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**EFFECT OF CREDIT RISK MANAGEMENT AND PROFITABILITY IN
ETHIOPIAN MICROFIANCE INSTITUTIONS**

BY

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FOR THE DEGREE OF MASTERS OF BUSINESS ADMINISTRATION IN FINANCE**

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Declaration

I declare that the thesis entitled: *Credit risk management and profitability in Ethiopian microfinance institutions*, hereby submitted in partial fulfillment of the requirements for Masters of business administration in finance at the University of Addis Ababa, is my original work and has not been submitted for any degree in any other university. I have undertaken it independently with the advice of my advisor, Takele Fufa (PhD). In performing the thesis I have used different sources and material which have been acknowledged.

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June 2024

Certification

This is to certify that Nebiyu Woldesenbet Dilala has carried out his research work on the topic entitled “**Credit risk management and profitability in Ethiopian microfinance institutions**”. The work is original in nature and is suitable for the submission for the reward of MBA Degree in Finance.

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Abstract

The study's goal is to quantitatively investigate the impact of credit risk management on the profit of microfinance institutions in Ethiopia. The study's credit risk ratio indicators are Portfolio at risk (PAR > 30 days), Write-off ratio (WOR), Risk coverage ratio(RC), Capital asset Ratio(CAR), and Deposit loan ratio(DLR) are used as independent variables to measure the amount of credit level of the MFIs. The study's proxies for profitability is ROA. This was done by collecting data from 21 microfinance in Ethiopia for the period from 2011 to 2022 which was published by the Association of Ethiopia Microfinance Institution (AEMFI) was used as the main sources of data. Descriptive statistical methods including mean, maximum, minimum, and standard deviation were used to examine the acquired data. Additionally, using STATA software, multiple linear regressions were utilized to determine the effect of independent variables over dependent variables. From the Five proxies of credit risk management, the findings reveal that, Portfolio at Risk > 30 Days & WOR have a significant effect on ROA, While RC, CAR and DLR have an insignificant effect on ROA. Based on the study it is recommended that MFIs need to adopt a rigorous credit risk management policy, develop their credit risk control capacity, and establish sound and competent credit risk management departments. Further research with a 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, PAR>30 days, WOR, RC, CAR, DLR, ROA.

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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
NPL	Non-Performing Loan
OLS	Ordinary Least Square
P-value	Probability Value
PAR	Portfolio at risk
ROA	Return on Asset
ROE	Return on Equity
LAR	Loan to Assets Ratio
DLR	Deposit to Loan ratio
WOR	Write-off ratio
RC	Risk Coverage ratio

Chapter One

1. Introduction

1.1 Background to the study

Credit risk is one of the three basic hazards that a bank or any other regulated financial organization faces, according to the Basel Accords (1999), a worldwide regulation framework for financial institutions.

Research by Githaiga (2013), Kithinji (2010), Achou (2008), and others has extensively examined the broad effects and linkages between risk management and profitability in financial organizations. These studies underscore the critical role that effective risk management plays in enhancing financial performance. This study aims to determine the specific impact of credit risk management on the profitability of commercial banks. By analyzing how well banks manage credit risk, including practices such as client screening, loan diversification, and regular monitoring, the study seeks to reveal the direct correlation between these risk management strategies and the banks' bottom lines. The goal is to provide a nuanced understanding of how minimizing non-performing loans and maintaining a high-quality loan portfolio can significantly boost profitability in commercial banking.

The vast portfolios of bad loans, according to Bleim (2001), are the primary source of the majority of systemic financial crises. Dionne (2005) underlines the significance of determining if the risk of a specific loan poses a danger to the portfolio as a whole. According to Shibiru & Mebratu (2017), credit risk management consistently has a substantial effect on how well Ethiopian private commercial banks operate. Factors unique to each bank: Adequate capital, loan growth, non-performing loans, bank size, and liquidity had a big impact on banks. The researchers advised the bank's Credit Risk Management to evaluate risk and create plans to reduce credit risk occurrence.

Credit risk control includes risk appraisal, refinement of control procedures, and risk reduction via the deployment of managerial resources. Among the methods include shifting to another party, fighting off the danger, decreasing the threat's negative consequences, and accepting some or all of the threat's consequences. Oldfield and Santomero (1997) posited that dangers going through all monetary establishments may be segmented into 3 separate kinds from a control perspective. These are I) risks that may be removed or prevented through simple business practices, (ii) risks that can be passed on to other people, and (iii) risks that must be actively controlled at the firm level. Sinkey (2002) contemporary-day threat control with inside the banking enterprise may be highlighted through 5 verbs and those are; identity, measure, price, monitor, and control. This form of threat reduction is particularly significant to the agricultural banking business because the bulk of their customers are exposed to co-version risk, market risk, and credit risk.

Lassoued, N. (2017) Managing monetary establishments has by no means been easy, however in latest years it has grown to be even greater hard due to more uncertainty with inside the monetary surroundings. Credit control is one of the most important aspects of any employer's job, and it can't be overlooked by any monetary company that deals with credit, regardless of its commercial character. Microfinance institutions (MFIs) are more likely to fail to meet their social and financial objectives if they do not effectively manage their credit risk threats. Donors, investors, lenders, debtors, and savers lose faith in organizations when poorly handled risks result in financial losses, and funds begin to dry up. When funds run out, microfinance institutions (MFIs) are unable to meet their social goal of offering offers to the impoverished and those on the verge of going out of business.

A microfinance institution's long-term existence and profitability may be ensured by focusing on profitability. Profitability is a requirement for a successful microfinance firm and the most cost-effective money supply; without it, no company could raise cash from outside investors. MFI income is also an important source of capital. If profits are not reinvested, financial stability will be compromised. Outstanding income is critical in guaranteeing MFIs' stakeholders, which include investors, debtors, suppliers, and regulators, by reducing the risk of

a monetary crisis. Muriu (2011) at the macro level, a worthwhile microfinance enterprise is higher positioned to conquer bad shocks and make contributions meaningfully to the steadiness of the general monetary system.

Effective credit risk management, according to the MFI Supervision Directorate guidelines, 2010, a department of the National Bank of Ethiopia (NBE), is the process of managing an institution's activities that create credit risk exposures in a way that significantly reduces the likelihood that such activities will negatively impact a microfinance institution's earnings and capital.

Despite extensive research on credit risk management in financial institutions, there is limited understanding of its specific effects on the profitability and operational sustainability of microfinance institutions in emerging economies like Ethiopia. Most existing studies, such as those by Githaiga (2013) and Shibiru & Mebratu (2017), focus on broader financial institutions and do not adequately address the unique challenges faced by MFIs. There is a need for empirical studies that investigate the direct correlation between credit risk management practices and financial performance metrics in the microfinance sector. This study aims to fill this gap by providing an in-depth analysis of credit risk management's impact on the profitability of Ethiopian microfinance institutions, contributing to both academic literature and practical policy formulation.

