MFIs' capability to fund and execute its task from deposits. The mean value showed that 29% Ethiopian MFIs asset has been held by deposits. Comparison of this ratio with other jurisdiction indicated that MFIs in

Central Africa, Eastern Africa, Southern Africa , Western Africa and the entire continent of Africa have mean score of DM 154.8%, 48.6%,30.5%, 59.5% and 154.8% respectively indicating that MFIs in these regions have mobilized higher commercial sources (savings) for financing their loan than MFIs in Ethiopia (MixMarket ,2012).This enables these Subs Saharan African MFIs to mobilize a cheaper source of funds than debts to finance their loans so that they can reduce the need of subsidies.

4.1.2.7 Number of active borrowers (BREADTH)

Number of active borrowers is a measure of breadth of outreach, which means the number of poor served by a microfinance institution (Woller and Schreiner, 2002). It is generally assumed that the larger the number of borrowers the better the outreach and thus, it leads an MFI to become more sustainable. The mean statistics for this variable is 16,317. This indicates on average a microfinance institution in Ethiopia is reaching 16,317 numbers of borrowers. However, when we see the industry average that an MFI is reaching, it is still very low as compared to the number of population in the country. Not only this, but also when this number is compared to the income level of the society, it still needs attention to reach more poor in the country.

4.1.2.8 Size of MFI (SIZE)

Size which is measured by the total asset of the institutions, measures whether they are large enough to be operationally as well as financially sustainable and cover their operational costs or not. The mean value of the variable, the minimum and maximum values are $2,326,789, $92,041 and $291,339,554 respectively. Based on this, therefore, the average total asset of the microfinance industry is around 2 million USD. When this value is compared to a calculated average USD of African Microfinance, which has been taken from a study by Lafourcade et al (2005), value (8,052,676) it is much lower.

4.1.2.9 Portfolios at risk, loans outstanding past due 30 days or more (PAR)

Loan portfolio is the dominant asset of MFIs. Portfolio quality reflects the risk of loan delinquency, determines future revenues and an institution’s ability to increase outreach and serve existing clients. A higher ratio brings higher risk to the portfolio. As indicated above the portfolio quality is low as PAR>30 stood at a mean score of 6.4%. This is a little bit lower than the mean score of

east Africa region ratio which stood at 8.3%. Generally speaking any portfolio at risk (PAR) exceeding 10% should be cause for concern (AEMFI, 2012). The portfolio at risk (PAR) should be below 10 percent for MFI loan portfolio operate efficiently. Hence, Ethiopian MFIs are relatively at a lower risk of loan delinquency.

4.1.2.10 The yield on gross loan portfolio (YGLP)

This indicates the ability of an MFI to utilize the short term assets to generate cash financial revenue. It indicates the efficiency with which an MFI has utilized its resources generating cash revenue. The higher the ratio, the better it indicates microfinance efficiency. The mean descriptive statistics for this variable shows that MFI in Ethiopia generates 0.24. This means that they generate on average 24 cents cash for each single dollar in the outstanding loan portfolio. The minimum and maximum yield on the gross loan portfolio for this study is 0.1 and 0.48 respectively. This means some of the inefficient MFI generates only 10 cents.

4.1.2.11 Operating expense ratio (OER)

OER, according to CGAP (2009), is the most commonly used measure of microfinance efficiency. It measures how an MFI's management has been efficient in reducing operating costs at a given level of operation. The lower the operating expense ratio will indicate efficiency in microfinance institutions cost reduction strategy. The operating expense ratio for the Ethiopian microfinance industry shows 0.244 in its mean. This indicates that on average they are incurring 24 cents in operating expense for each dollar in the gross loan portfolio. Some highly efficient institutions incur operating expense of 1 cent for each dollar in the gross loan portfolio. On the other hand, inefficient institutions in the industry incur an operating expense of 1 dollar 99 cents for each dollar on their gross loan portfolio.

4.1.2.12 Percentage of female borrowers (Pfemb)

Female clients relate to higher repayment rate (Makombbe et al 2005; Kabeer 2001) and therefore operational sustainability. We analyzed this relationship to establish whether the more female clients an MFI has the better it will perform in sustainability. The mean, minimum and maximum of percentage female borrowers are 57, 9.6 and 93 percent of total borrowers.

4.1.2.13 Return on Equity

Return on equity measures how well the institution uses all its equity and it is also an overall measure of profitability reflecting both the profit margin and the efficiency of the institutions (Ledgerwood, 1999). According to the cooperative principles, members should receive a return on their equity as dividend and retain a portion of the profit for reserve, expansion, and social fund in the equity of the MFI. In Ethiopia, 70 percent of profit is distributed as a dividend for members and the remaining amount is for reserve and expansion of the cooperative. But, as it can be observed from the descriptive result the mean return on equity is – 2 %, indicating that they loss 0.02 USD on a 1 USD equity they owned. The maximum return on equity is 0.36 USD and the minimum is - 4 USD, which is a total loss by any standard. This indicates that there are MFIs either running on a loss or operation with idle capacity.

4.2 Findings, data Analyses and discussion of regression models

This section presents the empirical findings from the econometric result for the factors affecting the financial and operational sustainability of microfinance institutions in Ethiopia. Before the interpretation of the results, a diagnostic test had performed for both FSS and OSS models whether the assumption for classical leaner regression model (i.e. OLS) violated or not. Thus, the following section discussed about the nature and significance of the model misspecification test

4.2.1 Regression Diagnostic Tests

In this study as mentioned in chapter three diagnostic tests were carried out to ensure that the data fits the basic assumptions of classical linear regression model. If individual effect β_0 (cross-sectional or time specific effect) does not exist (β_0=0), ordinary least squares (OLS) produces efficient and consistent parameter estimates.

$$Y_{it} = \beta_0 + \beta_i X_{it} + \varepsilon_{it} \quad \text{……………………………………………………(4)}$$

Where:

Y_{it} is the value of the dependent variable for cross section unit i, at time t, where i = 1… N;

β_0 is a heterogeneity or individual effect. It contains a constant term and set of individual or group specific variables which may be unobserved, such as lending type, type of MFIs, MFIs zone or MFIs specific characteristics (like preference or skill of MFI personnel and so on) which are taken to be constant over time.

X_{it} is the explanatory variable with a coefficient β_i, and

ε_{it} is the error term.

(OLS) produces efficient and consistent parameter estimates if only the following assumptions are hold. Otherwise, the OLS estimator is no longer best unbiased linear estimator. OLS consists of five core assumptions (Greene, 2008). These are:

- ✓ Linearity says that the dependent variable is formulated as a linear function of a set of independent variables and the error (disturbance) term.
- ✓ Exogeneity says that the expected value of disturbances is zero or disturbances are not correlated with any regressors.
- ✓ Disturbances have the same variance (homoskedasticity) and are not related with
- ✓ one another (nonautocorrelation)
- ✓ Full rank assumption says that there is no exact linear relationship among independent variables (no multicollinearity).

If individual effect $\beta 0$ is not zero in longitudinal data, heterogeneity (individual specific characteristics like intelligence and personality that are not captured in regressors) may influence assumption. In particular, disturbances may not have same variance but vary across individual (heteroskedasticity) and/or are related with each other (autocorrelation). Consequently, the results for model misspecification tests are presented as follows.

4.2.1.1 Multi Collinerity

As mentioned by (Greene, 2008, Brooks, 2008) the explanatory variables shall not be correlated with one another for the regression model operate properly. The fundamental assumption that is made when using the OLS estimation method is that there shall not be any kind of relationship

between independent variables. If there is no relationship between the explanatory variables, they would be said to be orthogonal to one another. If the explanatory variables were orthogonal to one another, adding or removing a variable from a regression equation would not cause the values of the coefficients on the other variables to change.

In any practical context, the correlation between explanatory variables will be non-zero, although this will generally be relatively being in the sense that a small degree of association between explanatory variables will almost always occur but will not cause too much loss of precision. However, a problem occurs when the explanatory variables are very highly correlated with each other, and this problem is known as multicollinearity. The most simple, operational definition of unacceptable co-linearity makes no pretense to theoretical validity. As it is mentioned Robert R. Gluaber, (2005), an arbitrary rule of thumb is established to constrain simple correlations between explanatory variables to be smaller than 0.8. This assumption has been tested for the variables considered in the study as the independent variables. Therefore, the null hypothesis is articulated as there is no very high correlation between the independent variables. This is summarized with the alternative hypothesis as follows.

Ho: No Multicollinearity

Ha: Multicollinearity

From table 4.4, the maximum observed positive correlation for the independent variables of Financial Self-Sufficiency is 0.71 between cost per borrower and operational expense ratio of microfinance institutions and between deposit mobilization and the size of microfinance institutions which is 0.63 and thus, this is sufficiently small as compared to the tolerable correlation sated for this particular study which is 0.8. According to correlation result from Table 4.5 for all the explanatory variables of operational Self-Sufficiency, the largest correlation is observed between average loan size to average loan borrower and number of borrowers, which has a coefficient value of 0.574 and between cost per borrower and the return on equity which is 0.554. These values are below the standard set used for this particular study which is a correlation coefficient of 0.8. Based on this, it can be reasonably ignored. Therefore, we fail to reject the null hypothesis of no multicollinearity between the independent variables under both cases (models).

	CPB	DM	INF	OER	PAR	SIZE	YGLP
CPB	1						
DM	-0.4053998	1					
INF	-0.0807461	0.1431737	1				
OER	0.7106236	-0.4950224	-0.267298	1			
PAR	0.0413523	0.135849	0.031236	-0.0540480	1		
SIZE	-0.3480507	0.6356965	0.396506	-0.4831118	-0.2224171	1	
YGLP	0.178356	-0.324471	0.03141500	0.220142	-0.2058807	-0.2397375	1

Table 4-4 Multicollinearity Test for FSS Explanatory Variables.

	BREADTH	CPB	DEAPTH	DER	PFEMB	PRODVTY	RE
BREADTH	1.000000						
CPB	-0.441599	1.000000					
DEAPTH	0.574169	-0.260042	1.000000				
DER	0.401171	-0.250529	0.363356	1.000000			
PFEMB	-0.204239	0.181500	-0.154819	-0.421843	1.000000		
PRODVTY	0.397416	-0.354513	0.326405	0.026868	0.109470	1.000000	
RE	0.428289	-0.554520	0.531131	0.150104	-0.127656	0.323748	1.000000

Table 4-5 Multicollinearity Test for OSS Explanatory Variables.

