
**ADDIS ABABA UNIVERSITY**

**COLLEGE OF BUSINESS AND ECONOMICS**

**DEPARTMENT OF MBA IN FINANCE**

# THE EFFECT OF CREDIT RISK MANAGEMENT ON PROFITABILITY OF MICROFINANCE INSTITUTION IN ADDIS ABABA

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**A PROPOSAL SUBMITTED TO COLLEGE OF BUSINESS & ECONOMICS DEPARTEMENT OF BUSINESS ADMINSTRATION IN PARTIAL FULFILLMENT OF THE REQUREMENTS FOR THE DEGREE OF MASTRES OF BUSINESS ADMINSTRATION IN FINANCE**

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This is to certify that the thesis prepared by **Girmaye Wube**, entitled: **The Effect of Credit Risk Management on Profitability Of Microfinance Institution In Addis Ababa** submitted to the department of MBA in finance in partial fulfillment of the requirements for MBA Degree in Finance fulfills with the regulations of the University and meets the accepted standards with respect to originality and quality.

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## Abbreviations and Acronyms

| | |
|---|---|
| ANOVA | Analysis of Variance |
| AEMFI | Association of Ethiopian microfinance institutions |
| CBE | Commercial Bank of Ethiopia |
| MFIs | Micro Finance Institutions |
| NBE | National Bank of Ethiopia |
| NIM | Net Interest Margin |
| NPLTL | Non-Performing Loan to Total Loan |
| OLS | Ordinary Least Square |
| P-value | Probability Value |
| PAR | Portfolio at risk |
| ROA | Return on Asset |
| ROE | Return on Equity |
| TLTA | Total Loan to Total Assets |
| TLTD | Total Loan to Total Deposit |
| VIF | Variance Inflation Factor |
| WOR | Write-off ratio |

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## Abstract

*The objective of the study is to empirically examine the quantitative effect of credit risk management on the profitability of Microfinance Institutions in Addis Ababa. The study has chosen the ROE and ROA as the proxies for profitability. Whereas, the traditional credit risk ratios indicators which are Total Loan to Total Assets (TLTA), Total Loan to Total Deposit (TLTD) and Non- Performing Loan to Total Loan (NPLTL) are used as independent variables to measure the amount of credit level of the MFIs. This was done by collecting data from 8 MFIs operated in Addis Ababa and their annual report for the period from 2009 to 2018 which was published by Association of Ethiopia Microfinance Institution (AEMFI). The data collected was analyzed with the aid of descriptive statistical techniques such as mean, maximum, minimum, and standard deviation. More so, multiple linear regressions were used to establish the relationship between study variables and to test the hypotheses using STATA software. The study made six hypotheses and two regression tests for the two independent variables, ROE and ROA. Key findings from the study confirmed that, Non- Performing Loan to Total Loan (NPLTL) ratio has negatively and significantly influences on both Return on Asset (ROA) and Return on Equity (ROE). Total Loan to Total Deposit (TLTD) ratio has negatively and significantly influences on profitability of MFIs measured in terms of Return on Equity (ROE). The study further found that Total Loan to Total Asset (TLTA) ratio has positively and significantly influences on return on equity (ROE) while it positive but insignificant effect on return on asset (ROA). Based on the study it is recommended that MFIs need to adopt a rigor credit risk management policy, develop their credit risk control capacity, and establish sound and competent credit risk management department. Further research with large sample size and additional indicators of credit risk management and performance is also an interesting expansion for this research.*



***Key Words*****:** *credit risk management; Profitability, microfinance institutions, TLTA, TLTD, NPLTL, ROA and ROE.*

# CHAPTER ONE

# Introduction

## 1.1Back ground of the study

As the critical part of financial systems, microfinance institutions play an important role in contributing to a country's economic development and also operation in an economy. If the microfinance institutions do not perform well, the effect to the economy could be huge and broad. From different part of financial system, Microfinance is the major one playing important role in contributing economic development for the country especially for developing country.

Microfinance refers to small scale financial services for both credits and deposits that are provided to people who farm or fish or herd; operate small or microenterprise where goods are produced, recycled, repaired, or traded; provide services; work for wages or commissions; gain income from renting out small amounts of land, vehicles, draft animals, or machinery and tools; and to other individuals and local groups in developing countries in both rural and urban areas (Robinson, 2001). In addition to distributing loans, MFIs also offer a wide range of financial services, such as savings and insurance options (Premchander 2009). Microfinance is a provision of financial services like savings, credit, insurance, remittance, etc. in a very small quantity generally to the poor people (Dasgupta, 2001).

The concept of micro financing engages lending money to small-scale enterprises and individuals that either can't afford or cannot access bank loans or other forms of financing in the market. This type of lending activity can expose these institutions to credit risks. Thus risk management is and has been a critical part of such institutions (Sanford, 1985). According to Chua et al (2000), Credit risk refers to the likelihood of a loss arising from the default of an individual or an enterprise to repay the loan granted. These losses directly affect financial performance of these MFIs adversely at the end of the year. In order to mitigate on the losses arising from lending activities, the MFIs must make certain that lending risks are not excessive. In other words, in order to help keep the risk exposure within acceptable boundaries they should put in place effective risk management tools or systems. The efficient management of credit risk is a vital part of the overall risk management system and is crucial to every FI's profitability and

eventually their survival in the market (Swarens, 1990). According to Amanuel (2015), The MFIs should operate within sound, well defined credit granting criteria. The criteria should include a clear indication of the institution's target market and a thorough understanding of the borrowers as well as the purpose and structure of the credit and its source of repayment. There has to be a well-defined process of loan approval as well as a clearly established procedure of amendment of the current loan agreement, renewal and re-financing of existing credits (Harker & Satvros, 1998).

Micro finance institutions operate in an environment where customers are without credit histories or necessarily predictable borrowing behaviors making it more necessary to deal with credit risk management (Vincent et al 2014). Exposure to risk continuous to be one of the greatest concerns to MFIs in Addis Ababa who must institute risk management practices to reduce the impact of such exposure on their operations and overall performance. Such practices should include: Establishing an appropriate credit risk environment; Operating under a sound credit – granting process; maintaining an appropriate credit administration, measuring and monitoring processes and ensuring adequate controls over credit risks (Pagadala, 2017).

Typically, Foos et al., (2010) defined risk management as the practice of risk identification, risk analysis and assessment, risk audit monitoring, and risk treatment to control financial exposures of the bank. In the review of Sinkey (2002), modern risk management in the banking industry can be highlighted by five verbs and these are; identify, measure, price, monitor and control. Among other risk, such as market risk, operational risk and legal risk etc, the major cause of MFI problems are related to the credit risk. Risks are exposed to MFIs while credit risk is one of the threats to reliability of microfinance institutions. The MFIs are advised to implement "know your customer" principle as introduced by Demirgüç-Kunt and Detragiache (1997) to minimize the credit risk. Fuser & Meier (1999) credit risk management as including credit limits, taking collateral, loan selling, syndicated loans, credit insurance, and securitization and credit derivatives. Financial institutions can get better their financial performance by ensuring the risks are considered in the decision making process. Thus, the significance of the credit risk management and its impact to the profitability of financial institutions has makes more fascinated on this study.

The MFI Supervision Directorate guidelines, 2010, a department of the National Bank of Ethiopia (NBE) notes that effective credit risk management is the process of managing an institution's activities which create credit risk exposures, in a manner that significantly reduces the probability that such activities will impact negatively on a microfinance institution's earnings and capital. Hosna (2009), assumed that if the credit risk management is success, the profit level will be satisfactory. In disparity, if the credit risk management is poor, the profit level will be reasonably low. In similar manner, Magali, (2014), mentioned that when credit risk management is conducting in improper approach, then overdue loans occur. Thus, the study therefore seeks to examine to what extents the credit risk management practice affect profitability of MFIs in Addis Ababa.

### 1.1.1 MFI Industry in Ethiopia

The Ethiopian Microfinance sector is one of the fastest growing financial institutions in the world today (Pagadala, 2017). The development of formal microfinance institutions in Ethiopia is a recent phenomenon that gained momentum after the establishment of micro fiancé institutions proclamation (40 /1996) that made it obligatory for all such institutions to be registered with National Bank of Ethiopia.

According to the Proclamation No. 626 /2009, the main purpose of a micro-financing institution shall be to collect deposits and extend credit to rural and urban farmers and people engaged in other similar activities as well as micro and small scale rural and urban entrepreneurs, the maximum amount of which may be determined by the National Bank. Micro Financing Business Proclamation No. 626 /2009 states that it is prohibited to engage in micro-financing business without obtaining a license from the National Bank of Ethiopia; provided however, that banks licensed under the appropriate law may engage in micro-financing business without a separate micro-financing business license.

Limited access to financial services is among the major problems impeding livelihood development both for rural and urban people especially poor (Hermes and Lensink 2007). The problem is particularly severe in developing countries, such as Ethiopia, mainly for two reasons. First, most of the conventional banks in the country are provide financial credit service for those who have capital. Second, whenever available, the formal banking sector systematically excludes the urban poor due to the higher screening, monitoring, and enforcement costs of providing a

small loan. Moreover, most urban poor have few or no assets that can be secured by a bank as collateral (Shu and Oney 2014). Since microfinance is a system that distributes small loans to poor people in order for them to generate income and start their own small businesses, it has the ability to lessen poverty as well as promote entrepreneurship, social and economic development in poor communities especially in fast developing countries like Ethiopia (Pagadala, 2017)

The National Bank of Ethiopia (NBE), which is the supervisory authority for the entire financial sector, has proposed certain Risk management guidelines for microfinance institutions operating in Ethiopia (Risk management guidelines for micro finance institutions, 2010). As per these guidelines, NBE provides a risk management framework to all licensed microfinance institutions operating in Ethiopia. This framework sets out the minimum risk identification, measurement, monitoring and control system that shall be put in place by microfinance institutions.

The main types of microfinance service provider in Ethiopia particularly in Addis Ababa includes, non-bank financial institutions, licensed saving and credit cooperatives and NGOs. Currently, there are 35 registered MFIs in Ethiopia and most of are working in Addis Ababa. Therefore, this paper is studying the impact of credit risk management on the profitability in Addis Ababa MFIs. However, this research only focuses on 10 (ten) microfinance institutions.

## 1.2 Statement of the problem

Micro finance provides financial help to those persons in the society who are unable to get assistance from bank. Most of these loans are small in size and distributed to poor people in order for them to generate income and start their own businesses. It has the ability to lessen poverty as well as promote entrepreneurship, social and economic development in poor communities, However at the same time microfinance portfolios are exposed to various kinds of risks due to their inherent characteristic especially credit risk (Pagadala, 2017). There is much interest in the knowledge regarding sustainability of the continuous growth and development of concept of financing. This research has been designed particularly to provide the much needed knowledge on credit risk management which is one of the most sensitive areas than can determine the direction of growth MFI can take. In today's dynamic environment, all micro finance institutions are exposed to potential credit risks. Due to such exposure to credit risks, efficient credit risk management is required. Chua et al. (2000) also found that managing credit risk is one of the basic tasks to be done in micro financial institutions, once it has been identified

and known. As a result, effective and sound credit risk management is a foundation for the safe and sound operation of a micro finance institution to improve their performance.

Sound credit management is a requirement for a financial institution's stability and continuing profitability, while weakening credit quality is the most frequent cause of poor financial performance and condition. According to Gitman (1997), the possibility of bad debts increases as credit standards are comfortable. Firms must therefore ensure that the management of receivables is efficient and effective. Such delays on collecting cash from debtors as they fall due has serious financial problems, increased bad debts and affects customer relations. If payment is made late, then profitability is eroded and if payment is not made at all, then a total loss is incurred. On that basis, it is simply good businesses to put credit management at the front end by managing it strategically.

A number of studies have been done locally and internationally in relation to credit risk management and profitability of MFIs. The following are some of them. A study carried out by Parrenas (2005) on American Banks that failed in the 1980s found out that the consistent element in the failures was the inadequacy of the Bank's management system for controlling loan quality. Accoding to Iqbal & Mirakhor (2007), strong risk management practices can help MFIs reduce their exposure to credit risk and enhance their ability to compete well in the industry. The two studies have documented the existence of profit and a positive link between MFIs financial performance and credit risk management practices. A study by Iqbal and Mirakhor (2007) found out that strong risk management practices can help MFIs reduce their exposure to credit risk and enhance their ability to compete well in the industry. Laurentis and Mattei (2009) in their study of Lessors' recovery risk management capability shows that the development of modern reliable systems of risk management like credit scoring can enhance even more those management capabilities. Chege (2010) concluded that credit risk management practices enhance profitability of the MFIs. Kipkemboi (2013) revealed a positive relationship between credit risk management practices and financial performance of MFIs. Otieno and Nyagol (2016) concluded the existence of a significant relationship between credit risk management and financial performance of MFIs.

Indeed, the issue of credit risk has become a topical issue in policy debates due to their impact they have on banks operations, nonetheless as posited by Amanuel (2015) there seems to be relatively scant research on this topic mostly within Ethiopia, particularly in Addis Ababa.

However, it is possible to conclude that although there have been a number of studies on credit risk management and related issues both in developed and developing countries, in Ethiopia, the connection between credit risk management and profitability has not been examined in comprehensive approach before. Some earlier studies have sought to address this gap in the literature by measuring credit risk management within Ethiopia, for instance, Michael (2006) and Samuel (2006) tries to touch the issue of credit risk management in some micro finance institutions in Ethiopia, Befkadu (2007) equally studied Outreach and Financial Performance Analysis of Microfinance Institutions in Ethiopia, Andenet (2011) on his part assessed Institutional Viability and Financial Performance of Microfinance Institutions operating in Addis Ababa, Sara (2014) investigated the determinants of quality of MFIs loan portfolio and Amanuel Regassa (2015) similarly assed Credit risk management impact on profitability in Ethiopia microfinance institutions. But most of those previous studies did not assess exhaustively the performance of micro finance institutions in relation to credit risk management.

While the above research outcome provides valuable insights on credit risk management, they have not induced clearly the impact between credit risk management and profitability of microfinance. Although there have been attempts in the past to study MFIs in Ethiopia, much focus had been on the impact of MFIs in Poverty reduction. However, not much had been done to find out what relationship exist between CRM practices profitability of these microfinance institutions and by extension their survival and growth. This study therefore sought to fill this gap of knowledge by investigating the relationship between CRM practices and profitability of MFIs in Addis Ababa. Thus, this research sought to address this knowledge gap by seeking answers to the following questions: To what extent the adoption of some of the credit risk management indicators affect profitability of MFIs in Addis Ababa? Therefore, the purpose of this thesis is to look at the impact between credit risk management and profitability

## 1.3 Objective of the study

### 1.3.1 General objective of the study

The general objective of the study was evaluating the effect of the credit risk management on profitability of Microfinance Institutions in Addis Ababa.