1.2 Statement of the problem

Laurentis (2009) the challenges of credit risk management are implicit in the operations of financial institutions (including microfinance institutions) because credit risk events are generally uncertain. As Nancy (2001) pointed out, an effective credit risk management approach is required to assist top management in establishing guidelines to avoid operational losses due to human error, employee negligence, technology failure, or fraud. For example, a microfinance institution's management might implement internal controls and processes, as well as perform

internal audits on a regular basis to ensure that staffs are abiding by the code of conduct. The credit risk management policy may also cover the financial risks of financial institutions.

AlTamimi and AlMazrooei (2007) also note that financial institutions, including microfinance institutions, are a business that is primarily associated with credit risk due to its many risks. They also point out that one of the MFIs' responsibilities for its activities and procedures is credit risk management. In today's dynamic environment, all microfinance institutions are exposed to potential credit risk. Because of this level of credit risk, effective credit risk management is essential. Credit risk management, according to Chua et al. (2000), is one of the most basic activities to be undertaken in microfinance institutions once credit risk has been identified and understood.

Therefore, effective and sound credit risk management is the basis for the safe and sound operation of microfinance institutions in order to improve the operational efficiency of microfinance institutions. In this regard, various empirical studies are carried out at the international level. Here are some of them.

The studies by Michael (2006) and Samuel (2006) attempted to address credit risk management in a small number of Ethiopian microfinance institutions, but they did not thoroughly analyze the performance of these institutions in managing credit risk. For instance, Samuel's (2006) study focuses on a single microfinance institution, providing a limited perspective. This highlights a significant gap in the literature, as a comprehensive analysis of credit risk management practices across a broader spectrum of Ethiopian microfinance institutions is still lacking. This study aims to fill this gap by examining a wider range of institutions to provide a more detailed and accurate assessment of their credit risk management performance.

Laurentis and Mattei (2009), in their study of lessors' recovery risk management capability, demonstrated that the development of modern, reliable systems of risk management, such as credit scoring, can significantly enhance these management capabilities. Their findings underscore the importance of adopting advanced technological tools and methodologies to

improve the accuracy and efficiency of risk assessments and recovery strategies. By implementing such systems, financial institutions can better predict potential defaults, tailor their risk management approaches, and ultimately reduce the incidence of non-performing loans, thereby strengthening their overall financial stability.

In Ethiopia, the studies by Wolday (2001), Befkadu (2007), Zigju (2008), and Michael (2006) focus on the progress of microfinance institutions in terms of the number of clients, loan amounts, and the number of branches these institutions have established throughout the country. These studies provide valuable insights into the expansion and outreach of microfinance services, highlighting growth in client base and geographic coverage. However, they primarily emphasize quantitative growth metrics, leaving a gap in understanding the effectiveness of credit risk management practices within these institutions. This underscores the need for further research to evaluate the quality and impact of risk management strategies on the sustainability and profitability of Ethiopian microfinance institutions.

Wenner et al. (2007) researched managing credit risk in financial institutions in Latin America and discovered that donors and governments can play a crucial role in reducing credit risk by facilitating the gathering and sharing of pertinent data. Their findings highlight that information asymmetries significantly contribute to increased credit risk, and by improving data transparency and accessibility, financial institutions can make more informed lending decisions. This collaboration between donors, governments, and financial institutions can lead to a more stable financial environment by mitigating the uncertainties and risks associated with insufficient or unevenly distributed information.

Fernand (undated) conducted a research study on managing microfinance risks, providing observations and suggestions that underscore the increasing importance of risk management in this sector. Fernand noted that as microfinance institutions continue to grow and evolve, the complexity and scale of the risks they face also expand. Effective risk management practices are essential to ensure these institutions can sustainably achieve their social and financial objectives. Fernand's study suggests that the significance of risk management will continue to

grow in the future, necessitating ongoing improvements in risk assessment, mitigation strategies, and the adoption of advanced risk management tools and technologies to safeguard the stability and success of microfinance operations.

The need for microfinance risk management is further emphasized by elements like escalating market competition and the adoption of new technology. The growing interest in MFIs further reinforces the importance of risk management in MFIs. The fact that systematic risk management is still not as common as it ought to be, however, is alarming.

Sound credit management is essential for a financial institution's balance sheet and long-term profitability. It ensures that institutions can maintain liquidity and solvency, which are crucial for sustainability. Poorly managed credit risks can lead to financial losses, stakeholder distrust, and the drying up of funds, which hinders institutions, especially MFIs, from achieving their social and financial goals. Decreasing credit score deterioration is the most prevalent cause of poor financial performance and condition, highlighting the importance of robust credit risk management strategies.

According to Gitman (1997), as credit rules are lowered, the likelihood of problematic loans increases. Firms have to consequently make certain that the control of receivables is efficient and effective. Such delays in accumulating cash from borrowers as they fall due have severe monetary problems, expanded awful money owed, and influences client relations. If payment is made late, then profitability is eroded and if payment isn't made at all, then a complete loss is incurred. On that basis, it is just brilliant practice to proactively handle credit management at the front end.

Nonetheless, in developing and developing countries, especially Ethiopia, we can conclude that the relationship between credit risk management and profitability is not considered in this way. Ethiopia's Institutional Viability and Performance, for example, was investigated by Andinet (2011). Sara (2014) looked into the factors that influence the quality of an MFI's loan portfolio. Microfinance Institutions in Ethiopia: Issues of Portfolio Risk, Institutional Arrangements, and

Governance were investigated by Gebrehiwot (2002) in *Microfinance Theory, Policy, and Experience*. The Association of Ethiopian Microfinance Institutions published Wolday's study *Networking Microfinance Activities in Ethiopia: Challenges and Prospects* in 2000. As a result, it's difficult to trust that these researches looked at the credit risk management practices of microfinance companies in general, let alone in Ethiopia.

A thorough review of the literature indicates that only a very few study has been undertaken on credit risk management and profitability performance in Ethiopian MFIs. Moreover; studies that should have been carried out giving high focus on specific MFI and the other MFIs in the country are missing.

The research paper aims to address the significant gap in the literature regarding the relationship between credit risk management and profitability within Ethiopian microfinance institutions (MFIs). Previous studies by Laurentis (2009) and Nancy (2001) emphasize the inherent challenges and critical importance of effective credit risk management in financial institutions, including MFIs. AlTamimi and AlMazrooei (2007) further underscore that credit risk management is vital for the stable operation of MFIs due to the numerous risks they face. However, existing research by Michael (2006) and Samuel (2006) provides limited insights, focusing on a small number of institutions and often just a single one, which restricts the generalizability of their findings. To bridge this gap, this research paper will utilize performance measurement variables Return on Assets (ROA), over a twelve-year period (2011-2022) and will include additional explanatory variables of financial structure in the regression analysis to assess the relationship between credit risk management and profitability in Ethiopian MFIs.

1.3 Research Question

The research work seeks to find answers to the following questions:

- What effect does Portfolio at risk >30 days on Return on Asset of MFIs in Ethiopia

- What effect does write off ratio on Return on Asset of MFIs in Ethiopia?
- What effect does Risk coverage ratio on Return on Asset of MFIs in Ethiopia.
- What effect does Capital asset ratio on Return on Asset of MFIs in Ethiopia.
- What effect does Deposit loan ratio on Return on Asset of MFIs in Ethiopia.