4.2.1.2 Hetroscedasticity

It has been assumed that the variance of the errors is constant, σ2; this is known as the assumption of homoscedasticity. If the errors do not have a constant variance, they are said to be heteroscedastic. Consequence of proceeding with the existence of hetroscedasticity is that, the OLS estimators will still give unbiased (and also consistent) coefficient estimates, but they are no longer blue that is, they no longer have the minimum variance among the class of unbiased estimators. Therefore, for the assumption to hold and to get efficient estimator, this test has been made for both OSS and FSS models using the White test for heteroscedasticity and their results are indicated under the table that follows. It is hypothesized that there is no heteroscedasticity in which the null and alternative hypothesis are summarized here under for both models.

Ho: no Heteroscedasticity (Homoscedastic)

Ha: Hetroscedastic

If the P-values of these test statistics are considerably in excess of 0.05, then they give the same conclusion that there is no evidence for the presence of hetroscedasticity. However, if the P-values

for these tests are less than 0.05, suggests in this case, that there is evidence of heteroscedasticity. EViews reports (see Appendix 2 a and 2 b) the F-statistic, the LR statistics and the results of the auxiliary regression on which they are based. For both models the two statistics reject the null hypothesis of homoskedasticity. It is clear evident that the errors are homoscedastic. Therefore, based on this statistic we fail to reject the null hypothesis that is indicated as there is no Heteroscedasticity for both models. This can be concluded that the variance of the errors is constant in both cases.

4.2.1.3 Autocorrelation

The notion of autocorrelation defines that there is no serial correlation or autocorrelation among the disturbances β_0 entering the population regression function (Greene 2008). The covariance between the error terms over time (or cross-sectional, for that type of data) is zero. In other words, it is assumed that the errors are uncorrelated with one another. If the errors are not uncorrelated with one another, it would be stated that they are "auto-correlated" or that they are "serially correlated". Therefore, to conduct the Breusch- Pagan LM test, the hypothesis is stated as follows.

Ho: No Autocorrelation ($\rho = 0$)

Ha: Autocorrelation ($\rho \neq 0$)

As it can be seen from the statistics of Breusch- Pagan LM test, for both models the statistics reject the null hypothesis of No Autocorrelation. Therefore, it can be concluded that there is an evidence of a relationship between successive residuals and based on this, in both cases, and we rejected the null hypothesis of no autocorrelation. The result is indicated under appendix 3 a and 3 b.

4.2.1.4 Normality

The assumption of normality requires the disturbance to be normally distributed around the mean. This test has been conducted using the Jarque-Bera test. The p-value of the normality test should be bigger than 0.05 to not to reject the null hypothesis of normality at the 5% significance level (Brooks, 2008). The null and alternative hypothesis for the test has been indicated here under.

Ho: Normally Distributed Errors

Ha: Non-Normal Distribution Errors

A normal distribution is not skewed and is defined to have a coefficient of kurtosis of 3 (Brooks, 2008). However, the coefficient of the kurtosis in this study is 2.80 for OSS model and 4.8 for FSS model which is below and above 3 for OSS and FSS models respectively. But the p-value for the Jarque-Bera (JB) test of OSS and FSS models are 0.13538 (13.538%) and 0.000001 (0.0001%) respectively. This indicates that the p-value for the Jarque-Bera test for OSS model is greater than 0.05 which indicates that the errors are normally distributed. Based on the statistical result, we fail to reject the null hypothesis of normality at the 5% significance level. but, for FSS we rejected the null hypothesis of normality at the 5% significance level. since it's p-value is 0.0001%.

4.2.2. Multiple Correlation Analysis

Multiple correlation analysis is used in situations involving two or more independent variables and their degree of association with the dependent variable (Leonard J, 2004). Therefore, in order to look at the degree of association between OSS and its explanatory variables as well as FSS and the explanatory variables, multiple correlation analysis has been done and shown here under.

	BREADTH	CPB	DEAPTH	DER	PFEMB	PRODVTY	RE	OSS
BREADTH	1.000000							
CPB	-0.441599	1.000000						
DEAPTH	0.574169	-0.260042	1.000000					
DER	0.401171	-0.250529	0.363356	1.000000				
PFEMB	-0.204239	0.181500	-0.154819	-0.421843	1.000000			
PRODVTY	0.397416	-0.354513	0.326405	0.026868	0.109470	1.000000		
RE	0.428289	-0.554520	0.531131	0.150104	-0.127656	0.323748	1.000000	
OSS	0.783408	-0.594419	0.606356	0.238411	-0.167188	0.384132	0.524489	1.000000

Table 4-6 The relationship between OSS and its determinants

	DM	FSS	INF	OER	PAR	SIZE	YGLP	CPB
DM	1.000000							
FSS	0.475000	1.000000						
INF	0.143174	0.046227	1.000000					
OER	-0.495022	-0.530770	-0.267298	1.000000				
PAR	0.135850	-0.305886	0.031237	-0.054048	1.000000			
SIZE	0.635697	0.645773	0.396506	-0.483112	-0.222417	1.000000		
YGLP	-0.324472	0.041579	0.031415	0.220142	-0.205881	-0.239738	1.000000	
CPB	-0.405400	-0.538859	-0.080746	0.710624	0.041352	-0.348051	0.178356	1.000000

Table 4-7 The relationship between FSS and its determinants

According to the above correlation result on Table 4.5, it can be stated that there is a negative correlation in cost per borrower and percentage of female borrowers to Operational Self-Sufficiency Ratio. This indicates that a change in cost per borrower and percentage of female borrowers are negatively contributing towards changes in Operational Self-Sufficiency Ratio. Likewise, there is positive correlation in debt to equity ratio, number of borrowers, loan per loan officer, average loan balance per borrower and return on equity to Operational Self Sufficiency Ratio. This implies that changes in the predictors; (debt to equity ratio, number of borrowers, loan per loan officer, average loan balance per borrower and return on equity) is positively contributing towards the change in Operational Self-sufficiency Ratio.

From the above table 4.6 of correlation of the independent variables to the financial sustainability (FSS), it can be concluded that there is a negative correlation in cost per borrower, portfolio at risk and operating expense ratio to financial self-sufficiency of MFIs in Ethiopia. This is an indication for the change in cost per borrower, portfolio at risk and operating expense ratio negatively affects the changes in Financial Self-Sufficiency Ratio. Instead size of an MFI, deposit mobilization, and the yields on gross loan portfolio are positively correlated to financial self-sufficiency ratio of an MFI. This implies the change in these explanatory variables positively contributes towards the change in Financial Self-sufficiency Ratio.

4.2.3 Model Selection

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. Prior to go to doing the regression, deciding on whether the random effect model or fixed effect model was a vital phase of the research.

4.2.3.1 Random versus fixed effect model

According to Grene (2008) 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 models provide consistent estimators; the researcher employed the standard Hausman test suggested in the econometric literatures (Greene 2008 and Brook 2008). The Hausman test tests the null hypothesis that random error provides consistent estimates compared to fixed effect model. The test results for the two models, FSS and OSS were not statistically significant. Thus, we could

not reject the null hypothesis that RE provides consistent estimates. See appendix 5 a and 5 b for the result.

4.2.3.2 Random effects versus Pooled OLS models

We further checked for the appropriateness of using the RE model as opposed to the pooled OLS method. The advantage of using pooled OLS as opposed to the RE model especially when there are no random effects is that we are not attempting to allow for non-existing within group autocorrelation and we can take advantage of finite sample properties of OLS instead of having to rely on asymptotic properties of random effects. We applied the Breusch and pagan Lagrangian multiplier test for random effects. The test statistics for both models (i.e. FSS and OSS) were statistically significant which indicated existence of random effects. The researcher rejected the null hypothesis that there were no random effects. This indicated that the pooled OLS regression would have not been appropriate. Therefore, this study decided to use the RE panel models.

Therefore, finally the researcher estimated the regression models to explain the determinants of Financial Self Sufficiency and Operational Self Sufficiency using random effect model. Therefore, the two models (i.e. FSS and OSS) were estimated using heteroskedastic and autocorrelation consistent standard errors. This was done to remedy the heteroskedasticity and autocorrelation problems, which are explained above. It has been also mentioned by Brooks (2008) that, the random effects model is more appropriate when the entities in the sample can be thought of as having been randomly selected from the population, but a fixed effect model is more plausible when the entities in the sample effectively constitute the entire population. Since this study has taken samples from the population and the result of the two tests show random effect model is appropriate, the researcher has decided the random effect model to be the appropriate model for this study.

4.2.3 Findings from Financial Self-Sufficiency (FSS) regression model

Based on the regression result on appendix 6 a below, the study found that the estimated result of multiple regression analysis is at a good level where the R-squared is 46.4% and the Adjusted R-squared value is 42.8%, respectively. The value of the Adjusted R-squared revealed that there are good relationships between dependent and independent variables where all independent variables

can explain about 42.8% of the financial self-sufficiency within the sample. However, the remaining 47.2% of the change in FFS regression model is explained by other factors which are not included in the regression line. Both the R-squared and the Adjusted R-squared values in this study are found to be higher (has more explanatory power) than the previous results found in Ethiopia. Moreover, for panel data, R-Squared greater than 20% is still large enough for reliable conclusions (Ganka, 2010).

Overall reliability and validity of the model was further enhanced by the Prob(F-statistic) value (0.00000) which indicates strong statistical significance within the population. Thus, the null hypothesis of the overall test of significance that all coefficients are equal to zero was rejected as the p-value was sufficiently low (less than 0.05).

The dependent variable being explained is financial sustainability which is measured by financial self-sufficiency ratio. The variables yield on gross loan portfolio (YGLP), cost per borrower (CPB) macroeconomic variable Inflation rate (INF) and Size of MFI (SIZE) are found to be significant regressors of MFIs sustainability in Ethiopia at 0.01%, 2.12%, 0.04% and 0.0000% respectively. Macroeconomic variable Inflation rate, and cost per borrower each affected MFIs' financial sustainability negatively and are statistically significant at 0.04 % and 2.12 % respectively. On the other hand, Yield on Gross Loan Portfolio (YGLP) and Size of MFI (SIZE) positively affect financial sustainability and are significant at 0.01% and 0.0000 % respectively. Deposit Mobilization, operating expense ratio and portfolio at risk are not statistically found to affect MFIs' financial self-sufficiency in Ethiopia. The following section demonstrates the impact each explanatory variable on financial self-sufficiency and overall sustainability.