### 1.3.2 Specific objectives of the study

The specific objectives of the study were;

- To measure the influence of Total Loan Total Asset (TLTA) ratio on Return on Asset (ROA) of MFIs in Addis Ababa.
- To measure the influence of Total Loan Total Deposit (TLTD) ratio on Return on Asset (ROA) of MFIs in Addis Ababa.
- To measure the influence of Non-performing Loan Total Loan (NPLTL) ratio on Return on Asset (ROA) of MFIs in Addis Ababa.
- To measure the influence of Total Loan Total Asset (TLTA) ratio on Return on Equity (ROE) of MFIs in Addis Ababa.
- To measure the influence of Total Loan Total Deposit (TLTD) ratio on Return on Equity (ROE) of MFIs in Addis Ababa.
- To measure the influence of Non-performing Loan Total Loan (NPLTL) ratio on Return on Equity (ROE) of MFIs in Addis Ababa

### 1.4 Research Hypothesis

In order to address the above research question, the following hypotheses to determine the impacts of credits risk management on profitability of MFIs in Addis Ababa were tested.

Hypothesis 1: There is a significant impact of Total Loan Total Asset (TLTA) ratio on Return on Asset (ROA) of MFIs in Addis Ababa.

Hypothesis 2: There is a significant impact of Total Loan Total Deposit (TLTD) ratio on Return on Asset (ROA) of MFIs in Addis Ababa.

Hypothesis 3: There is a significant impact of Non-performing Loan Total Loan (NPLTL) ratio on Return on Asset (ROA) of MFIs in Addis Ababa.

Hypothesis 4: There is a significant impact of Total Loan Total Asset (TLTA) ratio on Return on Equity (ROE) of MFIs in Addis Ababa.

Hypothesis 5: There is a significant impact of Total Loan Total Deposit (TLTD) ratio on Return on Equity (ROE) of MFIs in Addis Ababa.

Hypothesis 6: There is a significant impact of Non-performing Loan Total Loan (NPLTL) ratio on Return on Equity (ROE) of MFIs in Addis Ababa

## 1.5 Significance of the Study

The findings of the research is empowered the management of different MFIs in Addis Ababa to properly carry out credit risk management and to know the relationship between credit risk and the profitability of MFIs then it enables them to reduce losses and increase profitability. The findings of the research is may also provide policy measures to the various stakeholders to tackle the effect of credit risk in order to enhance the quality of their risk assets. It also enables financial regulatory organs and policy makers to implement different legal frameworks regarding credit risk management on the bases of the information obtained on this study. Besides, it also provide as a source of literature for other scholars who intend to carry out further research on the efefct of credit risk management on profitability with specific reference to MFIs

## 1.6 Scope of the Study

The conceptual scope of this study lied on the effects of credit risk management on profitability of MFIs in Addis Ababa**.** The study covered 10 purposively selected MFIs in Addis Ababa. Thus, the area of concentration was Addis Ababa, which is the hub of commercial and business activities in Ethiopia. The types of credit risk management indicators that were investigated in this study were; Total Loan to Total Assets (TLTA), Total Loan to Total Deposit (TLTD) and Non- Performing Loan to Total Loan (NPLTL). The profitability of MFIs was measured with in terms of Return on Asset (ROA) and Return on Equity (ROE).

## 1.7 Limitation of study

This study is limited to the influence Credit Risk has on the on the profitability performance of some selected MFI in Addis Ababa from 2009 to 2018 and therefore the findings, analyses and recommendations cannot be linked to the whole financial sectors in Ethiopia. Thus those MFIs outside head office in Addis Ababa are omitted in this study as Data, resource and time are the limiting factors that inhibit collecting the data from all MFIS across the country. More so, in this study only three tradition credit risk management indicators (Total Loan to Total Assets (TLTA), Total Loan to Total Deposit (TLTD) and Non- Performing Loan to Total Loan (NPLTL)) were used in order to represent credit risk management. It cannot include some other types of credit risk management indicators.

## 1.8 Organization of the study

The research is organized into five chapters. Chapter one contains the background of the study, problem statement, the objectives of the research, research questions, scope as well as the limitations of the study. Chapter two gives the literature review i.e. examining the theoretical background and empirical review of the research topic. Chapter three explains in detail, the methodology employed for the research. Chapter four is concerned about data presentation and analysis of the research findings. Lastly chapter five would comprise of summary, conclusion, and recommendations.

# Chapter Two

# LITERATURE REVIEW

This chapter deliberates other research works conducted on credit risk and its impact on profitability. It particularly, discussed some empirical and theoretical literature on the effect of credit risk management on the profitability performance.

## 2.1 DEFINITION AND CONCEPT

### 2.1.1 Risk overview

Generally risk accompanies any action in life. It involves the potential of gaining or, in particular, losing something of value. There are many different classifications of the phenomenon of risk. Basic types of risks can be political, legal, technical, environmental, economic, etc. The latter is usually associated with the influence of financial and other economic factors on a project. Economic risk can also be described as the chance that macroeconomic conditions, such as exchange rates, government regulation, or political stability will affect an investment (Aleksandra, 2018).

Risk is "the variability of the actual return from the expected returns associated with a given asset or investment" (Khan & Jain, 2004). Ehrhardt & Brigham (2011) also defined risk as "the chance that some unfavorable event (both financial and physical) will occur". In a market economy, risk is especially visible in aspects of running a business. It is the position where the actual return of an investment is different than expected return. Risk means the possibility of losing the original investment and the amount of interests accrued on it (Ali, 2019).

### 2.1.2. Credit risk

There are many various definitions of credit risk. However, they always have some element in common. One such element is the fact that counterparty (borrower) might not repay the financial means that were lent to them. In the literature we can find the following, chosen definitions of credit risk, which can be defined as the "possibility of loss arising from the failure of a counterparty to make a contractual payment" (Hull et al, 2004). Credit risk is the risk that a borrower defaults and does not honor its obligation to service debt. It can occur when the counterpart is unable to pay or cannot pay on time (Gestel and Baesens, 2008).

According to Basel Committee on Banking Supervision, credit risk is defined as the potential that a bank borrower or counterparty will fail to meet its obligations in accordance with agreed terms (Safakli, 2007). It is also perceived to be the current and prospective risk to earnings or capital arising from an obligor's failure to meet the terms of any contract with the Bank or otherwise to perform as agreed. It is found in all activities in which success depends on counterparty, issuer, or borrower performance In particular, banking and microfinance sector generally has considerable credit exposure due to their prominence on lending and trading. Conventionally, credit risk is related with lending, investing, and credit granting activities and concerns the return of borrowed money. However, a great source of credit risk in banks arises from the performance of counterparties in contractual agreements e.g. given a financial obligation, which is not fully discharged, either due to the counterparty disability to fulfill his or her obligations which may result in a loss (Horcher 2005).

Credit risk is susceptible to all sub kinds of financial risk such as the risk of interest rate change, risk of changes in the national economy, but also to specific kinds of credit risk solely, such as: collateral risk, default risk and concentration risk (Ali, 2019). The risk is primarily that of the lender and includes lost principal and interest, disruption to cash flows, and increased collection costs. It denotes to the risk that a borrower will default on any type of debt by failing to make required payments. The risk is primarily that of the lender and includes lost principal and interest, disruption to cash flows, and increased collection costs (Gestel, et al, 2008).

Ho and Yusoff (2009) agree that the largest source of credit risk for microfinance institutions throughout the activities of the bank and microfinance institutions are loans. Financial institutions are increasingly in front of credit risk in various financial instrument loans, together with acceptance, trade financing, foreign exchange transactions and etc. In order to compensate the risk that occurred in their business cycle, the financial institutions should aware in identifying of measurement, monitored and controlled credit risk as well as inadequate capital against risk. Bikker and Bos (2005) found that commercial banks or MFIs are most likely to make a loss due to credit risk. Giesecke (2004) claims that the achievement of financial institution is depending on the accuracy of measurement and the efficiency of management faced the credit risk.

### 2.1.3 Credit Risk Management

Credit risk management, refers to the systems, procedures and controls, which a company has in place to ensure the efficient collection of customer payments thereby minimizing the risk of non-payment (Mokogi, 2003). The key purpose of credit risk management is for a microfinance bank (MFB) or commercial bank (CB) to maximize its risk-adjusted rate of return while maintaining exposure within its acceptable risk tolerance. An effective credit risk management (CRM) requires building an appropriate credit risk (CR) environment; working under a healthy credit lending process; maintaining an appropriate credit administration that necessitate the monitoring process and the adequate controls over credit risk (Greuning&Bratanovic, 2003). Raghavan (2005) and Funso (2012) summarize approaches of credit risk Management as follows: Internal risk rating; risk foreseeing and warning means; pricing on a scientific basis; Credit derivatives ;Credit securitization; assets and loans securitization; adoption of a sound Internal lending policy; Credit Reference Bureaus and Information sharing; Hedging Credit Risk and compliance to Basel accord.

It is broadly recognized that lack in credit risk administration and management policies by monetary establishments have helped altogether to the financial downturn around the world (Fraser & Simkins, 2010) As fallout to this emergency, orders including credit risk administration are currently being given more imperativeness, particularly in monetary related areas (Horne, 2007) like banks and other financial institutions. Micro finance institutions operate in an environment where customers are without credit histories or necessarily predictable borrowing behaviors (Vincent et al 2014) making it more necessary to deal with credit risk management. Best practices require that an internal control framework for credit risk assessment include a clear loan review process that is independent of the lending unit. The loan review process should contain a credit grading system (the borrower's financial condition, capacity to pay, value of the collateral and other characteristics that may influence the likelihood of the collection of principal and interest). The credit risk can be based on history of defaults (for specific borrowers, industries) courtesy of information sharing.

### 2.1.4 Credit Risk Management Indicators

There are different indicators of credit risk management. In the following section the major credit risk management indicators were discussed.

### Portfolio at Risk (PAR)

According to the bulleting Wolday et. al., (2014), the most widely used indicator of portfolio quality in the microfinance industry is Portfolio at Risk (PAR), which measures the portion of the loan portfolio "contaminated" by arrears as a percentage of the total portfolio. Although various other measures are used, PAR has emerged as the principal indicator. It is easily understandable; doe not undertake risk, and is comparable across MFIs. A microenterprise loan is considered to be at risk if a payment on it is more than 30 days late from the due date. This rule could be much stricter due to lack of bankable collateral in microfinance (Wolday et. al., 2014). Apart from this, PAR is also a sound measure of Credit Risk management which also provides information about portfolio quality of a firm. PAR is the proportion of loan with overdue clients to the total loan outstanding of the organization.

### Non-performing loan ratio (NPLR)

This is the major indicator of commercial banks credit risk. A loan is said to be non-performing, if the borrower default its payment schedule or it is in arrears. It is the ratio of Nonperforming Loan to Total Loan. It represents how much of the bank's loans and advances are becoming nonperforming which measures the extent of credit default risk that the bank sustained. As the amount of this ratio increase it will send bad message for the management of the banks because it shows high probability of none recovering the banks major asset.

### Capital adequacy ratio

Capital adequacy refers to the amount of equity and other reserves which the bank holds against its risky assets. It is also defined as the ratio of capital to the risk-weighted sum of bank's assets (Hyun & Rhee, 2011). It shows the financial soundness of a bank, its capacity of covering the eventual losses due to some risk.

## Loan and advance to deposit ratio (LTRR)

Loan to deposit Ratio indicates the ability of banks to withstand deposit withdrawals and willingness of banks to meet loan demand by reducing their cash assets. When the banks are more liquid, they can reduce risk of insolvency. This ratio provides more general information on the issue deposit because it takes no account the mix between time and demand deposit, and other issues. Even so, LTDR can be used as useful tools for assessing Banks liquidity.

### 2.2 Theoretical Review

The theoretical framework of a thesis identify with the set of concepts, descriptions, and suggestions that relay to the research problem. It can be termed as the basis on which the whole research project is founded. The theoretical literature described theories related to credit risk management. Several theories have been designed by different scholars to explain credit risk management. The following section discussed theoretical framework related to the study variables which were considered important for this study.

### 2.2.1Portfolio Theory

The Portfolio Theory often described as modern portfolio theory. For a long time financial institutions have been faced with credit defaults. Having been pioneered by Harry Markowitz in 1952, the Modern portfolio theory is widely used in the banking sector as well as the MFIs. Most of the MFIs are using the value at risk along with portfolio at risk to handle exposure brought about by interest rate and market dynamics. This theory lets investors assess the expected risk and return in their investment portfolios (Wong, 2013)

Modern Portfolio Theory (MPT) advices shareholders to reap advantages within the stock exchange through diversification of shares. This may result to maximization of their portfolios. It goes on to give insight on the pricing of risky assets. This doesn't mean that the first economists neglected financial markets. This theory encourages asset diversification as the best way of protecting oneself against market risk additionally as risk which is distinctive to a particular organization (Omisore, Munirat & Nwufo, 2012). It asserts that organizations ought to extremely xiv contemplate the link between risk and income. Moreover, the investor choosing high risk investment ought to be remunerated through high income. To reduce loss on assets, corporations are applying quantitative approaches to credit risk measuring through developing tools that

measure credit risk in a portfolio thereby applying credit derivatives to transfer risk effectively at the same time maintaining client relationships (Mutua, 2015).

This theory helps in examining the relationship between Portfolio at risk and financial stability and performance. It considers how diversification of financial products minimizes credit risk hence improving on financial performance.

### 2.2.2 Liquidity Risk Theory

Liquidity risk is a major exposure that precedes any relentless market catastrophe. It is argued that it is the definitive indicator that leads to the explosion of credit risks in addition to market risks, and it is referred to as the means, which modifies remote loss dealings into wide spread collapses of financial institutions. The unmatched crisis in the United States mortgage market in 2007 makes no exception. Acerbi and Scandolo (2007) depicts that any financial institution should be in a position to classify as well as categorize the liquidity risk to which it is exposed. In the case of microfinance institutions, their liquidity requirements along with the sources of liquidity on hand to convene these requirements rely extensively on the institutions dealings, product portfolio, cash flows reports as well as well as their balance sheet makeup. Therefore, it is required of any financial institution to evaluate its liquidity position to avoid a declining effect on its earnings and capital.

### 2.2.3 Asymmetric information theory

This study was guided by theory of Asymmetric information. The theory of asymmetric information proposes that an imbalance of information between buyers and sellers can lead to inefficient outcomes in certain markets. George Akerlof, Michael Spence and Joseph Stiglitz were influential in developing this theory in the 1970s. The meaning of this theory is that it may be complex to distinguish between good and bad borrowers, which may result into adverse selection and moral hazards problems. in the market, the person that possesses more information on a particular item to be transacted (in this case the borrower) is in a position to negotiate optimal terms for the transaction than the other party; in this case, the lender (Auronen, 2003). The party that knows less about the same specific item to be transacted is therefore in a position of making either right or wrong decision concerning the transaction. Loan defaults resulting in

accumulation of nonperforming loans in banks thrive in the information asymmetry environment that prevails due to lack of a credit information sharing mechanism (Richard, 2011).