1.4 Objective of the study

1.4.1 General objective of the study

The general objective of the study is to measure the relationship between credit risk management and profitability of Microfinance Institutions in Ethiopia.

1.4.2 Specific objectives of the study

The specific objectives of the study will be;

1. To measure the influence of Portfolio at risk >30 days on Return on Asset of MFIs in Ethiopia
2. To measure the influence of Write off ratio on Return on Asset of MFIs in Ethiopia.
3. To measure the influence of Risk coverage ratio on Return on Asset of MFIs in Ethiopia.
4. To measure the influence of Capital asset ratio on Return on Asset of MFIs in Ethiopia.
5. To measure the influence of Deposit loan ratio on Return on Asset of MFIs in Ethiopia.

1.5 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 Ethiopia were tested.

➤ **Hypothesis :**

1. There is a positive significant impact of PAR>30 days on Return on Asset (ROA) of MFIs in Ethiopia
2. There is a positive significant impact of WOR on Return on Asset (ROA) of MFIs in Ethiopia.
3. There is a positive significant impact of RC ratio on Return on Asset (ROA) of MFIs in Ethiopia.
4. There is a positive significant impact of CAR ratio on Return on Asset (ROA) of MFIs in Ethiopia.
5. There is a positive significant impact of DLR ratio on Return on Asset (ROA) of MFIs in Ethiopia.

1.6 Significance of the Study

The findings of the study enables the management of various MFIs in Ethiopia to properly manage credit risk and understand the relationship between credit risk and MFI profitability, allowing them to reduce losses and increase profits. The research findings may also give policy measures to various stakeholders to address the influence of credit risk in order to improve the quality of their risk assets. It also enables financial regulatory bodies and policymakers to develop various legislative frameworks for credit risk management based on the findings of this study. Besides, it also provide as a source of literature for other scholars who intend to carry out

further research on the effect of credit risk management on profitability with specific reference to MFIs

1.7 Scope of the study

The scope of the study was deliberately narrowed to include only microfinance institutions (MFIs) registered by the National Bank of Ethiopia and possessing at least ten years of data. This focused approach ensured a comprehensive analysis while maintaining data consistency and reliability. Specifically, the study aimed to examine the relationship between credit risk management and profitability within this subset of Ethiopian MFIs using data spanning from 2011 to 2022. By utilizing a consistent timeframe and including only registered MFIs with sufficient historical data, the study aimed to provide a robust analysis of the factors influencing profitability in the Ethiopian microfinance sector, thereby contributing valuable insights to both academia and industry practitioners.

1.8 Limitation of the study

This study is limited to the influence Credit Risk has on the on the profitability performance of some selected MFI in Ethiopia from 2011 to 2022 and therefore the findings, analyses and recommendations cannot be linked to the whole financial sectors in Ethiopia. Our study intends to focus the 41 microfinance in Ethiopia but thirteen of them are less than ten years old and seven of them have no full ten year data and the research focused only twenty one of the total number.

1.9 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

2. Literature review

2.1 DEFINITION AND CONCEPT

2.1.1 Risk overview

Other studies on credit risk and its impact on profitability is discussed in this chapter. It particularly, discussed some empirical and theoretical literature on the effect of credit risk management on the profitability performance.

Generally risk accompanies any action in life. It involves the potential of gaining or, in particular, losing something of value. 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 defined as "the difference between the actual and expected returns associated with a certain asset or investment" (Khan & Jain, 2004). Risk is also described as "the likelihood that some negative occurrence (both financial and physical) will occur" (Ehrhardt & Brigham 2011). Risk is notably obvious in aspects of running a business in a market economy. 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

Credit risk is defined in a variety of ways. They all have something in common, though. One such issue is the possibility that the counterparty (borrower) will not repay the funds provided to

them. We may find the following, chosen definitions of credit risk in the literature, which can be described as the "possibility of loss coming from a counterparty's failure to complete a contractual payment" (Hull et al, 2004). Credit risk refers to the possibility that a borrower would default on its debt repayment obligations. When the counterpart is unable to pay or does not pay on time, this can happen (Gestel and Baesens, 2008).

(The Basel Committee on Banking Supervision defines credit risk as the probability that a bank borrower or counterparty would fail to meet their obligations in accordance with agreed terms (Safakli, 2007). It's also referred to as the current and future risk to earnings or capital caused by an obligor's failure to comply with the terms of any contract with the Bank. It can be found in any activity where the success of the counterparty, issuer, or borrower is dependent on their performance. The banking and microfinance sectors, in particular, have high credit risk due to their reliance on lending and trading. Credit risk relates to the payback of borrowed funds and is usually connected with lending, investing, and credit providing businesses.

However, the performance of counterparties in contractual agreements, such as giving a financial obligation that is not fully discharged, either owing to the counterparty's inability to meet his or her responsibilities, which may result in a loss, is a significant source of credit risk in banks (Horcher 2005).

Credit risk is vulnerable to all subtypes of financial risk, such as interest rate risk and national economy risk, as well as to specific types of credit risk, such as collateral risk, default risk, and concentration risk (Ali, 2019). The lender bears the majority of the risk, which includes missed principle and interest, cash flow disruptions, and higher collection expenses. It refers to the possibility of a borrower failing to make required payments on any type of debt. The lender bears the majority of the risk, which includes lost principle and interest, cash flow disruptions, and increased collection expenses (Gestel, et al, 2008).

Loans, according to Ho and Yusoff (2009), are the most significant source of credit risk for microfinance institutions throughout their operations. 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

Mokogi (2003) 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. The primary goal of credit risk management is to maximize a microfinance bank's (MFB) or commercial bank's (CB) risk-adjusted rate of return while keeping 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). The following are the techniques to credit risk management that Raghavan (2005) and Funso (2012) summarize: 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 with the 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 a result of the crisis, orders such as credit risk management are being given greater priority, particularly in monetary-related domains (Horne, 2007), such as banks and other financial institutions. Customers at micro financial institutions don't have credit histories or necessarily predictable borrowing patterns, making credit risk management more difficult (Vincent et al 2014). A clear loan review process, outside of the lending unit, is

required by best practices in an internal control structure for credit risk assessment. 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.

1. *Portfolio at Risk > 30 Days (PAR 30)*

Portfolio at risk is important because it indicates the potential for future losses based on the current performance of the loan portfolio. The PAR ratio is the most widely accepted measure of loan performance in the microfinance industry (MicroSave, 2008; CGAP, 2003). PAR > 30 days is often used as the threshold beyond which loans are considered to be at higher risk. This ratio also includes Renegotiated Loans. This not only forbids the concealment of difficult loans through rescheduling or refinancing but also shows that clients who have had repayment issues are riskier.