Size of Microfinance Institutions

Based on the regression result, it is found that the total asset (which is a proxy measure for the Size of an MFI), is positively and significantly affects the financial sustainability. This is strongly significant at 0.000 % significance level. This indicates that a change in the size (total asset) causes a change in financial sustainability positively. This means, an increase in the size of an MFI will lead to an increase in the financial sustainability of MFIs in Ethiopia. Therefore, we reject the null hypothesis which was articulated as there is no significant relationship between the size of microfinance institutions and their financial self-sufficiency. Thus, the finding supports the alternative hypothesis that the size of a microfinance institution affects its financial self-sufficiency

positively and significantly. Further this finding is supported by the findings of Bogan et al (2008), Kyereboah-Coleman and Osie (2008).

Cost per Borrower

Cost per borrower, which measures the MFI effectiveness in cost reduction given the number of borrowers they are serving, negatively affects the financial self-sufficiency of microfinance institutions in Ethiopia. This variable is highly significant at 2.12 % significance level based on the regression result. An increase in the cost per borrower reduces the financial self-sufficiency of the institutions. Therefore, the lower the figure, the better MFI is financially sustainable. From this we can understand that the reduction of cost per borrower will significantly makes an institution to be more sustainable. Therefore, we reject the null hypothesis which was articulated as there is no significant relationship between the cost per borrower and financial self-sufficiency of microfinance institutions. Thus, the finding supports the alternative hypothesis that the cost per borrower affects financial self-sufficiency negatively and significantly. This finding is supported by a finding by Melkamu (2012), Christen et al (1995) Cull et al (2007) and Dissanayake (2012). However, in a study by Ganka (2010) the finding reports that, the cost per borrower had a negative correlation but statistically insignificant impact on financial self-sufficiency.

Inflation

The econometric result from the regression above indicated that inflation negatively affects financial self-sufficiency of Ethiopian MFI. This variable is highly significant at 0.04 % significance level based on the regression result. Therefore, the researcher rejected the null hypothesis that inflation has no influence on the FSS of Ethiopian MFIs. Thus, the finding supports the alternative hypothesis that inflation affects financial self-sufficiency negatively and significantly. This may be due to the fact that repayment levels are usually weak and low in the presence of higher inflation rates (Weele K. V., & Markowich P., 2001). This study further believed that the significant negative effect of inflation may point to the fact that, MFIs' regulations and policies adopted by the government may play a considerable part in creating unfavorable environment for the sector to be affected by the inflation.

Portfolio at risk > 30 days ratio

Portfolio at risk is important because it indicates the potential for future losses based on the current performance of the loan portfolio. The PAR ratio is the most widely accepted measure of loan performance in the microfinance industry (CGAP, 2008). PAR > 30 days is often used as the threshold beyond which loans are considered to be at higher risk. The economic result for this variable indicated that the variable has a negative coefficient showing inverse relation with the financial self-sufficiency, but the variable portfolio at risk was statically insignificant. Therefore, the study failed to reject the null hypothesis which stated there is no significant relation between the portfolio at risk and financial self-sufficiency of microfinance institution. Hence, we conclude that the finding of the study supports the alternative hypothesis that states the portfolio at risk doesn't affects the financial self- sufficiency of Ethiopian MFI. Studies conducted by Fukasawa (2011), stated that the ratio of portfolio at risk has a negative significant effect on financial self-sufficiency of MFIs. As per the econometric result by Ganka (2010), there is a negative relationship between PAR and financial sustainability of microfinance institutions.

Deposit to loan ratio

The economic result shows that Deposit mobilization of Ethiopian MFIs indicated a positive coefficient but statistically insignificant. This result indicated that commercially available sources (savings) can enhance sustainability. This leads the researcher to accept the null hypothesis that deposits to loan ratio has no relationship with the financial self-sufficiency and sustainability of Ethiopian MFIs. Studies conducted by Bogan (2009) stated that sustainable MFIs can reduce, and even eliminate the need for subsidies if they achieve a significant volume of business in the form of deposits.

The Yield on Gross Loan Portfolio

The yield on gross loan portfolio indicates the ability of an MFI to utilize the short term assets to generate cash financial revenues. Therefore, the more an MFI utilizes its short term assets, the grater it generates higher financial revenues, which on the other way round cause higher sustainability. This study also founds the same thing, that it affects financial self-sufficiency positively. This variable is highly and statistically significant at 0.01% significance level in affecting the financial sustainability of an MFI in Ethiopia. Since the higher the ratio the better the

financial sustainability of an MFI is, the MFI should utilize its resource to the maximum possible level so as to increase the financial revenue in the form of interests, fees, penalties and commissions from the gross loan portfolio. Therefore, we reject the null hypothesis which was articulated as there is no significant relationship between the yield on gross loan portfolio and financial self-sufficiency of microfinance institutions. Thus, the finding supports the alternative hypothesis that the yield on gross loan portfolio affects financial self-sufficiency positively and significantly. The finding of this study for the yield on gross loan portfolio is in line with that of Ganka (2010), Melkamu (2012), Woller and Schreiner (2002). All these findings support that yield affects the financial self-sufficiency (FSS) of a microfinance institution. All have indicated that the relation between yield and FSS is immediate and positive through interest and fee revenues.

Operating Expense Ratio

The regression result for operating expense ratio indicates negative correlation but insignificancy for determining the financial self-sufficiency of an MFI in Ethiopia. Based on the regression result, therefore, we fail to reject the null hypothesis that there is no significant relationship between the operating expense ratio of a microfinance institution and its financial self-sufficiency at 27.71 % significance level. This indicates that there is no evidence for microfinance institution‟s financial sustainability to depend on their operating expense ratio. However, this finding is against Ganka (2010) for this variable, which indicated that there is strong significant negative correlation to financial self-sufficiency.

The comparison of beta coefficient of the explanatory variables will indicate the relative strength of the significant variables in explaining the dependent variable. Thus, this comparison has been made between the significant determinant variables of financial self-sufficiency. The beta coefficient of macroeconomic variable Inflation rate, cost per borrower, Size of MFI and the yield on gross loan portfolio are -0.69, -0.0091, 0.1390 and 1.70029 respectively. Based on this, the yield on gross loan portfolio which has 1.70029 explains financial self-sufficiency more positively relative to Size of MFI. On the other hand, this study found that macroeconomic variable Inflation rate affects the financial self-sufficiency more negatively relative to cost per borrower. To put the relative strength of the beta coefficient regardless of their relationship with the dependent variable, it is found that the yield on gross loan portfolio is on the first place, macroeconomic variable Inflation rate on the second and Size of MFI on the third place.

4.2.4 Regression result and findings of OSS model

As indicated by appendix 6 b below, the observed R^2 value stands at 0.61892 (61.82%), and the adjusted R^2 at 0.592 (59.2%), implying that 59.2 percent of fitness can be observed in the sample regression line. Therefore, the model can measure 59.2 percent of the total variation in the Operational Self-Sufficiency Ratio as explained by independent variables (debt to equity ratio (DER), cost per borrower (CPB), number of borrowers (BREADTH), loan per loan officer (Prodvty), average loan size per average borrower (DEAPTH), return on equity (RE) and percentage of female borrowers (Pfemb) of MFIs.) jointly. Therefore, these seven variables explain 59.2% of the variance of operational self-sufficiency. The reported F-statistics in the regression output is 23.648 and its Prob. (F-Statistics) is 0.00000.

Based on this the researcher concluded that all the significant explanatory variables are jointly have power in explaining the operational self-sufficiency of microfinance institutions in Ethiopia. Therefore, the null hypotheses which were articulated as the predictor variables coefficients are simultaneously equal to 0 are rejected. Thus, the concluding remark here is that the predictor variables are significant in influencing the changes in the OSS. The rule of thumb for the rejection of the null hypothesis is that, if the P-value of the F-statistics is less than 0.05 (5%). Therefore the Prob. (F-statistics) here is 0.00000.

The regression result of the analysis indicates that number of borrowers and average loan size per average borrower, positively affects the operational sustainability of Microfinance institutions in Ethiopia significantly at 0.0000 % and 0.03 % respectively. For this particular study, debt to equity ratio and cost per borrower are found to be strongly and negatively affect the operational self-sufficiency of microfinance institutions at 1.02 % and 0.21 %. On the other hand, the variables return on equity, loan per loan officer and percentage of female borrowers of MFIs are insignificant. Let us see the details and implication of these variables one by one under the following sections:

Number of Active Borrowers

It is generally assumed that the larger the number of borrowers the better the outreach. Number of active borrowers indicates the level of the breadth of outreach; meaning that the number of poor served by a microfinance institutions (Woller and Schreiner, 2002). This study has found that the

number of active borrower is among the variables that most highly and significantly affects the operational self-sufficiency of microfinance institutions. This variable is statistically significant at 0.000% significance level. This result indicates that an increase in the number of borrowers would lead to an increase in the operational self-sufficiency of an MFI. Thus, if all other things are held constant, larger number of borrowers would lead an MFI to become more sustainable. In general, the larger the number of borrowers the better the sustainability is. Therefore, we reject the null hypothesis which was expressed as there is no significant relationship between the number of active borrowers and operational self-sufficiency of microfinance institutions. Thus, the finding supports the alternative hypothesis that the number of active borrowers affects operational self-sufficiency positively and significantly.

According to LOGOTRI (2006) larger number of borrowers found to be the biggest sustainability factor, on the contrary, Ganka (2010) on Tanzanian microfinance institutions reports negative and significant relationship between breadth of outreach and sustainability. Ganka (2010) concludes on the result that increased in number of borrower itself does not improve sustainability of microfinance institutions. The reason could be increased inefficiency as a result of increased number of borrowers. However, Hartarska (2005) reports that number of borrowers had no significant impact on financial sustainability.

Average Loan Balance per Borrower

Studies such as Hulme and Musley (1996) assert that without the poor the supposed MFI is no longer different from a bank. Their argument is that outreach should not be measured by just total number of clients but it should rather be based on the number of poor clients. Besides, according to Ledgerwood (1999) the number of borrowers or clients as a measure of outreach considers only the total number of clients served from various products of MFIs without their relative level of poverty. Thus, average loan size has been used as a proxy measure of depth of outreach using relative level of poverty. Smaller loans indicate poorer customers (Cull et al., 2007).