This theory is relevant to this study with regard to credit risk management. Loans forms huge proportion of credit as they normally account for 10 – 15 times the equity of a Microfinance banks. In this way, the business of banking is potentially faced with difficulties where there is small corrosion in the quality of loans. Poor loan quality starts from the information processing mechanism and then increase further at the loan approval, monitoring and controlling stages (Kitwa, 1996). This problem is exaggerated especially, when credit risk management guidelines in terms of policy and strategies and procedure regarding credit processing do not exist or are weak or incomplete. Akerlof (1970), opined that adverse selection implies existence of qualitatively different types of credit seekers. In contrast with high quality borrowers, low quality borrowers are not capable to use the borrowed money for valuable investment and they will have a relatively large chance to fail on payment of the loan. Banks therefore prefer to choose high quality credit seekers and the major way of examining a potential borrower is by analyzing all available information. The selection challenge results from the behavior of low quality applicant that presumes to submit high quality project but do not forward all relevant negative information. Moral hazard models on the other hand imply that information sharing should reduce default rates and interest rates and increase lending of money, either because credit reference bureaus nurture competition by reducing informational rents, (Padilla & Pagano, 1996) or because they punish borrowers (Padilla & Pagano, 1997).

However, the impact of information sharing on aggregate lending in this model is vague. When banks exchange credit information about borrowers, the increase in lending to good credit borrowers may fail to compensate for an eventual reduction in lending to risky types.

### 2.2.4 Firm Characteristics Theories

These theories predict that the number of borrowing relationships will be decreasing for small, high-quality, informational opaque and constraint firms, all other things been equal (Godlewski and Ziane, 2008).Robert and Gary (1994) cited in Hamisu (2011), state that the most obvious characteristics of failed banks is not poor operating efficiency, however, but an increased volume of non-performing loans. Non-performing loans in failed banks have typically been associated with regional macroeconomic problems. DeYoung and Whalen (1994) cited in Hamisu (2011 )

observed that the US Office of the Comptroller of the Currency found the difference between the failed banks and those that remained healthy or recovered from problems was the caliber of management. Superior mangers not only run their banks in a most efficient fashion, and thus generate large profits relative to their peers, but also impose better loan underwriting and monitoring standards than their peers which result in better credit quality.

### 2.2.5 Credit Market Theory

A model of the neoclassical credit market postulates that the terms of credits clear the market. If collateral and other restrictions (covenants) remain constant, the interest rate is the only price mechanism. With an increasing demand for credit and a given customer supply, the interest rate rises, and vice versa. It is thus believed that the higher the failure risks of the borrower, the higher the interest premium (Ewert, 2000).

## 2.3 Empirical literature review

This section reviews literature from previous research regarding the effect of credit risk management on the profitability of financial institutions, especially on microfinance institutions.

### 2.3.1 Empirical studies on developed and emerging market countries

There are plenty of empirical studies in developed and emerging market countries concerning the relationship between of credit risk management and the profitability of financial institutions.

Duca and McLaughlin (1990) in line with Cooper, et al., (2003), conclude that bank profitability are contributing to credit risk significantly, since increased exposure to credit risk is normally associated with decreased firm profitability. The discussion is concerned about the quality of loans made. However, (Miller, 1997) suggest that financial institutions should more expose to high-risk loans even though there is a possibility to get lower profitability. According to Bobakovia (2003), the ability of foreseen, avoidance and monitor risk by the profitability of a bank are likely to cover losses. It is because the net effect of increasing the substandard credit ratio and decreasing the bank's profitability (Mamman and Oluyemi, 1994). However, Brewer et al (1996) uses bank total loans to total assets (TLTA) to study the effect of loan activities on microfinance risk. It is because loans are higher risk and less liquid than other bank or microfinance assets. Thus, it associates with a positive relationship between TLTA and the risk. In contrast, TLTA may lead to negatively correlate to microfinance risk measure when there is a

relative improvement in credit risk management strategies (Altunbas, 2010). Typically, Bourke (1989) reports, there is a negative impact of credit risk on profitability. It occurs when the more microfinance are exposed to high risk loans; the higher is the accumulation of unpaid loans. Thus, it reflects to lower return to the banks itself, (Miller and Noulas, 1997). Meanwhile, Felix and Claudine (2008) indicate, there is negative relationship of non-performing loans to total loan (NPLTL) on return on equity (ROE) and return on assets (ROA) and leads the decreasing of profitability of banks and microfinance . Therefore, should expose on upgrading the risk management and relies on the consequences of loan quality failure on profitability of financial institutions and the economy.

Li Yuqi (2007) examined the determinants of bank's profitability and its implications on risk management practices in the United Kingdom. The study employed regression analysis on a time series data between 2010 and 2018. Six measures of determinants of MFI's profitability were employed. Liquidity, credit and capital were proxies as internal determinants of MFI's performance. GDP growth rate, interest rate and inflation rate were used as external determinants of MFI profitability.

Using data for banks from Egypt and Lebanon banks, Hakim and Neamie (2001) examined the relationship between credit risk and bank's performance over the period 1993-1999. The study estimated a fixed effects model of bank return with varying intercepts and coefficients. The findings showed that credit variable is positively related to profitability. The study also found a strong link between capital adequacy and commercial banks returns, with high capitalization being the hindrance to returns. The study concluded that the capital is a sunk cost with large banks realizing high profits in absolute but not in percentage terms. As a policy implication, the study provided important input for the policymakers in the region to set better performance targets, and enable bank managers to allocate capital more efficiently across their business units (Hakim and Neamie, 2001).

Hudon (2010) analyzes the relationship between financial performance of MFIs and their management mechanisms. 83 MFIs of three types (non-profit institutions and NGOs, non banking financial institutions, for-profit institutions and cooperatives), from Latin America, Africa, Central Asia and NIS, North Africa and the Middle East, and Asia, constitute the dataset provided by PlaNet Rating. All these MFIs are evaluated based on three financial indicators

(ROA; AROA; Financial self-sufficiency) and four management dimensions (Decision making: board governance competencies). The results of Hudon (2010)'s analysis show that management ratings influence drastically the MFI financial performances. The author underscores that regulated MFIs have significantly better management ratings than non-regulated ones. It is also the case for larger MFIs, in terms of loan portfolio, total assets or borrowers. Conversely, younger MFIs may be more financially profitable, as suggested by Stephens (2005), but not particularly better managed. According to this study, the top management is a key indicator of financial success among the four management dimensions, and seems to have also a positive influence on the amount of received subsidies.

Haneef et al., (2012) did a study to investigate the impact of risk management on non-performing loan and profitability of banking sector of Pakistan. Five banks were selected for data collection and the data was secondary in nature. The result of this study revealed that there was no proper mechanism for risk management in banking sector of Pakistan. Study also concluded that non-performing loans are increasing due to lack of risk management which threatens the profitability of banks. They further concluded that risk management encompasses risk identification, assessment, measurement, monitoring and controlling all risks inherent in the business of banking; the basic principles relating to risk management that are applicable to every financial institution, irrespective of its size and complex it (Haneef et al., 2012).

### 2.3.2 Empirical studies in Sub-Saharan Africa countries

Empirical studies have also existed in Sub-Saharan African countries concerning the effect of the effect of credit risk management on the profitability of microfinance institutions.

Karekaho (2009) in his study on loan portfolio management and the performance of microfinance institutions in Uganda, Wakiso District, using an analytical and cross sectional survey focusing on both qualitative and quantitative data found out that the portfolio planning, client screening and portfolio control are related significantly with the portfolio performance of MFIs, but the strongest relationship was between portfolio control and the performance of MFIs. In addition, they asserted that, although all the independent variables predicted a significant proportion of this performance, the most significant individual predictor was again portfolio control dominated by loan monitoring. The results, therefore, indicated that if MFIs are to achieve the desired portfolio performance, they have to consider all these independent variables

but putting more emphasis on their loan portfolio control generally and loan monitoring in particular.

According to Muriu, (2011) empirical study on determinants of profitability of African MFIs, under the study "what explains the low profitability of MFIs in Africa" tried to find the factors contributing to profitability of MFIs. He used Generalized Method of Moments (GMM) system using an unbalanced panel dataset comprising of 210 MFIs across 32 countries operating from 1997 to 2008. The proxies for profitability were both ROA and ROE. Credit risk measured by the sum of the level of loans past due 30 days or more (PAR>30) and still accruing interest is negatively and significantly related to MFI profitability. This study therefore finds evidence to support the conjecture that increased exposure to credit risk is normally associated with lower MFI profitability.

Gatuhu (2013) in her study on the effect of credit management on the financial performance of microfinance institutions in Kenya using a descriptive survey design on all the MFIs registered under AMFI found out that the variables; client appraisal, credit risk control and collection policy have effect on financial performance of MFIs. She asserted that there is a strong relationship between financial performance of MFIs and client appraisal, credit risk control and collection policy. Client appraisal, credit risk control and collection policy significantly influence financial performance of MFIs in Kenya.

Mwithi (2012) conducted a study to determine the relationship between credit risk management practices and the level of non-performing loans of microfinance institutions in Nyeri County, Kenya. The study found out that the level of credit risk assessment and management was high in the MFIs. It was also found out that effective management of their institutions was affected by liquidity and profitability, and that asymmetric information in loan market affects the effective management of NPLs in MFIs in Nyeri County. The study found that inability to enforce covenants leads to NPLs among MFIs in Nyeri County to a very large extent. The study concluded that the relationship between credit risk management approaches employed by Micro Finance Institutions in Nyeri County and the level of Non-Performing Loans was a negative correlation i.e. the higher the level of credit risk management, the lower the level of NPLs.

Rodgers (2013) in his study on loan performance and profitability of microfinance institutions in Uganda used both quantitative and qualitative information (data) from questionnaires and interviews. The study design was mainly descriptive, analytical and explanatory. The research findings revealed that most of loan clients are affected by the loan period so as to meet their payment obligations. Most of the loan clients borrow for business purposes, the loan advanced was not adequate, the interest rates were very high and borrowers were not allowed participation in loan negotiation as terms and conditions are predetermined by the bank. The findings further revealed that expenses incurred by the borrowers from the time of application up to the time of repayment of the loans were too high, default rate was high, and not all the staff agreed that they monitor projects which are advanced and the bank does not motivate its clients to repay the loans.

Adamu, et al (2014) carried out a study on credit portfolio management in microfinance banks using the lending methodologies in Nigeria. They found out that the success of microfinance banks is dependent on the effective and efficient management of its credit portfolio. The risk portfolios proved to be the source of recurring problems and the cause of failure for many microfinance banks. Credit policies, procedures, systems and controls do not always assure asset quality and earnings. They asserted that practical approach is therefore necessary for effective loan portfolio management. They recommended that the practical approach is needed by microfinance banks and the need to have operations research experts among the bank's employees.

Kisala (2014) examined the relationship that exists between credit risk management on the loan performance of MFIs in Kenya. The researcher used a descriptive research design that involving an exhaustively analysis of credit risk management and its relationship with loan performance in micro finance institutions. A sample size of nine MFIs was used, however, both primary data and secondary data was collected from 5 micro finance institutions through questionnaires and annual reports (2007 - 2011). The researcher used ROE as a profitability indicator while CAR and NPL ratio as credit risk management pointers. The findings of the study pointed out that there is a major correlation involving credit risk management and loan performance. The findings of the research indicated that NPL and CAR do have a negative and comparatively significant effect on ROE. NPL ratio had a greater effect on ROE as compared to CAR. The

study instituted that there is a Correlation between credit risk management and micro finance institutions financial performance.

Wakaria (2016) carried out a study on the effect of credit management on the financial performance of microfinance institutions in Kenya. The researcher used descriptive research design as it draws in a comprehensive analysis of credit risk management and its correlation with financial performance in microfinance institutions. The researcher used secondary data (2011 – 2015) gathered from the study population of 13 deposits taking microfinance institutions licensed by Central Bank of Kenya and 22 non deposit taking microfinance institutions. The study's specific objectives were credit risk, liquidity risk and interest rate risk. The study found out most microfinance institutions in Kenya are faced with credit risk as depicted by the significant negative relationship between the financial performances (measured by return on equity) and credit risk. The study recommended that the microfinance institutions in Kenya must pay constant attention to credit risk being a major risk to non-performing loans.

### 2.3.3 Empirical studies in Ethiopia

In Ethiopia, although many researchers have been studied in the area of credit risk management of commercials banks, very little research has been done to understand the effect of credit risk management on profitability of MFIs. An attempt is made to document available literature on credit risk management practices of micro finance institutions in the following section.

In another study by Abafita (2003) microfinance and loan repayment performance was discussed in relation to a single MFI, Oromia Credit and Savings Share Company (OCSSCO) as a case study. He found that the overall repayment performance of the borrowers and the screening technique is sound and the credit scheme has contributed positively in terms of improving the incomes, access to education, access to health facilities and nutritional status of the borrowers. Wale (2009) conducted a study on performance of microfinance institutions in Ethiopia and found that they have poor GLP to assets ratio, allocating a lower proportion of their total assets in to loans. They also are not using their debt capacity properly. The large and small MFIs are allocating more loan loss provision expense than the industry average and the related PAR is high for these MFIs. All these indicate distorted credit risk management practices. In a study conducted by Goshim, 2011, on "performance of micro finance institutions in credit risk

management: the case of five micro finance institutions in Addis Ababa". By using mixed approach he found that the failure to effectively manage credit risk contributed to a greater extent to the micro finance institutions crisis.

Obsa (2012) examined the determinants of loan portfolios quality of MFIs in Ethiopia using a sample of 15 MFIs during 2003 to 2009 period. The results showed that a significant negative relationship between an institution size and LLP and PAR-30 days. Loan ratio (outstanding loans to total assets) positively and significantly impacts PAR-30 days and WOR. The coefficient for the ratio of women borrower reveals a significant negative impact on LLPR and WOR; the estimates also show a significant inverse relation between changes in total loan and the three indicators of MFIs loan portfolio risk: LLP, PAR -30 days and WOR. Operating expense ratio, the measure of efficiency is positively related to WOR. The study did not observe any significant relationship between macroeconomic factors (changes in gross national income per capital and Inflation) and MFIs portfolio risks indicators: LLP, PAR-30 days and WOR. More currently Tilahun (2013) investigate the determinants of financial sustainability of MFIs in east Africa were poverty is a serious problem and the regression results revealed that MFIs financial sustainability is positively and significantly driven by loans intensity and size.