Despite being a helpful metric, PAR does not fully capture the quality of a portfolio. Like all performance measurements, PAR can be manipulated. The most frequent method for an MFI to accomplish this is to write off past-due loans. It is crucial to take into consideration any MFI's PAR in addition to the Write-Off Ratio in order to account for this practice. Total Risk Ratio is the outcome of adding PAR30 and Write-Off Ratio. When there is rapid expansion, another distortion happens. The PAR can be diluted by rapid expansion. Arrears on loans build up over time, and recording defaults on the books takes time as well. By artificially inflating the PAR, portfolio growth can disguise these delays. An investigation of the rise in nominal PAR in circumstances of substantial portfolio growth can conclude an assessment of portfolio quality. There are numerous instances where the portfolio data and the financial accounts diverge. The

PAR statistics should only be used with extreme caution where there is a noticeable inconsistency.

MicroRate (2019) experience indicates that although the PAR varies from region to region, a PAR ratio that goes above 8% (or a Total Risk Ratio beyond 10%) should be a cause for worry. In more mature markets, high PAR ratios are common. Latin America, where there is a mix of methodologies, for example, reported a PAR of 4.5% (2019) while South Asia, where group lending is prevalent, reported a PAR of 0.7% (2019).

MFIs may falsify their PAR in response to government-sponsored funds that demand high standards of quality monitoring. For example, the Mexican government requires a PAR 90 of 5% to access certain types of government funds. This has led to large distortions of the PAR on the part of the MFIs which hope to secure these funds.

When MFIs are faced with poor portfolio quality, they may write off the loans from their books or refinance the loans by extending the terms, changing the payment schedules, or both. The outcome demonstrated a negative correlation between a loan at risk and MFIs' financial performance.

According to Anencam (2012), any portfolio at risk (par>30 days) exceeding 10% should be a serious cause for concern; because unlike loans of commercial banks, most loans are not backed by bankable collaterals.

2. Write-off

Write-offs indicator simply represents the loans that the institution has removed from its accounting records because of a substantial doubt that they will be recovered. Writing-off a loan is an accounting operation used to prevent the institution's assets from being unrealistically inflated by loans that are unlikely to be recovered. The process affects the gross loan portfolio and loan loss reserves equally. Therefore, unless provision reserves are inadequate, the transaction will not affect total assets, net loan portfolio, expenses or net income. Write-offs

have no bearing whatsoever on collection efforts or on the client's obligation to repay (anencam 2012).

Some institutions make aggressive write-offs in an effort to sanitize their portfolios. These MFIs will report a lower PAR, the write-off ratio will illustrate that the improvement in PAR is not necessarily an improvement in portfolio quality. Write-offs should be viewed in conjunction with PAR to get an accurate assessment of portfolio quality. It is important to take care that the numerator shows the principal balance of write offs for the year. This ensures that there are no distortions affected by the frequency with which MFIs make write-offs, as some make write-offs on a monthly, quarterly, semi-annual or annual basis. Typically, loans in arrears for more than 90 days are seriously delinquent and have a high probability of not being collected. After 180 days, these loans are typically written-off; however, it remains up to the MFI's discretion to determine when loans should be written off.

3. Risk Coverage

The risk Coverage measure shows what percent of the Portfolio at Risk over 30 days (including all refinanced and renegotiated loans) are covered by actual loan loss reserves. It indicates how prepared an institution is for a worst-case scenario (which would be if all delinquent loans defaulted). For microfinance institutions, a general guideline for appropriate coverage is 100% of PAR30. Anything above that is considered to be a strong practice. These are much higher levels than those maintained by commercial banks. To some extent, these high reserves reflect an attitude of "when in doubt, be conservative." Microcredit portfolios are typically not backed by collateral so it is important to reserve an adequate amount to offset unrecovered loans. While a higher Risk Coverage Ratio should generally be preferred, some cases justify lower levels of coverage. For instance, when collateral-backed lending makes up the majority of the portfolio, a ratio well below 100% is common. Likewise, since the MFIs' nominal reserves may be fairly little when PAR is particularly low, it may be wise to keep significant reserves. MFIs should keep large reserves to balance the risk of failure or deficiencies and the ensuing defaults if they use new, untested lending strategies. The Risk Coverage Ratio, PAR, and Write-Off Ratio must

all be examined together because they are all interrelated.

4. *Capital asset ratio*

CAR is a measurement of an MFI's available capital expressed as a percentage of an MFI's risk-weighted credit exposures. The capital adequacy ratio (sometimes referred to as the capital-to-risk weighted assets ratio or CRAR) is used to safeguard depositors and advance the stability and effectiveness of financial institutions globally. Two types of capital are measured: tier-1 capital, which can absorb losses without a bank/MA being required to cease trading, and tier-2 capital, which can absorb losses in the event of a winding-up and so provides a lesser degree of protection to depositors.

The capital adequacy ratio is calculated by dividing an MFI's capital by its risk-weighted assets. The capital used to calculate the capital adequacy ratio is divided into two tiers.

$$\text{CAR} = \frac{\text{AssetsTier 1 Capital} + \text{Tier 2 Capital}}{\text{Risk Weighted}}$$

Equity capital, common share capital, intangible assets, and audited revenue reserves make up Tier 1 capital, also known as core capital. Tier-1 capital is used to absorb losses and does not require an MFI to cease operations. Tier-1 capital is the capital that is permanently and easily available to cushion losses suffered by a bank/MFI without it being required to stop operating. A good example of an MFI's tier one capital is its ordinary share capital. Retained earnings, reserves, and general loss reserves that have not undergone an audit make up tier-2 capital. In the event that a company is liquidated or winds up, this capital absorbs losses. Tier-2 capital is the one that cushions losses in case the MFI is winding up, so it provides a lesser degree of protection to depositors and creditors. It is used to absorb losses if an MFI loses all its Tier-1 capital. The two capital tiers are added together and divided by risk-weighted assets to calculate an MFI's capital adequacy ratio. Risk-weighted assets are calculated by looking at an MFI's loans, evaluating the risk, and then assigning a weight. When measuring credit exposures, adjustments are made to the value of assets listed on a lender's balance sheet.

All of the loans the bank/MFI has issued are weighted based on their degree of credit risk. For example, loans issued to the government are weighted at 0.0%, while those given to individuals are assigned a weighted score of 100.0%.

Banks and other institutions must hold a minimum level of capital to limit the danger of going bankrupt, and this amount is determined by using risk-weighted assets. The capital requirement is based on a risk assessment for each type of MFI asset. For example, a loan that is secured by a letter of credit (guaranty) is considered to be riskier and requires more capital than a mortgage loan that is secured with collateral.

The reason for the minimum capital adequacy ratios (CARS) is critical to making sure that MFIs have enough cushion to absorb a reasonable amount of losses before they become insolvent and consequently lose depositors' funds,

The capital adequacy ratios ensure the efficiency and stability of a financial system by lowering the risk of MFIs becoming insolvent. Generally, an MFI with a high capital adequacy ratio is considered safe and likely to meet its financial obligations.

5. *Deposit to Loan portfolio (DLR)*

The deposit to loan ratio (DLR) is used to assess a MFI's liquidity by comparing an MFI's total deposits to its total loans for the same period. The DLR is expressed as a percentage. If the ratio is too low, it means that the MFIs may not have enough liquidity to cover any unforeseen fund requirements. Conversely, if the ratio is too high, the MFI may not be earning as much as it could be.