As the regression result for the average loan balance per borrower indicates the level of the depth of outreach; it is strongly significant in affecting the operational self-sufficiency of an MFI in Ethiopia positively at 0.03% significance level. This variable is measured by dividing the gross loan portfolio by the number of active borrowers. The value for this variable will be increased if

the gross loan portfolio is increased, other thing being constant. If the gross loan portfolio is increased instead of increasing the number of borrowers, it increases the efficiency of MFIs in making collection in two terms. The first thing is that the PAR will be reduced; if the outstanding loans are on the hand of few numbers of borrowers, for the MFI, there is nothing to worry about since it is on the hand of critically selected borrower. But this must be interpreted with a great caution because if the microfinance institution is to select among the borrowers, they may opt for the marginal poor and the poorest of the poor may be neglected here, and therefore a mission drift will occur Ledgerwood (1999). Second, if the borrowers are relatively few in number, the collection effort made by the MFI will be reduced which will greatly affects the cost spend per borrower and increases personnel productivity. Thirdly, the cost will be minimal for an MFI when it process and manage large loans with the lower number of borrowers. This study has made analysis on the impact of cost per borrower on the operational sustainability of Ethiopian MFI and the result is indicated under the next paragraph which negatively affects the operational sustainability. To conclude, therefore, as the result indicates, an increase in the average loan balance increases the operational self-sufficiency of MFI in Ethiopia by reducing the PAR and the cost per borrower. Therefore, we reject the null hypothesis which was articulated as there is no significant relationship between the average loan balance per borrower and operational self-sufficiency of microfinance institutions. Thus, the finding supports the alternative hypothesis that the average loan balance per borrower affects operational self-sufficiency positively and significantly. The finding of this study is supported by the findings of Ganka (2010), Melkamu (2008). The findings by these researchers conclude that microfinance sustainability is associated with higher loan size. However, the study made by Nadiya M (2011), is against the finding of this study, indicating operational self-sufficiency is negatively and significantly related to average loan size per borrower.

Percentage of female borrowers

According to the econometric result the Percentage of female borrowers, which is a measure of ratio of female clients to total clients, is insignificant predictor variable in determining the operational self-sufficiency even at 10 % significance level. The insignificant effect of female clients on operational sustainability contradicts the MFI literature that suggests that female clients relate to higher repayment rate (Makombbe et al 2005; Kabeer 2001) and therefore operational

sustainability. The result tends to suggest that female clients are positively related to operational sustainability. However, the relationship is not statistically significant even at 10 % significance level.

Cost per Borrower

The cost per borrower that an MFI incurs, negatively affects the operational self-sufficiency of Ethiopian microfinance institutions at 0.21 % significance level. The result from the analysis indicates that the increase in cost per borrower reduces the operational sustainability of microfinance institutions. The cost per borrower measures the MFI effectiveness in cost reduction given the number of borrowers they are serving. This implies the role of cost reduction in improving the operational sustainability. Therefore, we reject the null hypothesis which was articulated as there is no significant relationship between cost per borrower and operational self-sufficiency of microfinance institutions. Thus, the finding supports the alternative hypothesis that the cost per borrower affects operational self-sufficiency negatively and significantly. This finding is in line with that of Dissanayake (2012) which has found a strong negative relationship between cost per borrower ratio and operational self -sufficiency ratio. Woller and Schreiner (2002) examined the determinants of sustainability and it was found that cost per borrower was significant determinant of sustainability. However, Christen et al. (1995) found no association between cost per borrower and operational sustainability. Besides, Ganka (2010) indicated a negative statistically insignificant relationship between cost per borrower and financial self sustainability.

Return on Equity

Return on Equity indicates of how profitable a company is relative to its total equity. It is calculated by dividing net income after taxes and excluding any grants and donation by period equity. It gives us an idea as to how efficient management is in using its equity to generate earnings. According to the econometric result the Return on Equity, which is a measure of how well the institution uses all its equity and an overall measure of profitability reflecting both the profit margin and the efficiency of the institutions, is insignificant predictor variable in determining the operational self-sufficiency even at 10 % significance level. However, the beta coefficient value indicates it have a positive value. Based on the analysis, therefore, we fail to reject the null hypothesis which was articulated as there is no significant relationship between Return on Equity and operational self-sufficiency ratio of microfinance institutions in Ethiopia. Mohd et al (2014), have made a study on

the determinants of performance and financial self-sustainability of Microfinance Institutions (MFIs) in Bangladesh. The study showed that ROE has a positive effect on Operational self-sufficiency.

Debt to Equity Ratio

The result from the econometric analysis indicates the variable Debt to equity ratio has a negative and statistically significant impact on operational sustainability. The negative coefficient indicates that the more MFI is debt financed compared to other sources of finance, the more they be deficient in their sustainability. In other words, equity financing improves operational sustainability. The reason could be caused by the fact that owners benefit not from debt but rather from loans given to them. This makes equity a relatively cheaper source of finance and, therefore, improves operational sustainability. This finding supports the finding on debt to equity ratio by Dissanayake (2012), that leveraged MFI are more sustainable. The result by Hartarska and Nadolnyak (2007) is also indicated that less leveraged MFIs have better operational self-sufficiency (OSS). This study found debt to equity variable to be significant negative predictor for operational self-sufficiency, Therefore, based on the regression result from the study, we reject the null hypothesis which was formulated to show the absence of a significant relationship between debt to equity ratio and operational self-sufficiency of Ethiopian microfinance institutions.

Loan per loan officer

Loan portfolio per loan officer measures the productivity of a loan officer in terms of number of active loans handled by him/her. The loan portfolio per loan officer is given by the number of active loans divided by number of loan officers. According to the econometric result the loan per loan officer, which is a measure of productivity, is insignificant predictor variable in determining the operational self-sufficiency even at 10 % significance level. However, the correlation value indicates it have a negative value. Based on the analysis, therefore, we fail to reject the null hypothesis which was articulated as there is no significant relationship between loan per loan officer and operational self-sufficiency ratio of microfinance institutions in Ethiopia.

To compare which variable contributes relatively more to the other for the operational sustainability among the significant predictor variables, their beta coefficient has been compared. The comparison here is based on the beta coefficient which measures the relative strength of

various predictors within the model. Based on this, the beta coefficient for the significant variables; debt to equity ratio, cost per borrower, number of borrowers and average loan per borrower are -0.04512, -0.0102, 0.16632, and 0.2772 respectively. Thus, this indicates that relatively, the average loan per borrower improves operational sustainability more than the Number of borrowers of microfinance institutions. On the other hand, Debt to equity ratio negatively affects the operational sustainability more strongly than the cost per borrower. To put the relative strength of the beta coefficient regardless of their relationship with the dependent variable, it is found that the average loan per borrower is on the first place, Number of borrowers on the second, Debt to equity ratio on the third place and lastly cost per borrower.

To summarize, debt to equity ratio, cost per borrower, number of borrowers and average loan per borrower affects the operational self-sufficiency of microfinance institutions significantly. On the other hand, macroeconomic variable Inflation rate, cost per borrower, Size of MFI and the yield on gross loan portfolio are statistically significant variables in affecting financial sustainability of the microfinance institutions in Ethiopia.

Chapter 5 Conclusion and Recommendation

This chapter presents the key conclusions and recommendations made in the study, their implications and the areas for future research work. The conclusions are presented in two categories; first conclusions made from descriptive statistics of the explanatory variables and the determinants of Financial self-sufficiency and operational self-sufficiency of Ethiopian MFIs and the second section is about the implications of the conclusion made. And finally, recommendations for both MFI and future researchers is provided.

5.1 Conclusions

The average of operational sustainability of the 10 selected MFI is 115.17% indicating sustainability. This shows that, on average the operational sustainability of MFI in Ethiopia is 1.15 and therefore, we can infer from this that Ethiopian microfinance institutions are operationally sustainable. The average of the financial sustainability is 88.5% which indicates that MFI in Ethiopia are not Financial self-sufficient. The statistic for this variable is lower than the accepted benchmark of 100 %, hence, MFIs are not financially sustainable.

The operating expense of 29 cents is what actually the industry incurs on average for each dollar in the gross loan portfolio. Some highly efficient institutions incur 3 cents, while the inefficient institutions in the industry incur an operating expense of 1 USD 99 cent for each dollar on their gross loan portfolio. The average total asset of the microfinance industry in the country is about 2,326,789USD. These institutions are leveraged on average than financed through equity capital as their mean for debt to equity ratio indicates. The ratio for this variable is 1.6. The microfinance industry in the country generates on average 24 cents cash for each single dollar in the outstanding loan portfolio. The minimum and maximum yield on the gross loan portfolio for this study is 10 cents and 48 cents respectively. On average number of loans per loan officer for Ethiopian MFIs was 330. The minimum and maximum 81.5 and 897.8 respectively. Ethiopian MFIs staffs were more productive even above the African average productivity over the study periods. 29% Ethiopian MFIs loan has been held by deposits. Comparison of this ratio with other jurisdiction indicated that MFIs in Eastern Africa and Western Africa have mean score of DM 48.6% and 59.5%respectively indicating that MFIs in these regions have mobilized higher commercial sources (savings) for financing their loan than MFIs in Ethiopia.

The portfolio quality is low as PAR>30 stood at a mean score of 6.4%. This is a little bit lower than the mean score of east Africa region ratio which stood at 8.3%. Ethiopian MFIs are relatively at a lower risk of loan delinquency. The average percentage of female borrowers is 57 % percent of total borrowers. Average return on equity is – 2 %, indicating that they loss 0.02 USD on a 1 USD equity they owned. The maximum return on equity is 0.36 USD and the minimum is -0.40 USD, which is a total loss by any standard. This indicates that there are MFIs either running on a loss or operation with idle capacity. Average value of inflation is found to be 12.3 and it is higher than the average of the entire African continent which was 9%. The increased inflationary trends may have a negative effect by eroding the real value of MFIs' equity.