Tinishu Meshesha (2014) in a study titled "Microfinance Credit Rationing and Loan Repayment Performance: A Case of Omo Microfinance Konso Sub Branch" compared before and after performance of credit schemes and found that credit schemes have positive impact in improving the income, education, health and nutritional status of the borrowers. Another study conducted by Pasha and Negese(2014), on Performance of Loan Repayment Determinants in Ethiopian Micro Finance, by taking Sidama Micro Finance Institution as a case study and using Binary logistic model found that age of respondents, education level, time lag between loan application and disbursement, complicated loan processing procedures, Repayment period, and Loan diversion are essential and significant determinant of loan repayment rate.

Gizaw, Kebede and Selvaraj (2015) examined the impact of credit risk on profitability of commercial banks in Ethiopia. The study objective was to look into how credit risk affected the profitability of Ethiopian commercial banks. The data obtained for the study was obtained from 8 sample commercial banks for a period of 12 years (2003-2014) from annual reports of the different banks and National Bank of Ethiopia. Descriptive statistics and panel data regression

was used for data analysis. According to the research findings, loan loss provisions, non-performing loans, credit risk measures and inadequacy in capital affected the commercial banks profitability in Ethiopia.

Amanuel (2015) undertook a study to investigate the relationship between credit risk management and profitability of Microfinance Institutions in Ethiopia. This was done by collecting data from 12 MFIs' annual report published by AEMFI from 2003 to 2012. In order to test the relationship for the two abstract concepts, their proxies have been used. ROE and ROA have been chosen as the proxies for profitability, and PAR>30 days, LLPR, WOR and RC as proxies for credit risk management. The findings revealed that credit risk management does have statistically significant effects on profitability of commercial banks. Between the four proxies of credit risk management, LLPR & WOR have a significant effect on the both ROE and ROA while PAR>30 days & RC have an insignificant effect on both ROE and ROA.

## 2.4. Gap in Literature

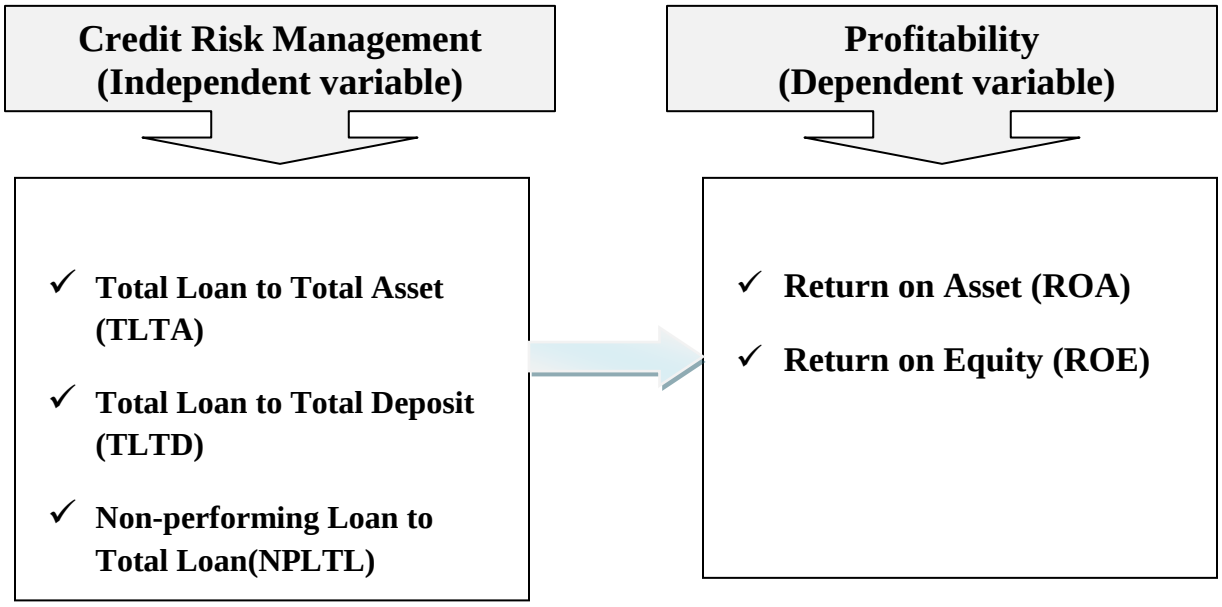
From the reviewed relevant literature, it was evident that very few studies have been found to empirically examine the effect of credit risk management on profitability of MFIs in Ethiopia. Even the existing little research in the area of credit risk management has not been done in a comprehensive approach on Ethiopia. Thus it is important to consider that research on credit risk management and its effect on profitability of MFIs are relatively in the beginning stages and have no or inadequate systematic evidence in Ethiopia in general and in Addis Ababa in particular. Hence, from review of the previous study the researcher concludes that available literature on credit risk management practices of Microfinance institutions in Ethiopia and its effect on performance of MFIs is mostly contributed by few unpublished master thesis with very few in-depth studies being done. Thus there is a huge potential for further empirical research in the area of practices of credit risk management of MFIs.

## 2.5 Conceptual Framework

A conceptual framework is a set of broad ideas and principles taken from relevant fields of enquiry and used to structure a subsequent presentation (Kombo & Tromp, 2009). A concept is an abstract or overall impression inferred or deduced from specific instance. It is a research instrument that helps a researcher to develop awareness and understanding of the situation under

inquiry and to communicate it. From the theoretical and empirical literature reviews, the following conceptual framework of the study is developed by the researcher.

**Figure 2.1 Conceptual Framework**




Source: Compiled by the researcher

In this framework, credit risk management is independent variable and profitability is dependent variable. The independent variable credit risk management is operationalized through: Total Loan to Total Asset (TLTA), Total Loan to Total Deposit (TLTD) and Non-performing Loan to Total Loan (NPLTL), while the dependent variable profitability is operationalized through; Return on Asset and Return on Equity.

# CHAPTER THREE

# Research Methodology

## 3.1. Introduction

Research methodology is a vital part of the research dissertation because it is the background against which the reader evaluates the findings and draw conclusions. This chapter presents the research method adopted for the study and discusses the technique applied for the analysis of the data gathered.

## 3.2. Research design

A research design expresses both the structure of the research problem and the plan of investigation used to obtain empirical evidence on the relations of the problem (Kerlinger, 1986).The primary aim of this study is to examine the effect of credit risk management on financial performance micro-finance institutions in Addis Ababa. To achieve this objective explanatory research design with a quantitative approach is used. Hence, explanatory research design enabled the researcher to examine the effect of credit risk management on profitability of micro-finance institutions in Addis Ababa.

## 3.3 Target population

Target population is the population to which a researcher wants to generalize the results of the study (Mugenda & Mugenda, 2003). The study employed a deductive approach as the aim is to test the validity of the proposed using the data gathered from the eight microfinance institutions based in Addis Ababa listed below.

1. Addis Credit & Savings Institution (ADCSI)
2. Aggar Microfinance S.C
3. Metemamen Microfinance S.C
4. Poverty Eradication and community empowerment (PEACE) Microfinance S.C
5. Specialized Financial & Promotional Institution (SFPI)
6. WASASA Microfinance S.C
7. Meklit Microfinance Institution (Meklit)
8. Vision Fund (Wisdom) Microfinance S.C

## 3.4. Sample size and sampling method

This research used non-probability approach which is convenient sampling technique in choosing microfinance institutions as a sample. Those microfinance institutions that continuously report their organized financial report to Ethiopia Micro finance institution Association are considered in a sample frame. The data are collected directly from Ethiopian Microfinance Institutions performance analysis report Bulletins from 2009 – 2018 published by the Association of Ethiopian Microfinance Institutions

## 3.5 Source and type of data

The study take a quantitative research approach by using secondary data gathered from Ethiopian Microfinance Institutions performance analysis report Bulletins from 2009 – 2018 published by the Association of Ethiopian Microfinance Institutions. This study used panel data covering a period of 10 years (2009 to 2018). The Panel data involves the pooling of observations on a cross section of units over several time periods and provides results that are simply not detectable in pure cross sections or pure time series studies (Brooks, 2008). The aim is to obtain the maximum number of observations possible. Given that the aim is to determine if a relationship exists between parameters utilized in credit risk management and parameters utilized in profitability.

## 3.6 Method of Data Analysis

In this study, quantitative data was gathered from selected microfinance institution and their annual financial reports. After that, collected data was rearranged and edited in order to become complete data that is needed for this study. Next, the collected panel data was analyzed using descriptive statistics, and multiple linear regression analysis. The descriptive statistics (Mean, maximum and minimum values and standard deviations) was used to analyze the general trends of the data from 2009 to 2018. A multiple linear regression model was used to determine the relative importance of each independent variable in explaining the variation financial performance of micro financial institutions in Addis Ababa. Regression analysis is a statistical technique used to analyze the relationship between a predictor variable(s) and predicted variable(s) with the assumption that there exists a linear relationship between the two variables. The multiple linear regressions model was conducted by the ordinary listing square (OLS) method using STATA software package.

According to Brooks (2008), ordinary least squares (OLS) is a method to estimate the slope and intercept in a linear regression model. This study used an ordinary least squares (OLS) regression to estimate the linear equation. The rational for choosing OLS is that, if the Classical Linear Regression Model (CLRM) assumptions hold true, then the estimators determined by OLS will have a number of desirable properties, and are known as Best Linear Unbiased Estimators (Brooks, 2008). In addition, as noted in Petra (2007) OLS outperforms the other estimation methods when the following holds; the cross section is small and the time dimension is short. Therefore, as far as both the above facts hold true in this study it is rational to use OLS. So necessary diagnostic tests were carried out on the variables to test whether the sample is consistent with the CLRM assumptions:

**Assumption 1: E (ut ) = 0**

The first assumption required is that the average value of the errors is zero. In fact, if a constant term is included in the regression equation, this assumption will never be violated (Brooks, 2008). Since this equation includes constant number this assumption is not violated.

**Assumption 2: Homoscedasticity:- var (ut ) = $\sigma 2 < \infty$ )**

Homoscedasticity in a study usually happens when the variance of residuals (error term) would be same for all predicated (Tabachnic & Fidell, 2007). If the errors do not have a constant variance, they are said to be heteroscedastic (Brooks, 2008). If heteroscedasticity occur, the estimators of the ordinary least square method are inefficient and hypothesis testing is no longer reliable or valid as it will underestimate the variances and standard errors. There are several tests to detect the Heteroscedasticity problem, which includes, Park Test, Glesjer Test, Goldfrey Test, White's Test and Autoregressive Conditional Heteroscedasticity (ARCH) test. In this study, the popular Breusch-Pagan test was employed to test for the presence of Heteroscedasticity. The hypothesis for the Heteroscedasticity test was formulated as follow:

H0: Constant variance (heteroscedasticity is not present)

H1: There is no constant variance (Heteroscedasticity problem) in the model.

$\alpha = 0.05$.

Decision Rule: Reject H0 if p value is less than significance level. Otherwise, do not reject H0.

**Assumption 3: Serial Correlation [cov(ui , u j ) = 0 for i _= j]**

The assumption of autocorrelation (serial correlation) is key assumptions in multiple regressions which assume that the error terms are independent (uncorrelated) of each other. It states that assumption states that covariance between the error terms over time is zero. In the case of autocorrelation problem, the estimated parameters can still remain unbiased and consistent, but it is inefficient. The result of T test, F test or the confidence interval will become invalid due to the variances of estimators tend to be underestimated or overestimated. Due to the invalid hypothesis testing, it may lead to misleading results on the significance of parameters in the model.

The most commonly used methods to determine whether there is autocorrelation, that is where there is a linear correlation between the error terms for one observation, is Durbin-Watson test. Therefore, in this study to test for the existence of autocorrelation, the popular Durbin-Watson Test was employed. According to Cochrane, (1997), if a value of d statistic is within the range 1.5 and 2.5 means there is no autocorrelation.

**Assumption 4: Multicollinearity**

Multicollinearity occurs when there are two or more independent variables that are highly correlated with each other. If the multicollinearity occurs, the regression model is unable to tell which independent variables are influencing the dependent variable. The consequences of Multicollinearity are large variances and covariance of OLS estimators, insignificant t ratio, wider confidence interval, high $R^2$ but few significant t ratio, sensitivity of OLS estimators and their standard errors to small changes in data (Simon, 2004). This study used Variance Inflation Factor (VIF) method to test for multicollinearity among study variables. A common rule of thumb is that if a given VIF is greater than 10, the multicollinearity is sever (Neter, Kutner, Wasserman and Nachtsheim, 1996).

**Assumption 5: the disturbances are normally distributed**

The other assumption of multiple regressions is normality which assumes that residuals (errors) are approximately normally distributed. In order to make valid inferences from regression analysis, the residuals of the regression should follow normal distribution. With the normality assumption, ordinary least square estimation can be easily derived and would be much more valid and straight forward. This study used Shapiro-Wilk test to find out whether the error term is normally distributed or not. According to Sharpiro and Wilk (1965), this was necessary to

illustrate that the standardized residuals was significantly normally distributed. The hypothesis for the normality test was formulated as follow:

H0: Error term is normally distributed

H1: Error term is not normally distributed

$\alpha = 0.05$

Decision Rule: if the p-value is less than the chosen alpha level, then the null hypothesis is rejected. On the contrary, if the p-value is greater than the chosen alpha level, then the null hypothesis that the data came from a normally distributed population cannot be rejected. However, since the test may be biased by sample size, as the test may be statistically significant from a normal distribution in any large samples. Thus a Q–Q plot or P-P Plot was required for verification in addition to the test.

Normal Q-Q Plots: This is a graphical procedure that plots the observed values on the X-axis and the expected values (assuming a normal distribution) on the Y-axis. Where the sample distribution is distributed exactly like a normal distribution, the points should fall on a straight line. P-P Plot may be used in place of Q-Q Plot if cumulative data –Probabilities were used as against direct observed data- Quantiles in Q-Q Plot.

### Assumption five: Linearity and model specification test

A further implicit assumption of the classical linear regression model is that the appropriate 'functional form' is linear. This means that the appropriate model is assumed to be linear in the parameters. The linearity assumption of multiple regression analysis assumes that there must be a linear relationship between the dependent variable and each of independent variables, as well as the dependent variable and the independent variables collectively (Asghar & Saleh, 2012). The most commonly used way of checking linearity is creating scatter plots and then visually inspecting these scatter plots to check for linearity. If the figure not has an obvious pattern and the point is evenly distributed above and below zero on the X-axis, and to the left and right of zero on the Y- axis, it is an indication of linearity.

According to Brooks (2008), Specification error occurs when omitting a relevant independent variable, including unnecessary variable or choosing the wrong functional form, so that regression model will be wrongly predicted. If the omitted variable is correlated with the

included variable, the estimators are biased and inconsistent. If the omitted variable is not correlated with the included variable, the estimators are unbiased and consistent. Whether the model should be linear can be formally tested using Ramsey's (1969) RESET test, which is a general test for misspecification of functional form. In this study Ramsey RESET test was used to see whether the developed model is correctly regressing.