The possible explanations of major positive impact of deposit access on MFIs' profitability are: First, the availability of deposit services in a country is influenced by some factors including the overall level of economic activities, economic development and trust in the financial system. All these factors may play a positive and an important role on the profitability of the MFIs. In this, deposit access can be thought as an indicator of the overall macroeconomic conditions that may

positively impact the MFIs' performance. Second, the increase in access to deposit services and deposit capacity both reduce the amount of loans provided by the informal moneylenders to the poor leaving the MFIs with a larger population of borrowers to serve. Greater deposit access may draw off away potential borrowers from the informal moneylenders which increases the demand for the MFIs' loans and enhances the MFIs' profitability (Ahlin et al 2010).

DLR shows an MFI's ability to cover loan losses and withdrawals by its customers. Also, the DLR helps to show how well the institution is attracting and retaining customers. If an MFI's deposits are increasing, new money and new clients are being on boarded. As a result, the MFI will likely have more money to lend, which should increase earnings. Although it's counter intuitive, loans are an asset for an MFI since institution earns interest income from lending.

Deposits, on the other hand, are liabilities because the institutions must pay an interest rate on those deposits, although at a low rate. Sustainable delivery financial services depend on the saving mobilization capacity of MFIs. To this end, Ethiopian MFIs have proved that the poor have a high propensity to save when provided with a safe, accessible and convenient mechanism. Access to saving facilities is important as credit for the poor. Saving help client make themselves less vulnerable to economic shocks and other kinds of crisis that plague the poor. Moreover, it increases the autonomy of the MFI and is one of their most reliable funding source for financing their growth and expansion.

2.2 Profitability of Microfinance Institutions

Profitability is a measure of a microfinance institution's ability to take risks and/or raise funds. One of the major themes in this study is profitability. This is due to the topic of this research is about the relationship between credit risk management and profitability. Clear explanation to the profitability of MFIs is crucial for readers to understand the research procedure and meanings. In this section, I will involve a specific discussion of profitability and two indicators (ROE and ROA) of profitability in this research.

The factors that influence commercial bank profitability can be divided into two categories: those that can be controlled by management (internal determinants) and those that are outside management's control (external determinants) (Guru, 1999, p.3; Kosmidou et.al, 2005, p.3).

The internal factors have an impact on banks' management policies and decisions regarding fund sources and uses, capital and liquidity management, and expense management (Guru et.al, 1999, p.3). As microfinance institutions are under the same category with commercial banks i.e. both are financial institutions, we can apply these categories of determinants of commercial bank's profitability to microfinance institutions. This kind of profitability factors can be examined by financial statements (Guru et.al, 1999, p.3).

Environmental and firm-specific factors are examples of external influences (Guru et.al, 1999, p.4). This research mainly focuses on the analysis of internal determinants because our purpose is to test the impact of credit risk management to firm's profitability. Internal credit risk management factors should be included in internal policy and decisions that may be assessed using financial accounts.

In addition, we employ ratios as measures of MFI/bank profitability. The advantages of employing ratios were mentioned by Guru (1999, p.7). Researchers prefer to use ratios as a measure of profitability because they are inflation invariant, meaning they are unaffected by price changes. However, in order to keep our test accurate, we must discover the right signs. Due to this issue, the DuPont system is being explored because it has been well regarded as an effective instrument in the literature of financial analysis.

2.3 The theories and concepts of profitability

Profit can refer to a company's remuneration for its management functions. It's known as normal profit, and it's the bare minimum required to keep a company in operation. Profit in accounting is defined as the difference between the purchase price and the costs of delivering whatever it is

that is accounted as an enterprise to market. (whether by harvest, extraction, manufacture, or purchase) in terms of the component costs of delivered goods and/or services The Scottish economist Adam Smith (1723-1730) viewed the growth rate of capital accumulation (which took place at a rate higher than total output) as the cause and hence the total output when high increase profit but low decrease profit.

The profitability theory can be examined from different perspectives, including the scientific, psychological, and cultural approaches.

From a scientific perspective, the profitability theory involves the objective analysis of financial data, economic principles, and mathematical models to understand the factors that contribute to a company's ability to generate profit. This approach focuses on quantitative analysis, statistical methods, and empirical research to identify the relationships between variables such as revenue, costs, market conditions, and profitability. It may involve using financial ratios, regression analysis, and other quantitative tools to measure and predict profitability.

The psychological approach to profitability theory considers the behavioral and cognitive factors that influence decision-making related to profitability. This approach explores how individual and collective human behavior, emotions, biases, and perceptions can impact financial decision-making, risk-taking, and investment strategies. It may involve studying topics such as investor psychology, consumer behavior, and the psychological biases that affect managerial decision-making related to profitability.

The cultural approach to profitability theory emphasizes the influence of social and cultural factors on business practices, economic systems, and profitability. This approach considers how cultural norms, values, traditions, and societal attitudes towards wealth creation, risk-taking, and entrepreneurship can shape the profitability of businesses. It may involve studying cross-cultural differences in business practices, the impact of cultural values on financial decision-making, and the role of cultural context in shaping profitability strategies.

Each of these approaches provides a unique perspective on the theory of profitability, offering insights into the diverse factors that contribute to a company's financial performance. Integrating these perspectives can lead to a more comprehensive understanding of profitability and inform strategies for improving financial outcomes in various contexts.

2.3.1 Financial Profitability

Any typical firm is preoccupied with its profitability, because without a profit or break-even point, the company will cease to exist. Some MFIs rely on subsidies and contributions as a safety net, allowing them to prioritize other requirements. However, because of the industry's rapid growth, profitability has become a top priority and a necessary step toward long-term viability, and it's critical to understand the many methods for calculating profitability.

Profitability ratios are significant to both managers and owners of businesses since they are used to determine the bottom line. If a small business has outside investors who have invested their own money, the main owner or manager must demonstrate profitability to the equity investors. The ratios, which are divided into margin ratios and return ratios, demonstrate a company's overall efficiency and performance. Margin ratios illustrate how successfully a corporation can turn sales dollars into profits at various stages of assessment. Ratios that illustrate returns represent the ability to gauge the firm's complete efficiency in delivering returns for its investors.

2.3.2 Return on Asset (ROA)

ROA, which is the ratio of net income to total assets, measure how profitable and efficient a bank's management is, based on the total assets (Guru et.al, 1999, p.7). As mentioned in the equation of ROE, in the next step, ROA can be disintegrated into the following elements

Where:

$$ROA = \frac{\text{Net income}}{\text{Total operating income}} \times \frac{\text{Total operating income}}{\text{Total assets}}$$

$$ROA = PM \times AU$$

PM= Net income generated per dollar of total operating income.