On average a microfinance institution in Ethiopia are reaching 16,317 numbers of borrowers (in other words poor). The cost per borrower for Ethiopian MFI is USD 18.5 on average to serve a single borrower. Some of the inefficient MFIs incurred USD 66, while the efficient MFIs are incurring only 6 USD per borrower. On the other hand, Microfinance industry in Ethiopia provides, on average, USD 95 for a borrower. The highest average loan size is USD 372, which is an indication of serving relatively non poor clients. Therefore, the loan size that Ethiopian microfinance institutions provide is small.

In an attempt to determine the significant determinants of OSS and FSS, the researcher hypothesized that the yield on gross loan portfolio, cost per borrower, macroeconomic variable Inflation rate, Size of MFI, Deposit Mobilization, portfolio at risk and operating expense ratio to be statistically significant predictor variables in determining financial self-sufficiency. Similarly, this study also hypothesized that the number of borrowers, average loan size per borrower, debt to equity ratio, cost per borrower, return on equity, loan per loan officer and percentage of female borrowers are statistically significant predictor variable in determining operational self-sufficiency. Based on this, the study found that macroeconomic variable Inflation rate, cost per borrower, size of an MFI and the yield on gross loan portfolio are statistically significant variables in determining financial self-sufficiency. On the other hand, the study found average loan size per average borrower, cost per borrower, number of active borrowers, and the debt to equity ratio to be statistically significant predictor variables in determining the operational self-sufficiency of Ethiopian microfinance institutions.

The quantified value for relation between cost per borrower with operational self-sufficiency and financial self-sufficiency, shows that, changes in the predictor variable negatively affected changes in the operational and financial self-sufficiency significantly. Also, return on equity negatively affect the operational self-sufficiency of microfinance institutions. On the other hand, correlation values of average loan balance per borrower and number of borrowers together with the operational self-sufficiency indicate that changes in the predictor variables positively contribute towards changes in the operational self-sufficiency. Finally, correlation values of Size of MFI and yield on gross portfolio together with financial self-sufficiency indicates the change in the predictor variables positively contributes towards changes in financial self-sufficiency significantly. On the other hand, correlation values of macroeconomic variable Inflation rate (INF) together with the financial self-sufficiency indicate that changes in the predictor variables negatively contribute towards changes in the financial self-sufficiency.

Based on the findings, therefore, the following concluding remarks have been made by the researcher. The conclusions made are: Microfinance institutions in Ethiopia are operationally self-sufficient but they are not financially self-sufficient. The loan size that Ethiopian microfinance institutions provide is small relative to other MFIs in African country. Ethiopian microfinance institutions are highly efficient in absolute terms in terms of the cost per borrowers and average number of loans per loan officer when compared to the African countries average. Average loan size per average borrower, cost per borrower, number of active borrowers, and the debt to equity ratio are statistically significant predictor variables which determines the operational self-sufficiency of microfinance institutions in Ethiopia. Return on equity, loan per loan officer and percentage of female borrowers are not statistically significant determinant variables of operational self-sufficiency of MFIs in Ethiopia. Macroeconomic variable Inflation rate, cost per borrower, size of an MFI and the yield on gross loan portfolio are statistically significant predictor variables in determining the financial self-sufficiency of Ethiopian microfinance institutions. Deposit Mobilization, operating expense ratio and portfolio at risk are statistically insignificant predictor variables in determining financial self-sufficiency

5.2. Recommendations

5.2.1 Recommendations for Microfinance Institutions

Based on the findings of the study, the researcher has recommended certain points what he thought to be very critical if considered and implemented by the microfinance institutions accordingly and properly. Therefore, the following suggestions have been given.

Ethiopian MFIs has to maintain a sufficient level of FSS ratio to ensure its financial sustainability. This is because the empirical evidences showed that unless 100 % FSS ratio is reached, the long-term provision of credit services is destabilized and MFI opts on the continued necessity to rely on donor funds. This is due to the fact that, if an MFI fail to achieve financial self-sufficiency, eventually its equity will be reduced by losses or must be compensated by grants. To be financially self-sufficient, therefore, one thing Ethiopian MFIs can do is they must increase the number of active borrowers they are serving or must expand their breadth so that they could increase the volume of sell (loan). This will reduce the cost per borrower when the number of borrowers is increased, because the total cost will be distributed over the total number of borrowers. However, selling high volume of loan alone may not guarantee financial sustainability. It should be accompanied by effective follow-ups to ensure higher repayment rate and strive to operate at relatively lower operating cost per borrower. Since the study found that cost per borrower to have a negative impact and number of active borrowers to have a positive impact on the operational self-sufficiency. Therefore, Ethiopian MFIs should strive to reduce the cost per borrower to the possible minimum level which will reduce the overall cost of operations.

The econometric result also showed that, Ethiopian MFIs should increase the average loan size (depth of outreach) to be sustainable. That is, larger average loan size will enhance operational sustainability, but; it increases the level of risk in case of defaults of repayments. Thus, MFIs should make every attempt to balance the average loan size. They should also be informed that, as the econometrics result indicates the operational sustainability of Ethiopian MFIs had been getting better hand in hand with the average loan size, inferring less depth of outreach, which implies the sign of mission drift. Therefore, MFIs in Ethiopia should safeguard their sustainability to go in agreement with their objectives if the MFIs still have to make their original mission sustain through putting in place measures for the determinants of mission sustainability. It is also found that size

of an MFI is significant in achieving operational sustainability; therefore, MFIs should increase their value of total assets.

It is also recommended that the government have to play a dominant role in creating and maintaining a conducive environment for empowering MFIs to guarantee their long-term sustainability through maintaining the macroeconomic stability via appropriate monetary and fiscal policies. To do so, the government must reduce its expense, financial institutions must increase saving interest rate, government must minimize its budget deficit and community awareness towards the importance of saving must be done so as to reduce inflation which in the opposite has a significant effect on sustainability of Ethiopian MFIs. This has been recommended based on that sustainability of Ethiopian MFIs are negatively and significantly affected by macroeconomic factor variable of Inflation.

As indicated in the discussion of the finding, the yield on gross loan portfolio, is relatively strong predictor variable of financial sustainability. Thus, a greater emphasis should be given in raising the yield. Financial self-sufficiency can be achieved when microfinance institutions are able to utilize their short term asset to generate cash financial revenues so as to increase the yield on the gross loan portfolio because, the yield on gross loan portfolio indicates the ability of an MFI to utilize the short term assets to generate cash financial revenues. Therefore, the more an MFI utilizes its short-term assets, the greater it generates higher financial revenues, which on the other way round cause higher sustainability. Contrary to our expectations, the percentage of woman members were not significant.

5.2.2 Recommendations for future studies

Further study may also consider MFIs' geographical location, growth stages, ownership, political stability, age, and MFIs product deliver methodology. Moreover, this study concentrated on only financial sustainability component. Therefore, further study can also examine other dimensions of sustainability (mission sustainability, program sustainability, and human resource sustainability) of MFIs in Ethiopia.

Furthermore, this study is limited to only quantitative aspect; it doesn't include the qualitative factors for the determinants of MFIs sustainability in Ethiopia. Future researchers on this topic are also recommended to do comprehensive study by considering other influencing factors using qualitative aspects.

This study used 11 years data to determine factors affecting the financial and operational sustainability. However, the 11 years period is short to allow some detailed econometric analysis. Therefore, future studies may consider taking longer study period. The longer study period may help to unveil what was probably not unveiled in this study.

This study investigated the macroeconomic variables affecting the financial sustainability of Ethiopian MFIs. Further research in this area can be done by investigating macroeconomic variable such as per capita income, real interest rate and GDP growth rate.

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Appendix 1 Data used in the analysis