H0: the model is correctly specified

H1: the model is not correctly specified

Decision Rule: Reject H0 if p-value is > significance level. Otherwise, do not reject H0.

## 3.7 Model Specification

Model specification refers to the determination of which independent variables should be included in or excluded from a regression equation. Model specification is the first and most critical stage of regression analysis; followed by estimation of parameters and interpretation of those parameters. Our estimates of the parameters of a model and our interpretation of them depend on the correct specification of the model (Allen, 1997). The econometric model adopted for the study was multivariate regression model. It is a statistical tool for the investigation of relationships between variables. It is valuable for quantifying the impact of various simultaneous influences upon a single dependent variable. Regression analysis is also important for quantifying the impact of various simultaneous variables upon a single dependent variable. In order to address the objectives of research inquires; the study used the following regression equations to test the significance of the study hypotheses:

The first generic objective of the study was to examine if credit risk management influence Return on Asset of micro finance institution in Addis Ababa. The following multiple linear regression equation was used to examine the effect of credit risk management on financial performance of micro finance institution in Addis Ababa.

$ROA = \beta 0 + \beta 1 TLTA + \beta 2 TLTD + \beta 3 NPLTL + \epsilon$ (1)

Where ROA represent Return on Asset, while TLTA, TLTD, NPLTL represent the independent variables the ratio of total loan total asset, the ratio of total loan to total deposit, and the ratio of nonperforming loan to total loan respectively. β0 is the constant, while β1, β2 and β3 represent corresponding coefficients for the respective independent variables to be estimated and e represent the error term that captures all relevant variables not included in the model.

The second generic objective was to establish whether credit risk management affects Return on Equity of micro finance institution in Addis Ababa. The following multiple linear regression equation was used to determine the effect of credit risk management on Return on Equity of micro finance institution in Addis Ababa.

$ROE = \beta 0 + \beta 1 TLTA + \beta 2 TLTD + \beta 3 NPLTL + \epsilon$ (2)

Where ROE represent Return on Equity, while TLTA, TLTD, NPLTL represent the independent variables the ratio of total loan total asset, the ratio of total loan to total deposit, and the ratio of nonperforming loan to total loan respectively. β0 is the constant, while β1, β2 and β3 represent corresponding coefficients or parameters for the respective independent variables to be estimated and e represent the error term that captures all relevant variables not included in the model.

## 3.8 The variables

For this research, Return on Equity (ROE) and Return on Asset (ROA) used as the indicator of the profitability in the regression analysis, (Marshal and Onyekachi, 2012). Whereas, the traditional credit risk ratios which is Total Loan to Total Assets (TLTA), Total Loan to Total Deposit (TLTD) and Non- Performing Loan to Total Loan (NPLTL) as the indicator of credit risk and use to measure the amount of credit level of the banks. The data used to calculate these ratios are retrieved from the financial statements from year 2009 to 2018 of Microfinance Institutions which are publicly available on the bulletin of Association of Microfinance Institutions in Ethiopia. The table below shows the variables have been conducted throughout this study.

**Table 3.1: Variable Description**

| | Variables | Measurement |
|---|---|---|
| Dependent variable | Return on Asset (ROA) | Net income before tax/ Total Asset |
| | Return on Equity (ROE) | Net income before tax/ Total Equity |
| Independent variable | Total Loan to Total Asset (TLTA) | $Total\ Loan/Total\ Asset$ |
| | Total Loan to Total Deposit (TLTD) | $Total\ Loan/Total\ Deposit$ |
| | Non-performing Loan to Total Loan(NPLTL) | $Non-Performing\ Loan/Total\ Loan$ |

# Chapter Four

## Data Analysis, Results and Discussion

This chapter discusses the interpretation and presentation of the findings obtained from the regression out put on the relationship between credit risk management and profitability of Microfinance Institutions in Addis Ababa. First, the descriptive statistics of the research will be discussed in order to provide better understanding for the data. Then the results of statistical tests will be presented and described.

## 4.1 Descriptive statistics

Table 4.1 provides a summary of the descriptive statistics of the dependent and independent variables for ten microfinance institutions' in Addis Ababa from the year 2009 to 2018 with a total of 80 observations. The table shows the mean, minimum, maximum, standard deviation and number of observations for the dependent variable Return on asset (ROA) and Return on Equity (ROE) and independent variables Total Loan to Total Asset (TLTA), Total Loan to Total Deposit (TLTD) and Non-performing Loan to Total Loan (NPLTL).

**Table 4.1:- Descriptive Statistics**

| | N | Minimum | Maximum | Mean | Std. Deviation |
|---|---|---|---|---|---|
| Return on Asset | 80 | -.03 | .70 | .0916 | .09823 |
| Return on Equity | 80 | -.07 | 2.41 | .2455 | .31504 |
| Total Loan to Total Asset | 80 | .007 | 1.33 | .7981 | .18958 |
| Total Loan to Total Deposit | 80 | .27 | 32.56 | 3.1432 | 3.53526 |
| Nonperforming loan to Total Loan | 80 | .001 | .20 | .0310 | .04114 |

*Source: Research findings*

Table 4.1 shows the average indicators of variables computed from the financial statements and the standard deviation that shows how much dispersion exists from the average value. According to Brooks, (2008), a low standard deviation indicates that the data point tend to be very close to the mean, whereas high standard deviation indicates that the data point are spread out over a large range of values. It shows the summary data for the variables used in the analysis. The data are average values across years and reported showing the trend of the key variables over the period 2009 to 2018.

The data shows that during 2009 to 2018 the average profit level ROA and ROE of Microfinance institution in Addis Ababa are 0.0916 and 0.2455 percent respectively. It is also observed that the spread of ROA is 0.09823 with a maximum observation of 0.7 percent and minimum observation of -0.03 percent. ROE has standard deviation of 0.31504 with a maximum observation of 2.41 and minimum observation of -0.07.

Total Loan to Total Asset ratio has a mean value of 0.7981and standard deviation of 0.18958 with a maximum value observation of 1.33 percent and minimum observation of 0.007 percent. Whereas, Total Loan to Total Deposit ratio has a mean value of 3.1432 and standard deviation of 3.53526 with a maximum value observation of 32.56 percent and minimum observation of 0.27 percent. Besides, Nonperforming loan to Total Loan ratio has a mean value of 0.031 and standard deviation of 0.04114 with a maximum value observation of 0.20 percent and minimum observation of 0.001 percent. From the standard deviation we can observe the indicator with widest spread is Total Loan to Total Deposit which has standard deviation of 3.53 which means from sample microfinance institutions in our study have greater diversification on their Total Loan to Total Deposit ratio

## 4.2. CLRM assumptions

Multiple linear regressions are based on the assumptions of Ordinary Least Square (OLS). Ordinary Least Square (OLS) is mainly based on classical linear regression model (CRLM) assumptions. To maintain the data validity and robustness of the regressed result of the research, the basic classical linear regression model (CRLM) assumptions must be tested for identifying any misspecification and correcting them so as to augment the research quality Brooks, (2008). There are different CLRM assumptions that need to be satisfied and that are tested in this study, which are: errors equal zero mean test, normality, homoscedasticity, autocorrelation, and multicollinearity. So in the following section necessary diagnostic tests were carried out on the variables.

### 4.2.1 Test for multicollinearity

Multicollinearity occurs when there are two or more independent variables that are highly correlated with each other. This leads to complications with understanding which independent variable contributes to the variance explained in the dependent variable, as well as technical issues in calculating a multiple regression model (Simon, 2004). When there is multicollinearity between explanatory variables; $R^2$ will be high but the individual coefficients will have high

standard errors, so that the regression 'looks good' as a whole, but the individual variables are not significant (Brooks, 2008). According to Lewis;Beck, (1993) suggestion inorder to find out the multicollinearity problem, the bivariate correlations among the independent variables should be examined and the existence of correlation of about 0.8 or larger indicates a problem of multicollinearity. Based on this rule of the thumb, there was no collinearity among the independent variables.

**Table 4.2 Correlation matrices of explanatory variables**

| | | Total Loan to Total Asset | Total Loan to Total Deposit | Nonperforming loan to Total Loan |
|---|---|---|---|---|
| Total Loan to Total Asset | Pearson Correlation | 1 | .552** | -.315* |
| | Sig. (2-tailed) | | .000 | .013 |
| | N | 62 | 62 | 62 |
| Total Loan to Total Deposit | Pearson Correlation | .552** | 1 | -.150 |
| | Sig. (2-tailed) | .000 | | .246 |
| | N | 62 | 62 | 62 |
| Nonperforming loan to Total Loan | Pearson Correlation | -.315* | -.150 | 1 |
| | Sig. (2-tailed) | .013 | .246 | |
| | N | 62 | 62 | 62 |

**. Correlation is significant at the 0.01 level (2-tailed). *Source: Research findings*

*. Correlation is significant at the 0.05 level (2-tailed).

Since there is no correlation above 0.8 in this study according to Cooper and Schendlar (2003) and Lewis Beck (1993), it can be concluded in this study that there is no problem of multicollinearity, thus enhanced the reliability for regression analysis.

### 4.2.2 Test for heteroscedasticity assumption (var (ut ) = σ2 <∞)

The condition of classic linear regression model implies that there should be homoscedasticity between variables. Homoscedasticity in a study usually happens when the variance of residuals (error term) would be same for all predicated (Tabachnic & Fidell, 2007). On the other hand, heteroscedasticity in a study usually happens when the variance of the errors vary across observation (Long & Ervin, 2000). The presence of heteroscedasticity in OLS estimators will still give unbiased (and also consistent) coefficient estimates, but they are no longer best linear unbiased estimators (BLUE) – that is, they no longer have the minimum variance among the class of unbiased estimators (Brooks, 2008). There are different ways for checking whether the

variances of error term are the same across observation. The most commonly used methods is Breusch-Pagan test which was used to test the null hypothesis that the error variances are all equal versus the alternative that the error variances are a multiplicative function of one or more variables. If sig-value is less than 0.05, reject the null hypothesis. So by using the Breustch-pagan test we can check if there is Heteroscedasticity. Here are the outputs from STATA for Breustch-pagan test for Heteroscedasticity both ROA and ROE.

**Table 4.3: Breusch-Pagan for Heteroscedasticity**

| H0 | Variables | Chi 2(1) | Prob > Chi2 |
|---|---|---|---|
| Constant variance | Fitted values of ROA | 2.97 | 0.0850 |
| Constant variance | Fitted values of ROE | 7.98 | 0.0047 |

As we can see from the above table 4.3, the sig-value for fitted values of ROA was 0.0850 which indicating that heteroscedasticity was not a concern. Whereas with regard to ROE the sig-value for fitted values was 0.0047 which is below cut point value of 0.05 and so soundly reject the null hypothesis of homoscedasticity. So there is problem of Heteroscedasticity in this model. This means that using OLS estimator the standard error will be biased estimates of the actual variance of the coefficient so we have to use robust the standard error in case ROE. In general if we have linear regression model with Heteroscedasticity, then the OLS estimators are sill unbiased and consistence. But unfortunately the same cannot be said for the standard error. The implication will be that with Heteroscedasticity inference is not just going to be correct so we have to use robust the standard error. But according to Sazali, et al (2010), only a large chi-square value greater than 9.22 is an indication of the existence of heteroscedasticity. In this case, a chi-square value for ROE is 7.98 which below the cut-point 9.22, thus according to Sazali, et al (2010) heteroscedasticity is not present. But for the result to be more robust, we have to use robust the standard error.

### 4.2.3 Test for absence of Autocorrelation

Another basic assumption of regression model says that the covariance between error terms should be zero. This means that error term should be random and it should not exhibit any kind of pattern. The autocorrelation exist when the error terms across observations are correlated with each other. If there exists covariance between the residuals and it is non zero, this phenomenon is called autocorrelation (Brooks, 2008). To check this we can use different methods.

**Durbin–Watson test**

The most commonly used methods to determine whether there is autocorrelation, that is where there is a linear correlation between the error terms for one observation, is Durbin-Watson test. According to Cochrane, (1997), if a value of d is within the range 1.5 and 2.5 means there is no autocorrelation. Therefore the result proved that there is no auto correlation as shown in table 4.3 below.

**Table 4.4: Durbin-Watson Test for Autocorrelation**

| Test Method | Dependent variable | Value |
|---|---|---|
| Durbin-Watson | ROA | 1.752 |
| Durbin-Watson | ROE | 1.60 |

*Source: Research findings*

### 4.2.4 Test for Normality (ut ~N(0, σ2))

The other assumption of classical linear regressions model is normality which assumes that residuals (errors) are approximately normally distributed. In order to test the hypothesis and determine the relationship between study variables, the residuals of the regression should follow normal distribution. A simple way to check this assumption is to test for one sample Shapiro-Wilk test.

**Shapiro-Wilk Test**

Shapiro-Wilk test is the most commonly used method of test for normality. It has been found to be the most powerful test in most situations (Richardson & Smith, 1993). It is mostly used for evaluating the assumption of univariate normality by taking the observed cumulative distribution of scores and comparing them to the theoretical cumulative distribution for a normally distributed variable. The null and alternative hypotheses were stated as follows:

Ho: The data is normally distributed

H1: The data is not normally distributed

The rule of thumb is that if the p -value is less than 0.05, H0 is rejected, and if the p-value is greater than 0.05, Ho is not rejected. As shown from table below, the tests results for ROA has a p-value of 0.138 and ROE has the p-value of 0.11113, which are greater than the cut point 0.05, confirming that the standardized residuals was significantly normally distributed (Asghar & Saleh, 2012).

**Table 4.5: Shapiro-Wilk W test for normal data**

| Variable | Observation | W | V | Z | Prob>z |
|---|---|---|---|---|---|
| Standardized Residuals for (ROA) | 62 | 0.97 | 1.65 | 1.09 | 0.138 |
| Standardized Residuals for (ROE) | 62 | 0.968 | 1.760 | 1.221 | 0.11113 |

*Source: Research findings*

### 4.2.5 Model specification Test

According to Brooks (2008), Specification error occurs when omitting a relevant independent variable, including unnecessary variable or choosing the wrong functional form, so that regression model will be wrongly predicted. If the omitted variable is correlated with the included variable, the estimators are biased and inconsistent. If the omitted variable is not correlated with the included variable, the estimators are unbiased and consistent. Whether the model should be linear can be formally tested using Ramsey's (1969) RESET test, which is a general test for misspecification of functional form. In this study Ramsey RESET test was used to see whether the developed model is correctly regressing.