AU= Amount of interest and noninterest income generated per dollar of total assets (Saunders & Marcia, 2011, p. 25)

As a result, greater PM and AU ratios result in increased ROA and ROE. PM is a metric that assesses a bank's ability to manage expenses (Saunders & Marcia, 2011, p. 25). There's also a correlation between MFI profitability and spending control.. The ability of the bank to earn revenue from its assets is valued by AU (Saunders & Marcia, 2011, p. 25). High PM and AU levels, on the other hand, indicate the presence of potential risks.. When a bank cuts its salary and profit costs, for example, PM will improve (Saunders & Marcia, 2011, p. 25). While the decrease in expenditure may be attributable to the departure of high-skilled workers, the increase in PM and ROA might indicate an underlying "labor quality" issue (Saunders & Marcia, 2011, p. 25).

2.4 Empirical literature review

This section examines prior studies on the impact of credit risk management on financial institution profitability, with a focus on microfinance organizations.

2.4.1 Empirical studies on developed and emerging market countries

On the relationship between credit risk management and financial institution profitability, various empirical studies have been conducted in both developed and emerging market countries.

According to Cooper et al. (2003), Duca and McLaughlin (1990) find that bank profitability is a major contributor to credit risk since higher credit risk is often associated with lower firm profitability. Despite the likelihood of lower profitability, (Miller, 1997) advises that financial institutions should increase their exposure to high-risk loans. Bobakovia (2003) asserts that a bank's ability to predict, minimize, and manage risk via profitability is likely to cover losses.

This is because increasing the substandard credit ratio while decreasing the bank's profitability has the net effect of increasing the substandard credit ratio while decreasing the bank's profitability Mamman and Oluyemi (1994). By comparing bank total loans to total assets, Brewer et al. (1996) investigate the impact of loan operations on microfinance risk (TLTA). Loans are riskier and less liquid than other bank or microfinance assets, which is why this is the case. As a result, there is a positive relationship between TLTA and risk. TLTA, on the other hand, may lead to a negative association with microfinance risk measurements when credit risk management systems improve Altunbas (2010). According to Bourke (1989), credit risk has a negative impact on profitability.

The more microfinance is exposed to high-risk loans, the more overdue loans it accumulates. As a result, the banks receive a lower return (Miller and Noulas, 1997). Meanwhile, non-performing loans to total loans (NPLTL) have a negative influence on return on equity (ROE) and return on assets (ROA), resulting in reduced bank and microfinance profitability, according to Felix and Claudine (2008). As a result, risk management should be prioritized, with particular attention paid to the impact of poor loan quality on financial institution profitability and the economy.

In the United Kingdom, Li Yuqi (2007) investigated the factors of bank profitability and their implications for risk management methods. The study employed regression analysis on a time series data between 2010 and 2018. The researchers used six different drivers of MFI profitability. Internal predictors of MFI success were liquidity, credit, and capital as proxies. As external factors of MFI profitability, GDP growth rate, interest rate, and inflation rate were considered.

Using data from Egyptian and Lebanese banks, Hakim and Neamie (2001) investigated the link between credit risk and bank performance from 1993 to 1999. The study constructed a fixed effects model of bank return with different intercepts and coefficients. The findings revealed that the credit variable is associated to profitability in a favourable way. The research also discovered a substantial correlation between capital adequacy and commercial bank returns, with high capitalization acting as a deterrent to returns. The study came to the conclusion that capital is a sunk cost, with major banks making huge profits in absolute terms but not in percentage terms. As a policy impact, the study offered critical feedback for regional policymakers in setting stronger performance objectives and enabling bank management to distribute capital more efficiently across their business divisions (Hakim and Neamie, 2001).

Haneef et al. (2012) conducted research into the influence of risk management on non-performing loans and the profitability of Pakistan's banking system. Five banks were selected for data collection and the data was secondary in nature. The findings of this investigation indicated that there was no appropriate risk management mechanism in Pakistan's banking industry. The poll also showed that non-performing loans are on the rise as a result of poor risk management, putting banks' revenues at risk. They went on to say that risk management include risk identification, assessment, measurement, monitoring, and controlling all hazards inherent in the banking industry; the basic risk management concepts that apply to any financial institution, regardless of size or complexity (Haneef et al., 2012).

2.4.2 Empirical studies in Sub-Saharan Africa countries

In Sub-Saharan African countries, empirical researches on the influence of credit risk management on microfinance company profitability have also been done.

Karekaho (2009) used an analytical and cross-sectional survey focusing on both qualitative and quantitative data in his study on loan portfolio management and the performance of microfinance institutions in Uganda's Wakiso District. He noticed that portfolio preparation, client screening, and portfolio control are all strongly linked to MFI portfolio success, with

portfolio control having the strongest connection. They also stated that while all of the independent determinants predicted a significant portion of this performance, portfolio control, driven by loan monitoring, was the most important individual predictor.. According to the findings, if MFIs want to achieve the goal portfolio performance, they must investigate all of these independent variables while concentrating more on loan portfolio control in general and loan monitoring in particular.

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 MFIs registered under AMFI, Gatuhu (2013) discovered that the variables client appraisal, credit risk control, and collection policy have an effect on the financial performance of MFIs.. She argued that there is a close link between MFI financial success and customer evaluation, credit risk management, and collection policy. The financial success of Kenyan MFIs is heavily influenced by client evaluation, credit risk management, and collection practices.

Mwithi (2012) performed research in Nyeri County, Kenya, to see if there was a link between credit risk management procedures and the proportion of non-performing loans in microfinance firms. The study discovered that MFIs have a high degree of credit risk assessment and management. It was also discovered that liquidity and profitability impact effective management of their institutions and that asymmetric information in the loan market affects effective management of NPLs in MFIs in Nyeri County. According to the findings, MFIs in Nyeri County had a high proportion of NPLs due to their failure to enforce covenants. The study discovered a negative relationship between the credit risk management methodology employed by Micro Finance Institutions in Nyeri County and the number of non-performing loans, i.e., the higher the degree of credit risk management, the lower the proportion of non-performing loans.

Adamu et al. (2014) studied loan portfolio management in microfinance banks using lending techniques in Nigeria. They discovered that the competent and efficient management of a microfinance bank's credit portfolio is critical to its success. Risk portfolios have shown to be a source of repeated issues and failure for many microfinance institutions. Asset quality and

profitability are not always guaranteed by credit rules, processes, systems, and controls. They said that for efficient loan portfolio management, a realistic methodology is required. They suggested that microfinance institutions should take a practical approach and hire operations research professionals as part of their staff.

Kisala (2014) investigated the impact of credit risk management on the lending performance of Kenyan microfinance institutions. The researcher employed a descriptive study approach that included a thorough examination of credit risk management in microfinance organizations and its link to loan performance. Although a sample size of nine MFIs was employed, primary and secondary data was acquired from five microfinance organizations via questionnaires and annual reports from five microfinance institutions (2007 - 2011). The ROE was employed as a profitability measure, while the CAR and NPL ratio were utilized as credit risk management indicators. According to the study's findings, there is a strong link between credit risk management and loan performance. The study's findings revealed that NPL and CAR had a negative and statistically significant impact on ROE. When compared to CAR, the NPL ratio had a higher impact on ROE. The study discovered a link between credit risk management and the financial success of microfinance firms.