	BREADTH	CPB	DEAPTH	DER	DM	INF	OER	FSS	OSS	PAR	PFEMB	PRODVTY	RE	SIZE	YGLP
1 - 01	11.93535	8	4.532599	9.43	0.5100	-0.082	0.099900	1.197056	1.0640	0.030200	0.3800	5.840000	0.048900	16.91996	0.146000
1 - 02	12.44902	7	4.276666	7.57	0.5300	0.007	0.088100	1.313769	1.3227	0.020900	0.3800	5.720000	0.284200	17.06645	0.149000
1 - 03	12.57308	6	4.418840	1.14	0.6116	0.137	0.074800	1.535602	1.7843	0.027100	0.2938	5.680172	0.194800	17.30999	0.188100
1 - 04	12.76901	6	4.644391	1.98	0.5524	0.033	0.061900	1.933149	2.3179	0.017500	0.3043	5.814130	0.199200	17.79031	0.191700
1 - 05	12.98267	7	4.770685	2.09	0.5356	0.100	0.061300	1.385568	1.9995	0.019000	0.3858	5.886104	0.196900	18.03400	0.177600
1 - 06	13.19339	7	4.983607	2.34	0.5321	0.123	0.049700	1.495451	2.2391	0.015500	0.4998	5.913503	0.257500	18.37809	0.180300
1 - 07	13.30088	8	5.220356	2.72	0.5564	0.172	0.045900	1.389361	2.2638	0.012700	0.5121	5.955837	0.288300	18.74855	0.179500
1 - 08	13.47383	11	5.389072	3.25	0.5356	0.444	0.055500	0.932157	2.0140	0.013500	0.5981	6.021023	0.364200	19.10301	0.189800
1 - 09	13.42914	8	5.262690	2.81	0.5964	0.085	0.037800	1.574341	2.0416	0.038000	0.6352	5.953243	0.269700	19.03649	0.172900
1 - 11	13.56113	9	5.389072	2.58	0.5973	0.332	0.054400	2.426642	2.4265	0.017500	0.6388	5.811141	0.289200	19.32463	0.204400
1 - 12	13.54944	10	5.537334	2.78	0.6363	0.241	0.050000	1.566700	2.1325	0.016400	0.6254	5.840000	0.240000	19.49464	0.194500
2 - 01	6.493754	29	4.718499	0.26	0.2970	-0.082	0.302000	0.664676	0.6432	0.140500	0.6641	5.414200	-0.006100	11.91523	0.173200
2 - 02	7.540622	35	4.653960	0.44	0.2100	0.007	0.322700	0.590477	0.6008	0.142300	0.6840	5.200000	-0.138300	12.29987	0.132000
2 - 03	7.960672	20	4.477337	0.73	0.2948	0.137	0.207900	0.663380	0.9128	0.120300	0.5677	5.541264	-0.026100	12.70954	0.183900
2 - 04	8.490233	14	4.369448	0.56	0.3254	0.033	0.173800	0.692153	0.7321	0.131500	0.5112	5.717028	-0.102900	13.21126	0.230700
2 - 05	8.690810	14	4.828314	0.60	0.2511	0.100	0.131800	0.601841	0.7676	0.130200	0.4976	5.693732	-0.062300	13.73033	0.161000
2 - 06	8.954028	16	4.736198	0.67	0.3043	0.123	0.136100	0.622225	0.8652	0.100600	0.6467	5.659482	-0.031700	14.11227	0.166700
2 - 07	9.134215	19	4.727388	0.62	0.3064	0.172	0.165600	0.766044	1.2591	0.096100	0.6477	5.874931	0.055800	14.27926	0.247900
2 - 08	9.341498	20	4.620500	1.01	0.3120	0.440	0.111200	0.720000	1.0010	0.100100	0.6277	5.730731	0.006000	14.02279	0.241100
2 - 09	9.540867	16	4.158883	0.59	0.3708	0.085	0.106000	0.741400	1.1000	0.099100	0.6327	5.749307	0.040580	14.18879	0.232900
2 - 11	9.531699	19	4.174387	0.75	0.4103	0.332	0.130400	0.697800	0.9100	0.120000	0.5477	5.693731	0.000558	14.01025	0.204900
2 - 12	9.521511	15	4.147134	1.33	0.5040	0.241	0.090600	0.946000	1.4000	0.096100	0.6270	5.849308	0.096000	14.11224	0.249000
3 - 01	8.016318	19	3.526361	0.09	0.2001	-0.082	0.560000	0.714487	0.7089	0.068000	0.8099	5.994000	0.000400	12.31657	0.341110
3 - 02	8.462525	19	3.688879	0.12	0.2190	0.007	0.508000	0.920777	0.9377	0.060000	0.8101	5.400000	-0.020500	12.61525	0.357000
3 - 03	8.699348	16	3.688879	0.19	0.2151	0.137	0.398200	0.792979	1.0412	0.058500	0.8201	5.564520	0.013500	12.93900	0.481000
3 - 04	8.625330	18	3.784190	0.30	0.3540	0.033	0.420900	0.920390	1.0039	0.012600	0.7609	5.327876	0.001000	13.50431	0.464800
3 - 05	9.221972	22	4.477337	0.51	0.1531	0.100	0.303700	0.594869	0.7649	0.003900	0.7048	5.609472	-0.066600	13.97876	0.245100
3 - 06	9.810110	17	4.158883	0.51	0.2334	0.123	0.233600	0.938532	1.2448	0.005500	0.7791	5.652489	0.068100	14.35917	0.317000
3 - 07	10.34657	16	4.248495	1.32	0.2701	0.172	0.232100	0.936242	1.2967	0.016700	0.7543	6.056784	0.109700	14.94898	0.344600
3 - 08	10.56929	16	4.394449	1.25	0.2359	0.444	0.213500	0.812604	1.4459	0.023800	0.7800	6.137727	0.190700	15.28372	0.373300
3 - 09	10.64890	17	4.454347	1.31	0.2021	0.085	0.209500	0.822200	1.4059	0.030380	0.7540	6.107727	0.107000	15.30349	0.343300
3 - 11	11.00489	15	4.754347	0.90	0.1569	0.332	0.210950	0.921718	1.5912	0.019900	0.7557	6.177270	0.217000	15.41367	0.446300
3 - 12	11.12413	16	4.844187	1.55	0.2026	0.241	0.209500	1.317309	1.4941	0.006800	0.7500	6.234411	0.190700	16.13714	0.415000
4 - 01	7.756623	18	3.583519	0.22	0.0500	-0.082	0.354000	0.250859	0.7500	0.103400	0.4206	4.433400	-0.004000	12.35463	0.175000
4 - 02	8.104099	18	3.951244	0.10	0.1020	0.007	0.270904	0.992842	1.0179	0.022300	0.3485	5.722000	0.004000	12.66400	0.382230
4 - 03	8.785692	15	4.189655	1.58	0.1192	0.137	0.246600	0.768461	1.0383	0.001400	0.3378	5.420535	0.013400	13.50732	0.321300
4 - 04	9.182764	12	4.477337	2.01	0.1158	0.033	0.147700	1.457048	1.5495	0.005600	0.2600	5.627621	0.218600	13.92775	0.306900
4 - 05	9.428029	12	4.672829	2.63	0.1201	0.100	0.117800	1.263249	1.4805	0.002200	0.2427	5.765191	0.204700	14.54743	0.267000
4 - 06	10.10602	12	4.744932	2.11	0.0985	0.123	0.110800	1.380393	1.5956	0.006300	0.3512	5.814130	0.241800	15.07936	0.261900
4 - 07	10.23070	13	4.912655	2.55	0.1151	0.172	0.099400	0.869646	1.0448	0.096500	0.2783	6.040255	0.032600	15.25271	0.267000
4 - 08	10.21347	15	4.912655	2.87	0.1473	0.444	0.110500	0.677899	1.0084	0.105800	0.3167	5.978886	0.006700	15.27639	0.233600
4 - 09	10.12005	15	4.663439	2.86	0.1851	0.085	0.110610	0.895000	0.9995	0.115000	0.2783	5.888577	0.005600	15.11892	0.200026
4 - 11	10.15460	11	4.624973	2.68	0.1783	0.332	0.101000	1.104000	1.3340	0.005100	0.3423	5.999600	0.220000	14.83375	0.300260
4 - 12	10.01234	12	4.919981	2.44	0.3132	0.241	0.127000	1.061138	1.1760	0.030400	0.3469	5.918894	0.152200	15.01997	0.273003
5 - 01	8.385033	20	4.143135	1.98	0.3200	-0.082	0.344000	0.702591	0.7248	0.177700	0.7099	5.100400	-0.075000	13.59676	0.200010
5 - 02	8.613231	26	3.988984	0.29	0.3202	0.007	0.438500	0.666859	0.6754	0.181000	0.5332	5.000100	-0.105100	13.62027	0.200000
5 - 03	8.767640	22	4.094345	0.65	0.6161	0.137	0.375100	0.405925	0.6078	0.346400	0.5435	5.407172	-0.098700	13.84515	0.268800
5 - 04	9.040145	18	4.521789	1.43	0.4838	0.033	0.229100	0.651908	0.7249	0.172700	0.7088	5.575949	-0.077500	14.16350	0.203500
5 - 05	9.192278	18	5.111988	1.30	0.3649	0.100	0.136100	0.909325	1.0967	0.181300	0.4047	5.505332	0.036200	14.44463	0.232800
5 - 06	9.243484	19	4.941642	1.28	0.3835	0.123	0.127400	0.738703	0.9368	0.373100	0.5564	5.686975	-0.025900	14.39335	0.190900
5 - 07	9.475317	18	4.779123	1.10	0.3353	0.172	0.140100	0.830475	1.1354	0.219900	0.0964	5.811141	0.053800	14.40348	0.216500
5 - 08	8.348537	25	5.924256	3.14	0.3154	0.444	0.139800	0.566926	1.1175	0.261800	0.6314	5.365976	0.062300	14.53800	0.225800
5 - 09	9.555277	20	4.488636	3.05	0.3506	0.085	0.127500	0.714000	1.0900	0.210000	0.6577	5.789200	0.056200	14.35429	0.200800
5 - 11	8.852379	19	4.804021	3.34	0.3595	0.332	0.124500	0.705000	1.0050	0.219000	0.5544	5.320400	0.052300	13.99822	0.195800
5 - 12	8.620472	17	5.214936	3.34	0.2994	0.241	0.090000	1.114500	1.3500	0.154000	0.5640	5.540200	0.123000	13.99130	0.273000