H0: the model is correctly specified

H1: the model is not correctly specified

**Table 4.6: Ramsey RESET test for model specification**

| H0 | Variables | F | Prob > F |
|---|---|---|---|
| Model has no omitted variables | Fitted values of ROA | 0.29 | 0.8347 |
| Model has no omitted variables | Fitted values of ROE | 2.16 | 0.1028 |

*Source: Research findings*

The rule of thumb is rejecting H0 if p value is less than significance level. Otherwise, do not reject H0. As shown from table above, the tests results for ROA has a p-value of 0.8347 and ROE has the p-value of 0.1028, which are greater than the cut point 0.05, confirming that the models are free from specification error.

## 4.3. Choosing among Pooled Regression, Fixed Effect & Random Effect Model

The results so far indicate that all CRLM assumptions are not violated, so the ordinary least square regression can be safely applied. However, since this study uses a panel data, there are three types of panel estimator approaches that can be employed, namely: Constant Coefficient (Pooled Regression) Model, Fixed Effects Models (FEM) and Random Effects Models (REM) (Brooks,(2008).

Constant Coefficient (Pooled Regression) Model assumes that there is neither significant cross sectional nor significant temporal effect and hence the model pools all of the data and run an ordinary least squares (OLS) regression model. On other hand, the simplest types of fixed effects models allow the intercept in the regression model to differ cross-sectionally but not over time, while all of the slope estimates are fixed both cross-sectionally and over time. The random effects approach proposes different intercept terms for each entity and again these intercepts are constant over time, with the relationships between the explanatory and explained variables assumed to be the same both cross-sectionally and temporally (Brooks, 2008). So it is important to select one of three models to make best estimation for the data.

There are different test methods that are used to select among these three panel estimator approaches. To examine whether pooled regression model or fixed effects model, a poolability test was conducted providing evidence in favor of the pooled regression model for both dependent variables (ROA and ROE). A figure from STATA below show a poolability test for both dependent variables, the P- value for both models is greater than 5% level of significance. Hence the F-test does not reject the null of zero company heterogeneity. Hence between the pooled regression model or fixed effects model, we select the former.

A poolability test for ROA

```
F test that all u_i=0: F(7, 51) = 2.06                     Prob > F = 0.0651
```

A poolability test for ROE

```
F test that all u_i=0: F(7, 51) = 1.21                     Prob > F = 0.3163
```

*Source: Stata output*

To examine whether pooled regression model or random effects model, a Breusch-Pagan poolability test was conducted providing evidence in favor of the pooled regression model for both dependent variables (ROA and ROE).

**Figure 4.1: A Breusch-Pagan poolability test for ROA**

```
. xttest0

Breusch and Pagan Lagrangian multiplier test for random effects

        ROA[MFI,t] = Xb + u[MFI] + e[MFI,t]

        Estimated results:
                     |       Var     sd = sqrt(Var)
             ROA     |    .0019293       .0439235
               e     |    .0012993       .0360455
               u     |          0              0

        Test:   Var(u) = 0
                                chibar2(01) =     0.00
                             Prob > chibar2 =   1.0000
```

**Figure 4.2: A Breusch-Pagan poolability test for ROE**

```
. xttest0

Breusch and Pagan Lagrangian multiplier test for random effects

        ROE[MFI,t] = Xb + u[MFI] + e[MFI,t]

        Estimated results:
                     |       Var     sd = sqrt(Var)
             ROE     |    .0247268       .1572476
               e     |    .0180114       .1342067
               u     |          0              0

        Test:   Var(u) = 0
                                chibar2(01) =     0.00
                             Prob > chibar2 =   1.0000
```

The above figure from STATA output show a Breusch-Pagan poolability test for both dependent variables, the P- value for both models are greater than 5% level of significance. Hence we do not reject the null of zero company heterogeneity. Hence between the pooled regression model or

random effects model, we select the former. In both of the above test we select the pooled regression model in favor of FE and RE models. So we do not need to conduct the Huausman test to see whether a FE or RE model is more appropriate rather we can pool the data with ordinary least square (OLS).

## 4.4. Regression analysis results

In order to address the two broader the research objectives mentioned in chapter one, two different hypotheses have been developed. And to test for those hypotheses, two regression analyses is conducted. The results of the hypotheses are summarized in the following Section.

### 4.4.1 Regression analysis – Credit Risk management & Return on Asset (ROA)

The first generic objective of study was to determining the effect of credit risk management on profitability of microfinance institution measured in Return on Asset (ROA). To do this multiple linear regression is used to estimate the effect of each of the independent variables which includes Total Loan to Total Asset (TLTA), Total Loan to Total Deposit (TLTD) and Non-performing Loan to Total Loan (NPLTL) on profitability of microfinance institution in Addis Ababa measured in terms of Return on Asset (ROA).

**Table 4.7: Pooled Regression (OLS) Model Result for ROA**

```
. regress ROA TLTA TLTD NPLTTL
```

| Source | SS | df | MS | Number of obs | = | 62 |
|---|---|---|---|---|---|---|
| | | | | F(3, 58) | = | 7.43 |
| Model | .032682143 | 3 | .010894048 | Prob > F | = | 0.0003 |
| Residual | .085003341 | 58 | .001465575 | R-squared | = | 0.2777 |
| | | | | Adj R-squared | = | 0.2403 |
| Total | .117685484 | 61 | .00192927 | Root MSE | = | .03828 |

| ROA | Coef. | Std. Err. | t | P>\|t\| | [95% Conf. | Interval] |
|---|---|---|---|---|---|---|
| TLTA | .0817219 | .0424654 | 1.92 | 0.059 | -.0032819 | .1667256 |
| TLTD | -.0065885 | .0048777 | -1.35 | 0.182 | -.0163523 | .0031754 |
| NPLTTL | -.8424059 | .2347849 | -3.59 | 0.001 | -1.312379 | -.3724329 |
| _cons | .0429163 | .031958 | 1.34 | 0.185 | -.0210546 | .1068872 |

*Source: Stata Output*

**Model Summary**

The model summary revealed a coefficient of determination ($R^2$) of 0.24 (24%). This meant that a change in profitability which is measured in terms of ROA could be explained by 24% change in the explanatory variables (Total Loan to Total Asset (TLTA), Total Loan to Total Deposit (TLTD) and Non-performing Loan to Total Loan (NPLTL).

The joint test of significance for the explanatory variables which was measured by F- Statistic was used to describe whether these variables were significant and whether they could be used in the model to predict profitability as shown in table 4.7. The result revealed f statistic of 7.43 that was associated with a p value of p <.01 and significant at 0.01 alpha level. This imply that the independent variables, that is, Total Loan to Total Asset (TLTA), Total Loan to Total Deposit (TLTD) and Non-performing Loan to Total Loan (NPLTL) considered were relevant in explaining the profitability of microfinance institution in Addis Ababa measured in terms of Return on Asset (ROA).

**Regression Coefficients**

The findings in table 4.7 show the coefficients of the regression. According to the findings, only Nonperforming loan to Total Loan ratio is significant in predicting the profitability of microfinance institution in Addis Ababa measured in terms of Return on Asset (ROA). Nonperforming loan to Total Loan ratio has significant but negative effect on Return on Asset with a beta value of -0.842 and t value of -3.588 which is significant at 1%. Total Loan to Total Deposit (TLTD) has also negative but insignificant effect on Return on Asset with a beta value of -0.00658 and t value of -1.351. While Total Loan to Total Asset ratio has positive but insignificant effect on Return on Asset with a beta value of 0.0817 and t value of 1.924 which is only significant at 10%.

From the table above, the following regression equation was established

$$ROA = 0.043 + 0.082TLTA - 0.007TLTD - 0.842NPLTL$$

From the model, the ROA (Financial performance) is 0.043 when other factors (TLTA, TLTD, NPLTL) are held constant. A unit increase in the ratio of total loan total asset holding other factors constant results in a 0.082 increase in the return on Asset (ROA). This indicates a positive association between the ratio of total loan total asset and return on Asset of the micro finance

institutions in Addis Ababa. Additionally, a unit increase in the ratio of total loan to total deposit results in a 0.007 decrease in the return on asset, other factors held constant. This indicates a negative association between the ratio of total loan total deposit and return on Asset. The decrease is however low. Finally, from the model, when other factors are held constant, (the ratio of total loan total asset and ratio of total loan total deposit), a unit increase in the ratio of nonperforming loan to total loan results in a decrease in the ROA of the microfinance institutions by 0.842. This finding indicates a negative association between the ratio of nonperforming loan to total loan and ROA of the MFIs in Addis Ababa.

### 4.4.2 Regression analysis – Credit Risk management & Return on Equity (ROE)

The second generic objective of study was to determining the effect of credit risk management on profitability of microfinance institution measured in Return on Equity (ROE). To do this multiple linear regression is used to estimate the effect of each of the independent variables which includes Total Loan to Total Asset (TLTA), Total Loan to Total Deposit (TLTD) and Non-performing Loan to Total Loan (NPLTL) on profitability of microfinance institution in Addis Ababa measured in terms of Return on Equity (ROE).

**Table 4.8: Pooled Regression (OLS) Model Result for ROE**

```
. regress ROE TLTA TLTD NPLTTL, vce(robust)

Linear regression                               Number of obs     =         62
                                                F(3, 58)          =       4.54
                                                Prob > F          =     0.0063
                                                R-squared         =     0.2901
                                                Root MSE          =     .13587
```

| ROE | Coef. | Robust Std. Err. | t | P>\|t\| | [95% Conf. | Interval] |
|---|---|---|---|---|---|---|
| TLTA | .4046047 | .2216134 | 1.83 | 0.073 | -.0390027 | .848212 |
| TLTD | -.0736268 | .0232836 | -3.16 | 0.002 | -.1202339 | -.0270196 |
| NPLTTL | -2.908293 | 1.16399 | -2.50 | 0.015 | -5.238272 | -.5783136 |
| _cons | .149867 | .1446504 | 1.04 | 0.304 | -.1396824 | .4394163 |

*Source: Stata Output*

**Model Summary**

The model summary revealed a coefficient of determination ($R^2$) of 0.253 (25.3%). This meant that a change in profitability which is measured in terms of ROE could be explained by 25% change in the explanatory variables (Total Loan to Total Asset (TLTA), Total Loan to Total Deposit (TLTD) and Non-performing Loan to Total Loan (NPLTL). The joint test of significance for the explanatory variables which was measured by F- Statistic was used to describe whether these variables were significant and whether they could be used in the model to predict profitability as shown in table 4.8. The result revealed f statistic of 7.9 that was associated with a p value of $p < 0.01$ and significant at 0.0002 alpha level. This imply that the independent variables, that is, Total Loan to Total Asset (TLTA), Total Loan to Total Deposit (TLTD) and Non-performing Loan to Total Loan (NPLTL) considered were relevant in explaining the profitability of microfinance institution in Addis Ababa measured in terms of Return on Equity (ROE).

**Regression Coefficients**

The findings in table 4.8 show the coefficients of the regression. According to the findings, all the risk management indicators (Total Loan to Total Deposit (TLTD) Total Loan to Total Asset (TLTA) and Non-performing Loan to Total Loan (NPLTL) are significant in predicting the profitability of microfinance institution in Addis Ababa measured in terms of Return on Equity (ROE). Nonperforming loan to Total Loan ratio has significant but negative effect on Return on equity with a beta value of -2.908 and t value of -2.45 which is significant at 5%. Total Loan to Total Deposit (TLTD) has also negative and significant effect on Return on equity with a beta value of – 0.074 and t value of -4.03. While Total Loan to Total Asset ratio has positive and insignificant effect on Return on equity with a beta value of 0.405 and t value of 2.04 which is only significant at 5%.

From the table above, the following regression equation was established

$$ROE = 0.150 + 0.405TLTA - 0.074TLTD - 2.908\text{-}NPLTL$$

From the model, the ROE (Financial performance) is 0.150 when other factors (TLTA, TLTD, NPLTL) are held constant. A unit increase in the ratio of total loan total asset holding other factors constant results in a 0.405 increase in the return on equity (ROE) and it is statistically significant. This indicates a positive association between the ratio of total loan total asset and

return on equity of the micro finance institutions in Addis Ababa. Additionally, a unit increase in the ratio of total loan to total deposit results in a 0.074 decrease in the return on equity, other factors held constant and it is also statistically significant. This indicates a negative association between the ratio of total loan total deposit and return on equity. The decrease is however low. Finally, from the model, when other factors are held constant, (the ratio of total loan total asset and ratio of total loan total deposit), a unit increase in the ratio of nonperforming loan to total loan results in a decrease in the ROE of the microfinance institutions by 2.908 and it is also statistically significant. This finding indicates a negative association between the ratio of nonperforming loan to total loan and ROE of the MFIs in Addis Ababa and the coefficient is also high.

## 4.5 Hypothesis test

In line with the hypotheses before, the summary of the discussion above shows in the Table 4.12 below:

**Table 4.12 Summary of Hypothesis test**

| Hypothesis | Acceptance | Remarks |
|---|---|---|
| H1: There is a significant impact of Total Loan Total Asset (TLTA) ratio on Return on Asset (ROA) of MFIs in Addis Ababa | Reject | Insignificant regression model (P-value of 0.059) |
| H2: There is a significant impact of Total Loan Total Deposit (TLTD) ratio on Return on Asset (ROA) of MFIs in Addis Ababa. | Reject | Insignificant regression model (P-value of 0.182) |
| H3: There is a significant impact of Non-performing Loan Total Loan (NPLTL) ratio on Return on Asset (ROA) of MFIs in Addis Ababa. | Accept | Significant regression model (P-value of 0.001) |
| H4: There is a significant impact of Total Loan Total Asset (TLTA) ratio on Return on Equity (ROE) of MFIs in Addis Ababa. | Accept | Insignificant regression model (P-value of 0.044) |
| H5: There is a significant impact of Total Loan Total Deposit (TLTD) ratio on Return on Equity (ROE) of MFIs in Addis Ababa. | Accept | Significant regression model (P-value of 0.002) |
| H6: There is a significant impact of Non-performing Loan Total Loan (NPLTL) ratio on Return on Equity (ROE) of MFIs in Addis Ababa | Accept | Significant regression model (P-value of 0.015) |

The statistical significance of the independent variables in explaining profitability is captured throughout the p-values. From the table above, the credit risk management indicator which is Non- Performing Loan to Total Loan (NPLTL) ratio has significantly influences on Return on Asset (ROA) and Return on Equity (ROE). Consequently, with respect to hypothesis testing, the study supports the null hypothesis that there is a significant impact of Total Loan Total Asset (TLTA) ratio on Return on Asset (ROA) of MFIs in Addis Ababa and there is a significant impact of Non-performing Loan Total Loan (NPLTL) ratio on Return on Asset (ROA) of MFIs in Addis Ababa. This result is parallel with Rashid et al (2014), the study found that ROA has a negative and significant relationship associates with non performing loan.