2.4.3 Empirical studies in Ethiopia

Despite the fact that numerous academics have researched credit risk management in commercial banks in Ethiopia, relatively little study has been done to determine the impact of credit risk management on MFI profitability. In the following section, an attempt is made to record available literature on credit risk management techniques of microfinance firms.

Girmay (2020) 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 ROE and ROA have been used by the study as stand-ins for profitability. While the standard credit risk ratios, such as Total Loan to Total Assets (TLTA), Total Loan to Total Deposit (TLTD), and Non-Performing Loan to Total Loan (NPLTL), are employed as independent

variables to quantify the amount of credit level of 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 the Association of Ethiopia Microfinance Institution (AEMFI). 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- The performing Loan to Total Loan (NPLTL) ratio negatively and significantly influences both Return on Asset (ROA) and Return on Equity (ROE). The total Loan to Total Deposit (TLTD) ratio negatively and significantly influences the profitability of MFIs measured in terms of Return on Equity (ROE). The study further found that the Total Loan to Total Asset (TLTA) ratio has a positive and significant influences on return on equity (ROE) while it positive but insignificant effect on return on asset (ROA).

Hiwot (2019) the research was to assess the Effect of Credit Risk Management on the Profitability Performance of Commercial Bank of Ethiopia proxied by ROA and ROE, The study used a secondary data for the period 2000 to 2018 for nineteen (19) years. the result showed that credit risk management which is measured by non- performing loan to total loan ratio, and management efficiency that is measured by the ratio of operating expense to total income have negative and significant effect on both dependent variables (ROA and ROE).The other independent variables (CAR,TLTA,NII&LR) are insignificant.

Tekalagn (2015) did research about credit risk management and its impact on the performance of commercial banks in Ethiopia the paper tries to investigate the relationship between credit risk management and its impact on the performance of commercial banks in Ethiopia. The study is based on secondary data which were collected from nine commercial banks in Ethiopia. To investigate the connection between credit risk and performance, panel data from the chosen banks covering six years from 2009 to 2014 were used. A panel data regression model and descriptive statistics were used to analyze the data. Return on Assets (ROA) and Return on equity (ROE) were used as performance variables and Capital Adequacy Ratio(CAR), Non-Performing Loans to Total Loans (NPLR), Loan provision to Total Loan Ratio(LPTLR), Loan Provision to Non-Performing Loans Ratio (LPNPLR), Loan Provision to Total Assets Ratio(LPTAR) and Non-Performing Loans to Total Loans (NPLTLR) were used as variables of

credit risk management. The regression results of the study suggested that CAR and NPLR of the banks are significantly negatively related to ROA and ROE and LPTLR, LPNPLR and LPTR are significantly positively related to ROA and ROE.

Kenned (2016) evaluated the impact of credit risk on the financial health of Kenyan commercial banks. The study covered the period between the years 2005 and 2014. Credit risk was measured by capital to risk-weighted assets, asset quality, loan loss provision, loan and advance ratios, and financial performance by return on equity (ROE). The study used the balance sheet components and financial ratios for 43 commercial banks in Kenya registered by the year 2014. According to the findings, credit risk has a significant negative impact on bank profitability. Poor asset quality or high non-performing loans to the total asset is related to poor bank performance both in the short run and long run.

Engdawor (2014) examined the quantitative effect of credit risk on the performance of commercial banks in Ethiopia, considering variables related to lending activities, over 5 years (2008-2012). The study used Return on Assets (ROA) as a dependent variable, to represent Banks' performance. Fundamentally, the study uses both descriptive and econometrics methods. The eight Banks were chosen for the sample using a non-probability method known as a judgmental sampling methodology, and the data were taken from the Annual Reports of the same Banks, which account for more than 80% of the total loan and advance in the industry. The study finds that the selected variables: the provision to total loans, loan to total asset, credit administration (cost to total loans), and Size (Economies of scale) have significant effects on the performance of Banks.

Misker (2015) examined the impact of credit risk management on the profitability of banks in Ethiopia. The study used secondary data for eight banks which stayed in the industry for more than eleven years based on panel data analysis for the period 2003 to 2013. The data was analyzed by using a random effect model and used to analyze EView 6 software. The study concluded that NPLR, Capital Adequacy, Loan to Deposit, and Bank Size, had a statistically significant effect on the level of ROE. However, the results of this random effect regression

model revealed the insignificant effect of Interest spread rate, GDP, and inflation rate on the level of ROE of commercial banks in Ethiopia for the period under consideration. According to the regression results, the findings indicated that bank credit risk management measured in terms of NPLR has a negative and statistically significant impact on ROE. This result is unusual since one would expect a riskier business will have a bigger return. This implies that banks can make a profit as far as they can minimize credit risk. The study concluded that profitability in the Ethiopian banking sector is largely driven by the managerial decision than external factors.

Girma (2011) investigated credit risk management and its impact performance of Ethiopian Commercial Banks. The researcher used 10 years of panel data from the selected commercial banks for the study, to examine the relationship between ROA and loan provision, non-performing loans, and total assets. The study shows that there is a significant relationship between bank performance and credit risk management. It shows the challenges faced by the financial institution regarding credit risk management and it shows the major tools or techniques used by financial institutions to manage their credit risk. The Bank's supervisors are well aware of this problem, it is however very difficult to persuade Bank managers to follow more prudent credit policies during an economic upturn, especially in a highly competitive environment. They assert that even conservative managers may find it exceedingly challenging to resist market demand for bigger earnings.

Zewude (2011) did a study on credit risk management and the profitability of commercial banks in Ethiopia. The purpose of the study was to measure the impact of credit risk management on the profitability of seven major commercial banks in Ethiopia. The researcher used a regression model, to analyze the data which was collected from the National Bank of Ethiopia and seven commercial banks in the country. The study used a multiple regression model with one dependent and two independent variables. The ROE was taken as the dependent variable while the independent variables were the NPL ratio and the CAR. A few questionnaires were also distributed to credit risk management bodies of each bank in the study. The study revealed that both the non-performing loan ratio and capital adequacy ratio hurts the profitability of commercial banks in Ethiopia. The impact level of the nonperforming loan ratio was negative

which means that a single unit increase in the nonperforming loan ratio led to a 0.594077 unit decrease in profitability of commercial banks in Ethiopia. A unit increase in capital adequacy ratio also led to 0.831816 unit decreases in the profitability of commercial banks of Ethiopia.

Chemjor (2007) in her study on the Significance of the factors contributing to non-performing loans in Commercial Banks in Kenya used questionnaires that were administered to the 43 commercial banks in Kenya that year. Three categories—bank-related, economic, and customer-related—were used to categorize the circumstances causing non-performing loans. A Likert scale continuum was used to rate the elements according to their importance, and factor analysis was employed to ascertain the components' importance. From the study, she established that insolvency or dissolving of the borrowing company had the most significant contribution to the non-performing loan problem. The second factor was the death of the borrower. The study also showed that poor loan monitoring and control by bank management, contract violations, ignorance of legal issues, man-made and natural disasters, bank takeovers by rival financial institutions, company failure as a result of loan default, job loss for the borrower, bankruptcy of the debtor, and closure of businesses with commercial bank loans due to competition were the main factors that bank management needed to pay attention to.