7 - 01	6.412600	54	2.758900	0.01	0.0110	-0.082	1.999950	0.049000	0.0540	0.002400	0.7200	5.100400	-3.991000	11.43690	0.282000
7 - 02	6.849066	52	3.091043	0.01	0.0190	0.007	1.920000	0.073880	0.0739	0.001700	0.7582	5.114000	-3.720000	11.86663	0.290000
7 - 03	7.313887	57	3.583519	0.01	0.0240	0.137	1.861700	0.128829	0.1546	0.053300	0.5203	5.365976	-0.354200	12.19052	0.289300
7 - 04	8.097426	35	3.465736	0.01	0.0270	0.033	1.412000	0.150007	0.1930	0.046900	0.6400	5.412000	-0.302000	12.33504	0.240000
7 - 05	8.435983	23	3.610918	0.01	0.0640	0.100	0.643200	0.290528	0.3488	0.138100	0.7180	5.796058	-0.223400	12.71319	0.237300
7 - 06	8.853951	21	4.110874	0.03	0.0390	0.123	0.403400	0.410060	0.5164	0.065900	0.9347	6.021023	-0.136400	13.26551	0.211900
7 - 07	9.288320	15	4.127134	0.31	0.2173	0.172	0.238100	0.533036	0.8135	0.069100	0.7230	6.068426	-0.046700	13.79236	0.238200
7 - 08	9.328400	15	4.069000	0.28	0.2825	0.444	0.205500	0.368054	1.0220	0.099911	0.6900	6.120020	0.004600	13.98419	0.232000
7 - 09	9.557753	17	4.043051	0.25	0.2595	0.085	0.215100	0.659730	0.9041	0.113600	0.7739	6.298949	-0.020500	13.99829	0.213100
7 - 11	9.366831	17	4.060443	0.32	0.3168	0.332	0.210100	0.591000	0.9210	0.100001	0.8100	6.324560	-0.007000	13.83340	0.221000
7 - 12	9.418817	17	4.488636	0.59	0.2131	0.241	0.221000	0.620100	0.9051	0.101110	0.8400	6.450400	-0.009100	14.17110	0.211000
10 - 01	8.121778	28	4.262680	1.53	0.2000	-0.082	0.340400	0.513957	0.5029	0.001400	0.5999	5.899100	-0.170200	13.22357	0.289000
10 - 02	8.340933	27	4.532599	1.44	0.2350	0.007	0.319300	0.594534	0.6033	0.001200	0.6202	5.900002	-0.160600	13.46759	0.279000
10 - 03	8.599326	21	4.682131	1.37	0.2283	0.137	0.205100	0.628905	0.8040	0.001800	0.6525	6.105230	-0.064200	13.67892	0.136100
10 - 04	8.957511	20	4.744932	1.27	0.2496	0.033	0.175400	1.423998	1.5255	0.001500	0.7662	6.249975	0.162600	14.08841	0.288100
10 - 05	9.527193	15	4.875197	2.60	0.2207	0.100	0.120900	0.825807	1.0307	0.001300	0.7979	6.754604	0.011000	14.61282	0.156600
10 - 06	9.867083	12	5.081404	2.73	0.2216	0.123	0.081500	1.569673	1.9584	0.006700	0.7957	6.822197	0.362600	15.01924	0.193700
10 - 07	9.876681	13	5.187386	2.19	0.2430	0.172	0.075100	1.357370	1.8765	0.005000	0.7457	5.521461	0.308400	15.20493	0.213500
10 - 08	9.899529	17	5.283204	1.98	0.2551	0.444	0.091100	0.809891	1.6495	0.004800	0.7659	5.420535	0.227300	15.30245	0.212100
10 - 09	9.807747	15	5.153292	1.70	0.2878	0.085	0.071100	1.270897	1.2397	0.055200	0.8114	5.433220	0.233200	15.18022	0.223200
10 - 11	9.803004	23	5.087596	1.21	0.2856	0.332	0.148900	0.690427	1.3261	0.001000	0.8080	5.777652	0.105200	15.10545	0.223600
10 - 12	10.04042	17	5.147494	1.34	0.3153	0.241	0.100400	0.964000	1.3221	0.004000	0.7889	6.429719	0.122300	15.23320	0.223300
11 - 01	8.783549	17	4.189655	0.70	0.3700	-0.082	0.230200	0.606702	0.5536	0.034300	0.7199	6.012080	-0.092000	13.51382	0.210000
11 - 02	8.952605	17	4.442651	0.83	0.3720	0.007	0.221600	0.692497	0.7071	0.011200	0.6999	6.015540	-0.087200	13.81246	0.200010
11 - 03	9.164506	16	4.488636	0.91	0.5172	0.137	0.182500	0.761310	1.0606	0.021800	0.6900	6.028278	0.016400	14.05913	0.213200
11 - 04	9.343997	15	4.644391	1.03	0.4184	0.033	0.155400	0.939899	1.0368	0.047400	0.6000	6.011267	0.009700	14.31619	0.195500
11 - 05	9.571157	14	4.709530	0.81	0.3840	0.100	0.128900	0.805177	1.0439	0.086000	0.5451	6.274762	0.011300	14.57757	0.190600
11 - 06	9.861050	15	4.828314	0.90	0.3542	0.123	0.124000	0.873400	1.2669	0.040500	0.6684	6.364751	0.058400	14.89735	0.183500
11 - 07	10.13832	15	4.787492	1.19	0.3767	0.172	0.120200	0.694489	1.1127	0.068600	0.5001	6.148468	0.028000	15.13762	0.164000
11 - 08	10.18335	16	4.804021	1.19	0.4355	0.444	0.130000	0.555186	1.1933	0.037700	0.5500	6.115892	0.064800	15.28150	0.234200
11 - 09	10.27657	14	4.521789	1.31	0.4784	0.085	0.141000	0.892000	1.1500	0.034000	0.5400	6.121010	0.040000	15.25929	0.210000
11 - 11	10.39345	12	4.663439	1.41	0.3818	0.332	0.127000	0.721837	1.4915	0.033300	0.5600	6.315358	0.143500	15.43621	0.234600
11 - 12	10.48969	12	5.030438	1.76	0.3327	0.241	0.119912	1.010000	1.5300	0.332000	0.5350	6.323413	0.161000	15.82930	0.241000
13 - 01	9.210417	23	4.417069	7.40	0.2020	-0.082	0.191000	0.610000	0.7400	0.050000	0.2800	5.324100	-0.002000	14.32010	0.201000
13 - 02	9.266626	20	4.553877	7.12	0.2510	0.007	0.142600	0.950240	0.8677	0.056000	0.2991	5.536150	0.112200	14.37680	0.144500
13 - 03	9.261414	20	4.744932	7.68	0.2190	0.137	0.189200	0.624510	0.6307	0.027000	0.2873	5.554500	-0.998400	14.53310	0.108500
13 - 04	9.405167	23	4.682131	0.77	0.3478	0.033	0.206300	0.872185	0.8862	0.053200	0.3344	5.899200	-0.051000	14.66263	0.198600
13 - 05	10.21786	22	4.727388	1.49	0.2783	0.100	0.195100	0.811872	1.0110	0.032600	0.4652	5.572154	0.005200	15.09570	0.217700
13 - 06	10.71308	21	4.779123	1.12	0.2574	0.123	0.176600	1.084462	1.2907	0.054600	0.6130	5.575949	0.116900	15.62530	0.177600
13 - 07	10.78245	26	4.927254	1.77	0.2527	0.172	0.199500	0.757012	0.9909	0.027400	0.5964	5.545177	-0.004700	15.88733	0.208100
13 - 08	10.94615	28	5.003946	1.29	0.2457	0.444	0.193300	0.614024	1.0049	0.038500	0.6484	5.572154	0.002500	16.06781	0.203800
13 - 09	10.93849	30	4.897840	1.27	0.2450	0.085	0.301000	0.798548	0.9257	0.049500	0.6594	5.564220	-0.056000	15.95480	0.343100
13 - 11	10.01234	60	4.969813	1.11	0.3132	0.332	0.427100	0.961497	0.9615	0.030400	0.3469	5.918894	-0.015600	16.47315	0.364600
13 - 12	11.05127	66	5.446737	1.06	0.3391	0.241	0.317800	0.817674	1.1709	0.017800	0.6649	5.793014	0.066300	16.83409	0.341300
14 - 01	7.284135	12	4.043051	0.26	0.2100	-0.082	0.197000	0.934969	0.9021	0.017880	0.6500	5.517740	0.007799	11.70766	0.323300
14 - 02	7.955074	12	4.317488	0.39	0.3400	0.007	0.175000	1.589851	1.6229	0.015660	0.5902	5.541800	0.150600	12.36425	0.455000
14 - 03	8.223627	12	4.234107	0.44	0.2538	0.137	0.166800	0.981215	1.3990	0.068800	0.6100	5.583496	0.097100	12.85694	0.312800
14 - 04	9.099298	12	4.276666	0.92	0.2681	0.033	0.175800	1.344298	1.4525	0.032100	0.3885	5.840641	0.119400	13.76845	0.319000
14 - 05	9.405167	12	4.262680	1.06	0.3322	0.100	0.162500	0.805475	1.1786	0.075800	0.3889	5.645447	-0.002500	14.26512	0.259300
14 - 06	10.02972	13	4.532599	1.16	0.3049	0.123	0.152100	0.915112	1.1304	0.008800	0.4436	6.023448	0.040100	14.90033	0.239300
14 - 07	10.33361	11	4.595120	1.35	0.3209	0.172	0.113500	1.005708	1.4792	0.017000	0.3623	6.222576	0.134800	15.23473	0.242600
14 - 08	10.56248	11	4.753590	2.03	0.3060	0.444	0.098900	0.700050	1.6500	0.008800	0.4326	6.232448	0.195900	15.49271	0.222400
14 - 09	10.65197	11	4.787492	2.15	0.3279	0.085	0.096800	1.542462	1.8415	0.014100	0.4564	6.361302	0.294600	15.71549	0.249800
14 - 11	10.91474	11	4.804021	1.82	0.3348	0.332	0.092100	1.647243	1.6468	0.009500	0.4311	6.381816	-0.070000	15.92889	0.222000
14 - 12	11.05946	14	4.919981	2.02	0.3110	0.241	0.113800	1.119449	1.8257	0.009300	0.4073	6.169611	0.276300	16.25516	0.275800

Appendix 2 a Heteroskedasticity LR Test for FSS model

	Value	Df	Probability
Likelihood ratio	32.20462	10	0.0004

LR test summary:

	Value	Df
Restricted LogL	9.456604	102
Unrestricted LogL	25.55891	102

Variable	Coefficient	Std. Error	t-Statistic	Prob.
C	-1.086425	0.255221	-4.256796	0.0000
YGLP	1.219513	0.220964	5.519069	0.0000
INF	-0.683510	0.124099	-5.507803	0.0000
DM	0.264070	0.161363	1.636498	0.1048
OER	-0.242349	0.071296	-3.399213	0.0010
SIZE	0.117982	0.018221	6.475182	0.0000
PAR	-0.118484	0.237850	-0.498146	0.6195
CPB	-0.002612	0.002284	-1.143668	0.2554

Weighted Statistics

R-squared	0.755977	Mean dependent var	1.150526
Adjusted R-squared	0.739230	S.D. dependent var	0.497978
S.E. of regression	0.260419	Akaike info criterion	-0.319253
Sum squared resid	6.917431	Schwarz criterion	-0.122854
Log likelihood	25.55891	Hannan-Quinn criter.	-0.239593
F-statistic	45.14193	Durbin-Watson stat	1.316828
Prob(F-statistic)	0.000000		

Unweighted Statistics

R-squared	0.574528	Mean dependent var	0.885806
Sum squared resid	6.917434	Durbin-Watson stat	1.230961

Appendix 2 b Heteroskedasticity LR Test for OSS model

	Value	Df	Probability
Likelihood ratio	14.76499	10	0.1409

LR test summary:

	Value	Df
Restricted LogL	2.148871	102
Unrestricted LogL	9.531365	102

Variable	Coefficient	Std. Error	t-Statistic	Prob.
C	-0.924539	0.396601	-2.331155	0.0217
DER	-0.048519	0.016186	-2.997545	0.0034
BREADTH	0.207606	0.019400	10.70155	0.0000
CPB	-0.013606	0.003114	-4.369205	0.0000
PRODVTY	-0.079915	0.069146	-1.155744	0.2505
DEAPTH	0.174655	0.053882	3.241417	0.0016
PFEMB	0.076069	0.140268	0.542316	0.5888
RE	0.035955	0.061663	0.583088	0.5611

Weighted Statistics

R-squared	0.792189	Mean dependent var	1.318964
Adjusted R-squared	0.777927	S.D. dependent var	0.707079
S.E. of regression	0.250839	Akaike info criterion	-0.027843
Sum squared resid	6.417884	Schwarz criterion	0.168556
Log likelihood	9.531365	Hannan-Quinn criter.	0.051817
F-statistic	55.54722	Durbin-Watson stat	1.149909
Prob(F-statistic)	0.000000		