Similarly, Total Loan to Total Deposit (TLTD) ratio has statistically significant in explaining profitability of MFIs measured in terms of ROE as indicated by (P = 0.002). Hence, the study accepts the null hypothesis that there is a significant impact of Total Loan Total Deposit (TLTD) ratio on Return on Equity (ROE) of MFIs in Addis Ababa. However, Total Loan to Total Deposit (TLTD) ratio has not a statistically significant effect in explaining profitability of MFIs measured in terms of ROA as shown by (P = 0.182). Consequently, with respect to hypothesis testing, the study rejects the null hypothesis that there is a significant impact of Total Loan Total Deposit (TLTD) ratio on Return on Asset (ROA) of MFIs in Addis Ababa. This finding is similar with Izzaamirah et al, (2016), which found that ROA has a negative and insignificant relationship with Total Loan to Total Deposit ratio.

Whereas, Total Loan to Total Asset (TLTA) ratio has statistically significant in explaining profitability of MFIs measured in terms of ROE as indicated by (P = 0.044). Hence, the study accepts the null hypothesis that there is a significant impact of Total Loan Total Asset (TLTA) ratio on Return on Equity (ROE) of MFIs in Addis Ababa. However, the study rejects the null hypotheses that there is a significant impact of Total Loan Total Asset (TLTA) ratio on Return on Asset (ROA) of MFIs in Addis Ababa. This finding is similar with Izzaamirah et al, (2016), in which he found that, there was an impact on credit risk management with negative relationship in TLTD and NPLTL, while TLTA has a positive relationship towards the bank profitability.

# CHAPTER FIVE

# SUMMARY, CONCLUSIONS AND RECOMMENDATIONS

## 5.1 Introduction

This chapter presents the summary of the findings, conclusions, and recommendations of the study. The study aimed at ascertaining the effect of credit risk management on the profitability of the micro finance institutions in Addis Ababa, measured in terms of Return on Asset (ROA) and Return on Equity (ROE).

## 5.2 Summary of Findings

In the beginning of the research it was explained that the study was conducted with an aim of examining the credit risk management on the profitability of the micro finance institutions in Addis Ababa. In order to test the relationship for two abstract concepts, we used proxies for them. The study has chosen the ROE and ROA as the proxies for profitability. Whereas, the traditional credit risk ratios indicators which are Total Loan to Total Assets (TLTA), Total Loan to Total Deposit (TLTD) and Non- Performing Loan to Total Loan (NPLTL) are used as independent variables to measure the amount of credit level of the MFIs. This was done by collecting data from eight MFIs operated in Addis Ababa and their annual report for the period from 2009 to 2018 which was published by Association of Ethiopia Microfinance Institution (AEMFI) was used as main sources of data. To maintain the data validity and robustness of the regressed result of the research, the Classical Linear egression Model (CLRM) assumptions tests which includes consists Normality, linearity, Multicollinearity, Heteroscedasticity and Autocorrelation were tested. The study made six hypotheses and two regression tests for the two independent variables, ROE and ROA, based on the 10-years data. Then, multiple linear regression were used to test these hypotheses, and tests of significance using t- tests has indicated varying level of significance amongst the independent variables as well as when combined, against the dependent variable.

According to the result of from inferential statistics, the following are the major finding of study concerning with each of the independent variable:

**Non- Performing Loan to Total Loan (NPLTL) ratio**

Based on the ordinary least squares (OLS), the study founds Non- Performing Loan to Total Loan (NPLTL) ratio has negatively and significantly influences on both Return on Asset (ROA) and Return on Equity (ROE). It implies that one should expect NPLTL to increase in step with overall portfolio growth. As the loan portfolio grows the anticipation for loan loss will increase adversely affecting the profitability of MFIs.

**Total Loan to Total Deposit (TLTD) ratio**

According to findings, Total Loan to Total Deposit (TLTD) ratio has negatively and significantly influences on profitability of MFIs measured in terms of Return on Equity (ROE). However, Total Loan to Total Deposit (TLTD) ratio has not a statistically significant effect in explaining profitability of MFIs measured in terms of ROA.

**Total Loan to Total Asset (TLTA)**

The other indicator of credit risk management i.e. Total Loan to Total Asset (TLTA) ratio has positively and significantly influences on return on equity (ROE). However, it has positively but insignificantly influences on return on asset (ROA)

## 5.3 Conclusion

Based on the findings of the study, the traditional credit risk management indicators, TLTD and NPLTL, are significant impact on the profitability of MFIs in Addis Ababa, which is measured in terms, ROE. The study further conclude that the two traditional credit risk management indicators, TLTD and NPLTL, are negative relationship with profitability of MFIs in Addis Ababa, whereas TLTA has a positive relationship towards the bank profitability, which is measured in terms of ROE and ROA.

## 5.4 Recommendation

Based on the findings of the study, the two traditional credit risk management indicators, TLTD and NPLTL, are significant and negative impact on the profitability of MFIs in Addis Ababa, which is measured in terms, ROE. Since these indicators of credit risk management in general has significant contributions to profitability of MFIs in Addis Ababa. It is advised to put more emphasis on credit risk management. In order to reduce risk on loans and achieve maximum profitability, the study makes several recommendations.

Firstly, the study recommends MFIs to constantly pay attention to the credit risk being a major risk affecting its performance and adopt a rigor credit risk management policy. The study recommends MFIs to revise Credit Policy & Procedures within a short period of time (yearly). This process of credit risk management is formalized in most organizations in a set of procedures generally called a credit policy manual. In addition, MFIs also need to establish strong follow up mechanism to insure strict adherence to the Policy and Procedure.

Secondly, the study also recommends the MFIs to enhance their credit risk control capacity. The credit analyst or manager is required to understand the ways in which bad debts or credit losses arise and to devise methods for identifying these. This then requires that due consideration is given to how these are effectively managed. A key issue is credit control, which involves constantly managing the credit-granting process. This can be seen as a policy that includes procedures, guidelines and processes for managing the credit process. As with all risk management processes, the exposure to credit risks has to be kept under constant review and action taken as required. This will help decrease default rate levels as well as non-performing loans and finally help in improve financial performance.

Thirdly, the study suggests that MFIs managers should pay attention to the management and control of credit risk in order to improve profitability, especially the control of Non-performing loan. The finding of the study revealed that the traditional credit risk management indicators, especially non –performing loan ratio (NPLTL), are strong, significant, and negative impact on the profitability of MFIs in Addis Ababa. Hence, mangers of MFIs might have the requirements to strengthen the TLTD and NPLTL ratio to help MFIs to operate more efficiently. In this instance, MFIs needs to come up with a ceiling on its non-performing loans beyond which it should shift its major focus towards thoroughly investigating and recovering the non-performing

loans of the MFIs in Ethiopia in general and in Addis in particular. MFIs also need to allocate more funds to default rate management and find better mechanisms to limit bad debt cost. Moreover, the positive effect of the loan to total asset revealed that increasing the loan book size coupled with enhancing the intermediation activity should be the focus of the MFIs managers without compromising the sound credit planning that could arise as a result of diseconomies of scale.

Fourthly, the study also recommends MFIs to establish sound and competent credit risk management department. Credit risk management is a dynamic process that responds to new information. Thus it required to established strong department which is responsible for constantly managing this process of credit granting. The MFIs Credit Department Staff need to get continuous training (at least in a quarter) to improve their knowledge, skill & attitude.

Finally, the regulatory framework should support and make sure MFIs to have strong credit risk management practice. Strong financial sector regulation can enhance the performance of sector players, reduce non-performing loans and improve performance. The regulators who include the National Bank of Ethiopia and the Association of Ethiopia Microfinance Institution (AEMFIs) must come up with strong credit risk requirements of the MFIs, in line with best risk management practices in the financial sector globally. This can be done through strengthening benchmarking and collaboration as well as directing the supervision focus towards credit risk.

## 5.5 Area Further Research

The study focused on the effect of credit risk management on profitability of MFIs empirical evidence of 10 MFIs in Addis Ababa. The study revealed that available literature on credit risk management practices of Microfinance Institutions in Ethiopia is mostly contributed by unpublished master thesis with very few in-depth studies being done. Thus there is a huge potential for further empirical research in the area of practices of credit risk management of MFIs and its effects on performance. It is therefore, recommended that further research with large sample size and wider coverage focusing on credit risk management on the profitability of MFIs in Ethiopia should be conducted. Besides, one of the recommendations that can be done to the research model is to include more indicators. The study use TLTA, TLTD and NPLTL to represent credit risk management and use ROE and ROA as profitability indicators. Except the indicators we involved in the research, other measures can also indicate the profitability and

credit risk management. Therefore, if could be more interesting to include more indicators to test the relationship. Meanwhile, it can help researchers to enhance the accuracy of the research model with the most suitable variables. Furthermore, the study also suggests that further studies should include a qualitative analysis of the relationship between credit risk management and profitability of MFIs in Ethiopia.

Besides, further research suggestion could be move the core of credit risk management to other risks management. Except the credit risk management, liquidity risk, market risk, operational risk or reputational risk can also be taken into consideration. For the financial industry's development, diversified types of financial institution have built to satisfy the demand of users. The focus of this research was on MFIs. Further research can focus on the risk management measurement of other financial institutions. In addition; profitability is only one aspect of banks' financial performance. Exploring the other aspects of financial performance is also an interesting expansion for this research.

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# Appendix 1: The raw data used for analysis (Source-AEMFI Bulletin)

| NO | FINANCIAL INSTITUTION | YEAR | ROA | ROE | Total loan/total asset | Total loan/total deposit | non perf loan/total loan |
|---|---|---|---|---|---|---|---|
| 1 | ADCSI | 2009 | 0.03 | 0.04 | 0.22 | 0.27 | 0.04 |
| 2 | ADCSI | 2010 | 0.04 | 0.06 | 0.80 | 3.90 | 0.03 |
| 3 | ADCSI | 2011 | 0.03 | 0.06 | 0.74 | 0.74 | 0.03 |
| 4 | ADCSI | 2012 | 0.03 | 0.08 | 0.55 | 1.88 | 0.03 |
| 5 | ADCSI | 2013 | 0.03 | 0.07 | 0.63 | 1.32 | 0.03 |
| 6 | ADCSI | 2014 | 0.08 | 0.32 | 0.74 | 1.35 | 0.03 |
| 7 | ADCSI | 2015 | 0.07 | 0.37 | 0.73 | 1.41 | 0.02 |
| 8 | ADCSI | 2016 | 0.10 | 0.42 | 0.74 | 2.27 | 0.03 |
| 9 | ADCSI | 2017 | 0.17 | 0.45 | 0.80 | 1.41 | 0.01 |
| 10 | ADCSI | 2018 | 0.19 | 0.54 | 0.68 | 1.67 | 0.01 |
| 11 | AGGAR | 2009 | 0.03 | 0.09 | 1.04 | 3.74 | 0.02 |
| 12 | AGGAR | 2010 | 0.05 | 0.18 | 0.84 | 3.62 | 0.03 |
| 13 | AGGAR | 2011 | 0.08 | 0.29 | 0.83 | 0.83 | 0.03 |
| 14 | AGGAR | 2012 | 0.09 | 0.35 | 0.80 | 1.35 | 0.03 |
| 15 | AGGAR | 2013 | 0.09 | 0.34 | 0.74 | 3.04 | 0.03 |
| 16 | AGGAR | 2014 | 0.12 | 0.29 | 0.81 | 2.08 | 0.03 |
| 17 | AGGAR | 2015 | 0.11 | 0.24 | 0.07 | 2.44 | 0.02 |
| 18 | AGGAR | 2016 | 0.12 | 0.29 | 0.81 | 5.04 | 0.02 |
| 19 | AGGAR | 2017 | 0.12 | 0.23 | 0.77 | 2.97 | 0.01 |
| 20 | AGGAR | 2018 | 0.12 | 0.22 | 0.74 | 3.51 | 0.00 |
| 21 | METEMAMEN | 2009 | (0.01) | (0.02) | 0.67 | 3.85 | 0.08 |
| 22 | METEMAMEN | 2010 | (0.02) | (0.02) | 0.70 | 4.17 | 0.20 |
| 23 | METEMAMEN | 2011 | 0.01 | 0.07 | 0.69 | 0.69 | 0.12 |
| 24 | METEMAMEN | 2012 | 0.06 | 0.01 | 0.89 | 5.51 | 0.04 |
| 25 | METEMAMEN | 2013 | 0.07 | 0.13 | 0.90 | 3.96 | - |
| 26 | METEMAMEN | 2014 | 0.06 | 0.10 | 0.83 | 2.70 | 0.02 |
| 27 | METEMAMEN | 2015 | 0.06 | 0.09 | 1.00 | 3.13 | 0.02 |
| 28 | METEMAMEN | 2016 | 0.06 | 0.10 | 0.84 | 4.06 | 0.02 |
| 29 | METEMAMEN | 2017 | 0.17 | 0.35 | 0.78 | 1.78 | 0.01 |
| 30 | METEMAMEN | 2018 | 0.19 | 0.40 | 0.79 | 1.78 | 0.01 |
| 31 | PEACE | 2009 | 0.02 | 0.07 | 0.87 | 3.85 | 0.02 |
| 32 | PEACE | 2010 | 0.07 | 0.18 | 0.80 | 3.48 | - |
| 33 | PEACE | 2011 | 0.09 | 0.21 | 0.91 | 0.91 | 0.00 |
| 34 | PEACE | 2012 | 0.07 | 0.14 | 0.79 | 3.50 | 0.00 |
| 35 | PEACE | 2013 | 0.04 | 0.09 | 0.88 | 3.01 | 0.00 |
| 36 | PEACE | 2014 | 0.05 | 0.12 | - | | 0.00 |
| 37 | PEACE | 2015 | 0.06 | 0.10 | 0.96 | 3.57 | 0.00 |
| 38 | PEACE | 2016 | 0.05 | 0.12 | 0.85 | 2.48 | 0.00 |
| 39 | PEACE | 2017 | 0.24 | 0.57 | 0.86 | 2.36 | 0.00 |
| 40 | PEACE | 2018 | 0.17 | 0.51 | 0.80 | 2.26 | 0.00 |
| 41 | SFPI | 2009 | 0.01 | 0.03 | 0.63 | 2.11 | 0.03 |
| 42 | SFPI | 2010 | **0.07** | **0.15** | 0.70 | 2.29 | 0.02 |
| 43 | SFPI | 2011 | 0.07 | 0.15 | 0.73 | 0.73 | 0.05 |
| 44 | SFPI | 2012 | 0.08 | 0.18 | 0.78 | 2.69 | 0.02 |
| 45 | SFPI | 2013 | 0.08 | 0.21 | 1.06 | 4.21 | 0.02 |

| NO | FINANCIAL INSTITUTION | YEAR | ROA | ROE | Total loan/total asset | Total loan/total deposit | non perf loan/total loan |
|---|---|---|---|---|---|---|---|
| 46 | SFPI | 2014 | 0.08 | 0.20 | 0.91 | 3.52 | 0.01 |
| 47 | SFPI | 2015 | 0.17 | 0.59 | 0.92 | 4.17 | 0.01 |
| 48 | SFPI | 2016 | 0.18 | 0.60 | 0.93 | 3.13 | 0.01 |
| 49 | SFPI | 2017 | 0.33 | 0.98 | 0.72 | 2.38 | 0.01 |
| 50 | SFPI | 2018 | 0.04 | 0.11 | 0.74 | 2.41 | 0.01 |
| 51 | WASASA | 2009 | 0.08 | 0.25 | 0.76 | 3.05 | 0.01 |
| 52 | WASASA | 2010 | 0.03 | 0.10 | 0.88 | 3.47 | 0.04 |
| 53 | WASASA | 2011 | 0.06 | 0.19 | 0.89 | 0.89 | 0.02 |
| 54 | WASASA | 2012 | 0.08 | 0.23 | 0.80 | 3.92 | 0.01 |
| 55 | WASASA | 2013 | 0.06 | 0.18 | 0.85 | 2.82 | 0.00 |
| 56 | WASASA | 2014 | 0.05 | 0.15 | 0.83 | 3.13 | 0.01 |
| 57 | WASASA | 2015 | 0.13 | 0.19 | 1.33 | 4.76 | 0.00 |
| 58 | WASASA | 2016 | 0.15 | 0.15 | 0.84 | 3.13 | 0.00 |
| 59 | WASASA | 2017 | 0.21 | 0.77 | 0.73 | 2.45 | 0.00 |
| 60 | WASASA | 2018 | 0.70 | 2.41 | 0.72 | 2.02 | 0.00 |
| 61 | MEKLIT | 2009 | - | - | 0.93 | 2.70 | 0.16 |
| 62 | MEKLIT | 2010 | (0.02) | (0.07) | 0.93 | 2.67 | 0.20 |
| 63 | MEKLIT | 2011 | 0.07 | 0.24 | 0.94 | 0.94 | 0.17 |
| 64 | MEKLIT | 2012 | 0.10 | 0.28 | 0.93 | 3.39 | 0.05 |
| 65 | MEKLIT | 2013 | 0.10 | 0.28 | 0.84 | 3.66 | 0.04 |
| 66 | MEKLIT | 2014 | 0.09 | 0.23 | 0.89 | 3.53 | 0.03 |
| 67 | MEKLIT | 2015 | 0.09 | 0.22 | 1.05 | 4.76 | 0.04 |
| 68 | MEKLIT | 2016 | 0.09 | 0.23 | 0.89 | 3.49 | 0.03 |
| 69 | MEKLIT | 2017 | 0.08 | 0.20 | 0.88 | 3.00 | 0.02 |
| 70 | MEKLIT | 2018 | 0.27 | 0.65 | 0.80 | 2.66 | 0.02 |
| 71 | VISION FUND/WISDOM | 2009 | (0.02) | (0.04) | 0.89 | 4.43 | 0.04 |
| 72 | VISION FUND/WISDOM | 2010 | **(0.01)** | **(0.03)** | 0.74 | 4.01 | 0.08 |
| 73 | VISION FUND/WISDOM | 2011 | (0.03) | (0.05) | 1.31 | 32.56 | 0.08 |
| 74 | VISION FUND/WISDOM | 2012 | 0.01 | 0.03 | 0.71 | 3.22 | 0.02 |
| 75 | VISION FUND/WISDOM | 2013 | 0.06 | 0.13 | 0.71 | 2.95 | 0.01 |
| 76 | VISION FUND/WISDOM | 2014 | 0.04 | 0.07 | 0.66 | 2.10 | 0.05 |
| 77 | VISION FUND/WISDOM | 2015 | 0.03 | 0.05 | 0.71 | 2.38 | 0.04 |
| 78 | VISION FUND/WISDOM | 2016 | 0.04 | 0.07 | 0.65 | 2.20 | 0.05 |
| 79 | VISION FUND/WISDOM | 2017 | 0.25 | 0.50 | 0.88 | 2.15 | 0.02 |
| 80 | VISION FUND/WISDOM | 2018 | 0.22 | 0.58 | 0.87 | 2.34 | 0.03 |

## Appendix -2: List of microfinance institutions used in the research

9. Addis Credit & Savings Institution (ADCSI)
10. Aggar Microfinance S.C
11. Metemamen Microfinance S.C
12. Poverty Eradication and community empowerment (PEACE) Microfinance S.C
13. Specialized Financial & Promotional Institution (SFPI)
14. WASASA Microfinance S.C
15. Meklit Microfinance Institution (Meklit)
16. Vision Fund (Wisdom) Microfinance S.C

# Appendix 3: Pooled Regression (OLS) Model Result

## A: Pooled Regression (OLS) Model Result for ROA

```
. regress ROA TLTA TLTD NPLTTL
```

| Source | SS | df | MS | Number of obs | = | 62 |
|---|---|---|---|---|---|---|
| | | | | F(3, 58) | = | 7.43 |
| Model | .032682143 | 3 | .010894048 | Prob > F | = | 0.0003 |
| Residual | .085003341 | 58 | .001465575 | R-squared | = | 0.2777 |
| | | | | Adj R-squared | = | 0.2403 |
| Total | .117685484 | 61 | .00192927 | Root MSE | = | .03828 |

| ROA | Coef. | Std. Err. | t | P>\|t\| | [95% Conf. | Interval] |
|---|---|---|---|---|---|---|
| TLTA | .0817219 | .0424654 | 1.92 | 0.059 | -.0032819 | .1667256 |
| TLTD | -.0065885 | .0048777 | -1.35 | 0.182 | -.0163523 | .0031754 |
| NPLTTL | -.8424059 | .2347849 | -3.59 | 0.001 | -1.312379 | -.3724329 |
| _cons | .0429163 | .031958 | 1.34 | 0.185 | -.0210546 | .1068872 |

*Source: Stata Output*

## B: Pooled Regression (OLS) Model Result for ROE

```
. regress ROE TLTA TLTD NPLTTL, vce(robust)
```

Linear regression

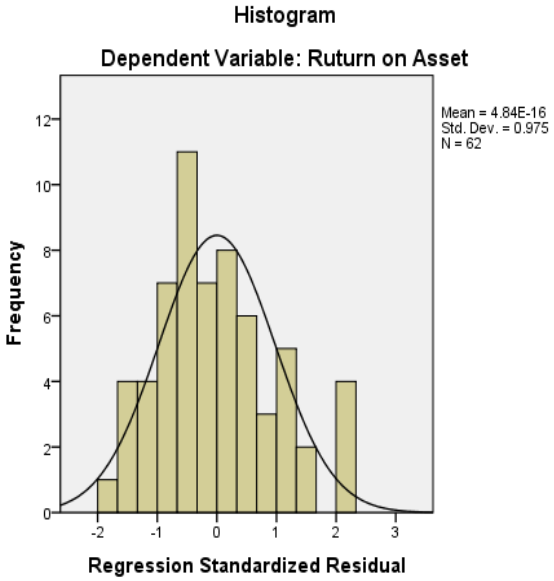
| | | |
|---|---|---|
| Number of obs | = | 62 |
| F(3, 58) | = | 4.54 |
| Prob > F | = | 0.0063 |
| R-squared | = | 0.2901 |
| Root MSE | = | .13587 |

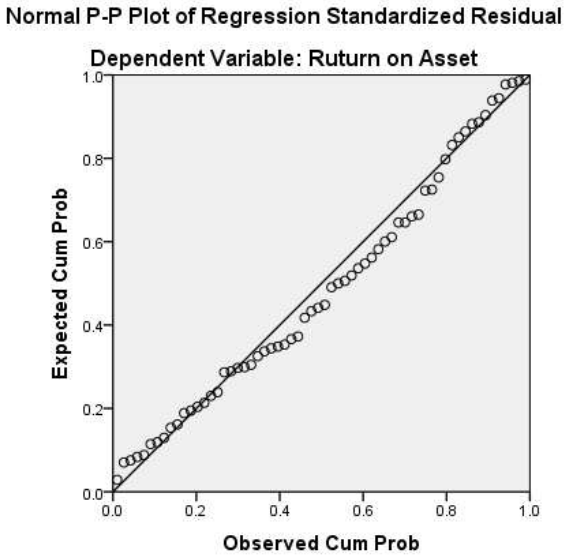
| ROE | Coef. | Robust Std. Err. | t | P>\|t\| | [95% Conf. | Interval] |
|---|---|---|---|---|---|---|
| TLTA | .4046047 | .2216134 | 1.83 | 0.073 | -.0390027 | .848212 |
| TLTD | -.0736268 | .0232836 | -3.16 | 0.002 | -.1202339 | -.0270196 |
| NPLTTL | -2.908293 | 1.16399 | -2.50 | 0.015 | -5.238272 | -.5783136 |
| _cons | .149867 | .1446504 | 1.04 | 0.304 | -.1396824 | .4394163 |

*Source: Stata Output*

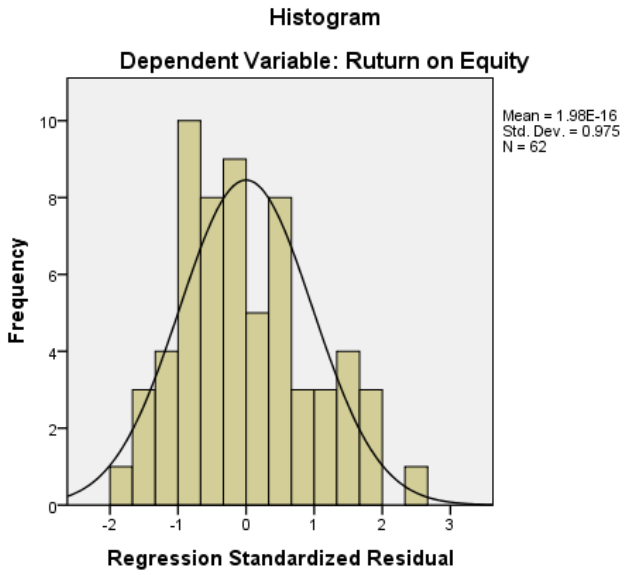
## Appendix 4: Tests for Normality: Histogram and Normal P-P Plot

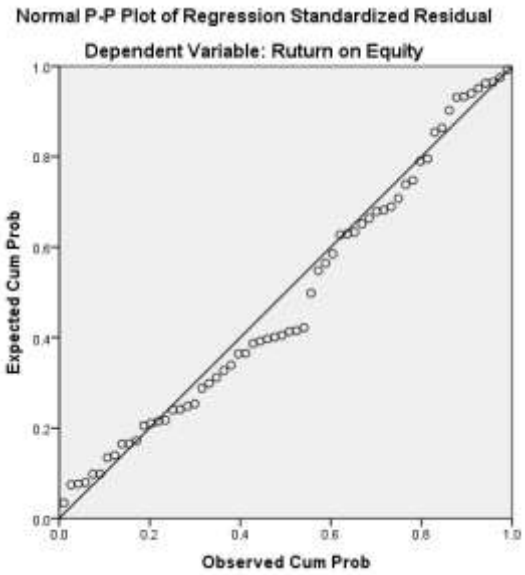
Histogram and Normal P-P Plot for standardized residual (ROA)




Histogram and Normal P-P Plot for standardized residual (ROE)



# Appendix 5:- Test for Multicollinearity

**Correlations**

| | | Total Loan to Total Asset | Total Loan to Total Deposit | Non performing loan to Total Loan |
|---|---|---|---|---|
| Total Loan to Total Asset | Pearson Correlation | 1 | .552** | -.315* |
| | Sig. (2-tailed) | | .000 | .013 |
| | N | 62 | 62 | 62 |
| Total Loan to Total Deposit | Pearson Correlation | .552** | 1 | -.150 |
| | Sig. (2-tailed) | .000 | | .246 |
| | N | 62 | 62 | 62 |
| Non performing loan to Total Loan | Pearson Correlation | -.315* | -.150 | 1 |
| | Sig. (2-tailed) | .013 | .246 | |
| | N | 62 | 62 | 62 |

**. Correlation is significant at the 0.01 level (2-tailed).

*. Correlation is significant at the 0.05 level (2-tailed).

A. ROA

| Variable | VIF | 1/VIF |
|---|---|---|
| TLTD | 1.27 | 0.787825 |
| TLTA | 1.25 | 0.797489 |
| NPLTTL | 1.01 | 0.986359 |
| Mean VIF | 1.18 | |

B. ROE

| Variable | VIF | 1/VIF |
|---|---|---|
| TLTA | 1.34 | 0.747746 |
| TLTD | 1.31 | 0.760765 |
| NPLTTL | 1.02 | 0.979362 |
| Mean VIF | 1.22 | |

# Appendix 6:- Test for Autocorrelation

A. ROA

Bruesch-Godfrey test for Autocorrelation

Breusch-Godfrey LM test for autocorrelation

| lags(*p*) | chi2 | df | Prob > chi2 |
|---|---|---|---|
| 1 | 0.689 | 1 | 0.4067 |

H0: no serial correlation

Durbin's alternative test for Autocorrelation

Durbin's alternative test for autocorrelation

| lags(*p*) | chi2 | df | Prob > chi2 |
|---|---|---|---|
| 1 | 0.644 | 1 | 0.4221 |

H0: no serial correlation

B. ROE

Bruesch-Godfrey test for Autocorrelation

Breusch-Godfrey LM test for autocorrelation

| lags(*p*) | chi2 | df | Prob > chi2 |
|---|---|---|---|
| 1 | 2.264 | 1 | 0.1324 |

H0: no serial correlation

Durbin's alternative test for Autocorrelation

Durbin's alternative test for autocorrelation

| lags(*p*) | chi2 | df | Prob > chi2 |
|---|---|---|---|
| 1 | 2.160 | 1 | 0.1417 |

H0: no serial correlation

# Appendix 7:- Test for Heteroscedasticity

A. ROA

```
Breusch-Pagan / Cook-Weisberg test for heteroskedasticity
         Ho: Constant variance
         Variables: fitted values of ROA

         chi2(1)      =     0.85
         Prob > chi2  =   0.3560
```

B. ROE

```
Breusch-Pagan / Cook-Weisberg test for heteroskedasticity
         Ho: Constant variance
         Variables: fitted values of ROE

         chi2(1)      =     7.98
         Prob > chi2  =   0.0047
```

# Appendex 8 :- Model Spesfication

A. ROA

```
Ramsey RESET test using powers of the fitted values of ROA
       Ho:  model has no omitted variables
                  F(3, 55) =      0.29
                  Prob > F =      0.8347
```

B. ROE

```
Ramsey RESET test using powers of the fitted values of ROE
       Ho:  model has no omitted variables
                  F(3, 55) =      2.16
                  Prob > F =      0.1028
```