Unweighted Statistics

R-squared	0.739361	Mean dependent var	1.151746
Sum squared resid	6.417887	Durbin-Watson stat	1.021010

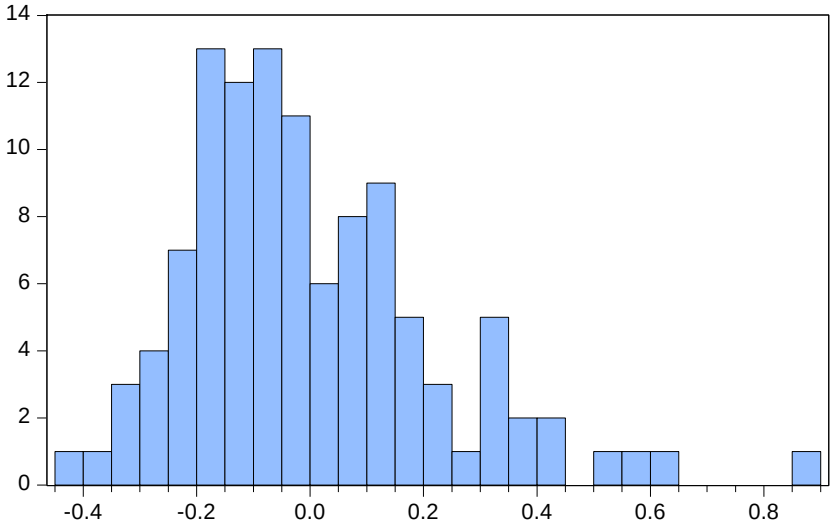
Appendix 3 a Autocorrelation test for FSS model

Test	Statistic	d.f.	Prob.
Breusch-Pagan LM	66.51278	45	0.0202
Pesaran scaled LM	2.267646		0.0234
Pesaran CD	2.287412		0.0222

Appendix 3 b Autocorrelation test for OSS model

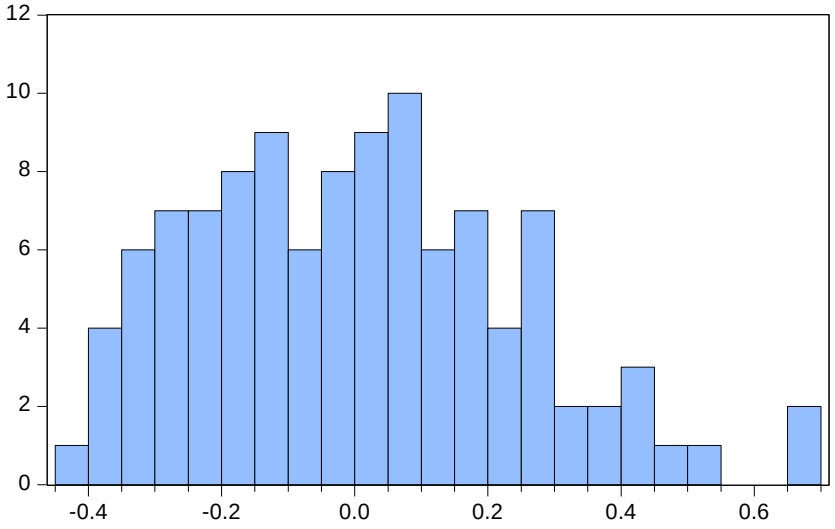
Test	Statistic	d.f.	Prob.
Breusch-Pagan LM	64.79522	45	0.0281
Pesaran scaled LM	2.086600		0.0369
Pesaran CD	0.072307		0.9424

Appendix 4 a Normality test for Ethiopian MFIs' FSS model



Series: Standardized Residuals	
Sample 2001 2012	
Observations 110	
Mean	-9.71e-17
Median	-0.049027
Maximum	0.896954
Minimum	-0.441245
Std. Dev.	0.223054
Skewness	1.079062
Kurtosis	4.781551
Jarque-Bera	35.89402
Probability	0.000000

Appendix 4 b Normality test for Ethiopian MFIs' OSS model



Series: Standardized Residuals	
Sample 2001 2012	
Observations 110	
Mean	1.87e-16
Median	-0.013076
Maximum	0.675516
Minimum	-0.402799
Std. Dev.	0.238376
Skewness	0.456917
Kurtosis	2.806031
Jarque-Bera	3.999953
Probability	0.135338

Appendix 5 a Hausman Test for OSS model

Test Summary	Chi-Sq. Statistic	Chi-Sq. d.f.	Prob.
Cross-section random	5.043914	7	0.6546

Cross-section random effects test comparisons:

Variable	Fixed	Random	Var(Diff.)	Prob.
DER	-0.043891	-0.045123	0.000023	0.7990
BREADTH	0.150582	0.166325	0.000487	0.4757
CPB	-0.008632	-0.010213	0.000001	0.1228
PRODVTY	-0.029309	-0.048416	0.001702	0.6432
DEAPTH	0.286545	0.277203	0.000945	0.7612
PFEMB	0.015091	-0.028322	0.010422	0.6707
RE	-0.009859	-0.012309	0.000064	0.7598

Variable	Coefficient	Std. Error	t-Statistic	Prob.
C	-1.223112	0.474908	-2.575473	0.0116
DER	-0.043891	0.017909	-2.450823	0.0161
BREADTH	0.150582	0.038375	3.924000	0.0002
CPB	-0.008632	0.003390	-2.546503	0.0125
PRODVTY	-0.029309	0.091776	-0.319356	0.7502
DEAPTH	0.286545	0.079349	3.611184	0.0005
PFEMB	0.015091	0.217632	0.069341	0.9449
RE	-0.009859	0.056096	-0.175758	0.8609

Effects Specification

Cross-section fixed (dummy variables)

R-squared	0.819232	Mean dependent var	1.151746
Adjusted R-squared	0.788132	S.D. dependent var	0.475295
S.E. of regression	0.218774	Akaike info criterion	-0.060346
Sum squared resid	4.451168	Schwarz criterion	0.357001
Log likelihood	20.31902	Hannan-Quinn criter.	0.108932
F-statistic	26.34199	Durbin-Watson stat	1.455189
Prob(F-statistic)	0.000000		

Appendix 5 b Hausman Test for FSS model

Test Summary	Chi-Sq. Statistic	Chi-Sq. d.f.	Prob.
Cross-section random	2.850601	7	0.8985

Cross-section random effects test comparisons:

Variable	Fixed	Random	Var(Diff.)	Prob.
YGLP	1.906866	1.702926	0.053979	0.3801
INF	-0.658375	-0.692549	0.007275	0.6887
DM	-0.016023	0.129632	0.049735	0.5137
OER	-0.129335	-0.148975	0.005159	0.7845
SIZE	0.137418	0.139058	0.000357	0.9308
PAR	-0.656014	-0.631676	0.068247	0.9258
CPB	-0.009671	-0.009195	0.000004	0.8207

Variable	Coefficient	Std. Error	t-Statistic	Prob.
C	-1.240355	0.492287	-2.519579	0.0135
YGLP	1.906866	0.472738	4.033667	0.0001
INF	-0.658375	0.206322	-3.191000	0.0019
DM	-0.016023	0.374122	-0.042828	0.9659
OER	-0.129335	0.154094	-0.839326	0.4034
SIZE	0.137418	0.033441	4.109207	0.0001
PAR	-0.656014	0.509139	-1.288477	0.2008
CPB	-0.009671	0.004457	-2.169841	0.0326

Effects Specification

Cross-section fixed (dummy variables)

R-squared	0.726616	Mean dependent var	0.885806
Adjusted R-squared	0.679583	S.D. dependent var	0.386210
S.E. of regression	0.218616	Akaike info criterion	-0.061790
Sum squared resid	4.444743	Schwarz criterion	0.355557
Log likelihood	20.39847	Hannan-Quinn criter.	0.107488
F-statistic	15.44883	Durbin-Watson stat	1.825873
Prob(F-statistic)	0.000000		

Appendix 6 a Regression results for the determinants of financial self-sufficiency

Dependent Variable: FSS

Variable	Coefficient	Std. Error	t-Statistic	Prob.
C	-1.258943	0.406566	-3.096532	0.0025
YGLP	1.702926	0.411706	4.136268	0.0001
INF	-0.692549	0.187866	-3.686405	0.0004
DM	0.129632	0.300387	0.431550	0.6670
OER	-0.148975	0.136330	-1.092753	0.2771
SIZE	0.139058	0.027595	5.039265	0.0000
PAR	-0.631676	0.437007	-1.445460	0.1514
CPB	-0.009195	0.003929	-2.339922	0.0212

Effects Specification	S.D.	Rho
Cross-section random	0.134198	0.2737
Idiosyncratic random	0.218616	0.7263

Weighted Statistics			
R-squared	0.464760	Mean dependent var	0.390524
Adjusted R-squared	0.428027	S.D. dependent var	0.283123
S.E. of regression	0.214123	Sum squared resid	4.676568
F-statistic	12.65265	Durbin-Watson stat	1.746743
Prob(F-statistic)	0.000000		

Appendix 6 b Regression results for the determinants of operational self-sufficiency

Dependent Variable: OSS

Variable	Coefficient	Std. Error	t-Statistic	Prob.
C	-1.166265	0.457334	-2.550140	0.0123
DER	-0.045123	0.017244	-2.616775	0.0102
BREADTH	0.166325	0.031390	5.298713	0.0000
CPB	-0.010213	0.003231	-3.160903	0.0021
PRODVTY	-0.048416	0.081983	-0.590564	0.5561
DEAPTH	0.277203	0.073151	3.789475	0.0003
PFEMB	-0.028322	0.192201	-0.147358	0.8831
RE	0.012309	0.055521	-0.221693	0.8250

Effects Specification	S.D.	Rho
Cross-section random	0.160311	0.3494
Idiosyncratic random	0.218774	0.6506

Weighted Statistics

R-squared	0.618744	Mean dependent var	0.438258
Adjusted R-squared	0.592579	S.D. dependent var	0.339445
S.E. of regression	0.216666	Sum squared resid	4.788304
F-statistic	23.64808	Durbin-Watson stat	1.356372
Prob(F-statistic)	0.000000		

Unweighted Statistics