Wale (2009) examined the performance of Ethiopian microfinance institutions and determined that they had a low GLP-to-asset ratio, allocating a smaller fraction of their total assets to loans. They're also not making the greatest use of their available debt. Large and small MFIs allocate greater loan loss provision expenditure than the industry average, and their associated PAR is high. All of these points to erroneous credit risk management strategies. According to a Goshim study published in 2011, "Performance of microfinance institutions in credit risk management: the case of five microfinance institutions in Addis Ababa.". He discovered that the failure to appropriately manage credit risk led to the micro finance institutions problem to a higher extent utilizing a hybrid approach.

Using a sample of 15 MFIs from 2003 to 2009, Obsa (2012) investigated the factors of loan portfolio quality in Ethiopian MFIs. The results demonstrated a significant inverse relationship

between the size of the institution, the LLP, and the PAR -30 day period. The loan ratio (current loans divided by total assets) has a favorable and substantial influence on PAR-30 days and WOR. The coefficient for the female borrower ratio has a substantial negative influence on LLPR and WOR; the estimates also demonstrate a strong inverse relationship between changes in total loan and the three loan portfolio risk indicators used by MFIs: LLP, PAR -30 days, and WOR. The operational expense ratio, a measure of efficiency, is positively related to WOR. There was no significant association between macroeconomic parameters (changes in gross national income per capita and inflation) and MFI portfolio risk indicators: LLP, PAR-30 days, and WOR, according to the research. Tilahun (2013) is presently looking at the factors that affect MFI financial sustainability in East Africa, where poverty is a major issue, and the regression results show that loan intensity and size have a positive and substantial impact on MFI financial sustainability.

Amanuel (2015) conducted research into the relationship between credit risk management and microfinance institution profitability in Ethiopia. Between 2003 and 2012, AEMFI released 12 MFI annual reports, which were used to compile the data. Their proxies were utilized to evaluate the link between the two abstract ideas. PAR>30 days, LLPR, WOR, and RC were chosen as proxies for credit risk management, whereas ROE and ROA were chosen as profitability proxies. According to the study, credit risk management provides statistically significant impacts on commercial bank profitability. Between the four credit risk management proxies, LLPR and WOR have a considerable impact on both ROE and ROA, but PAR>30 days and RC have a negligible impact on both ROE and ROA.

Gizaw, Kebede, and Selvaraj (2015) investigated the influence of credit risk on commercial bank profitability in Ethiopia. The study's goal was to see how credit risk influenced Ethiopian commercial banks' profitability. The study's data was gathered from yearly reports of eight commercial banks and the Ethiopian National Bank during a 12-year period (2003-2014). The data was analyzed using descriptive statistics and panel data regression. Loan loss provisions, non-performing loans, credit risk indicators, and capital sufficiency all had an impact on commercial banks' profitability in Ethiopia, according to the findings.

2.5 Summary and literature Gap

The major gap (Girmay 2020) is limited to the influence Credit Risk has on the profitability performance of some selected MFI in Addis Ababa from 2009 to 2018 therefore the findings, analyses, and recommendations cannot be linked to the whole microfinance sector which has ten years data in Ethiopia. Thus those MFIs outside the head office in Addis Ababa are omitted in this study as Data. More so, in this study, only three traditional 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.

The primary gap identified in the paper by Hiwot (2019) lies in its narrow focus on the financial sector of Ethiopia, which encompasses commercial banks, development banks, and microfinance institutions. Despite the presence of approximately 18 commercial banks operating in the country, the study exclusively evaluated the impact of credit risk management on the profitability performance of only the Commercial Bank of Ethiopia from 2000 to 2018. Consequently, the research overlooked the opportunity to investigate other private commercial banks, resulting in a significant gap in understanding the broader implications of credit risk management practices across the Ethiopian banking industry.

Tekalagn's (2015) paper exhibits a significant gap due to several key shortcomings. Firstly, the study relies on a limited dataset spanning only six years, which may not provide an adequate timeframe for robust analysis, particularly in the context of banking research where long-term trends and patterns are crucial. Additionally, the paper lacks transparency regarding the selection criteria for commercial banks, failing to clearly define whether the chosen banks belong to the private or public sector. This omission hampers the reader's ability to understand the context of the analysis and may introduce bias or limitations in the findings. Therefore, addressing these deficiencies is essential to enhance the credibility and validity of the research.

The main flaw observed in Kennedy's (2016) analysis was the omission of the primary dependent variable, return on assets (ROA). ROA serves as a crucial indicator that effectively measures and quantifies a bank's profitability and efficiency. Its absence from the analysis represents a significant limitation, as it hampers the ability to fully grasp the bank's financial performance. By neglecting to include ROA, Kennedy's study overlooks a fundamental aspect of banking analysis, thereby compromising the accuracy and completeness of the assessment. Therefore, addressing this deficiency is imperative to ensure a more comprehensive evaluation of the bank's profitability and efficiency.

According to the researcher, Engdawork's (2014) publication had a notable flaw in its methodology. Specifically, the study only utilized data spanning five years, which limited the scope and depth of the analysis. Furthermore, the omission of the primary dependent variable, return on equity (ROE), undermined the comprehensiveness of the study's findings. ROE is a crucial metric in assessing a company's financial performance and shareholder value, and its absence from the analysis represents a significant limitation. Therefore, the study's conclusions may not provide a comprehensive understanding of the factors influencing financial performance in the context studied.

Misker's (2015) article exhibits a notable weakness due to the absence of specific institutional names. The study fails to provide clarity on which institutions were selected for analysis, which undermines the transparency and reproducibility of the research. While the article outlines the criteria used for selection, the lack of explicit identification of the chosen institutions hampers the reader's ability to assess the validity and relevance of the study's findings. Consequently, the omission of this critical detail diminishes the overall credibility and impact of the research.

In my view, Girma's (2011) research gap recognized the difficulty of market pressure to follow more prudent credit policies. The gap the researcher observed in Zewde (2011) that tried to measure credit risk management and profitability of commercial banks in Ethiopia is he used only one dependent and one Independent variable. The study by Chemjor (2007) did not include the effect of the credit risk management practice on the profitability of commercial banks in

Kenya; she only assessed the significant factor which leads to Non-performing Loan (NPL) problem.

Margaret (2014) in her research on the effect of credit risk management on the financial performance of commercial banks in Kenya try to determine the relationship between credit risk management and the financial performance of commercial bank but consider only five years of data and also only two variables were used for regression analysis model one dependent (ROA) and one independent Credit Risk variables.

Shibiru and Mebratu (2014) assessed the impact of credit risk management on the performance of private commercial banks in Ethiopia. The major gap in this paper is they assess only private banks but more than half of the bank industry's financial assets and the loan is held by government banks particularly the Commercial Bank of Ethiopia.

This study tried to address these research gaps by assessing the effect of credit risk management on the profitability of MFIs of Ethiopia which is the big holding of the banking industry assets. Moreover, additional explanatory variables are included in the regression which will have an impact on profitability.

2.6 Conceptual Framework

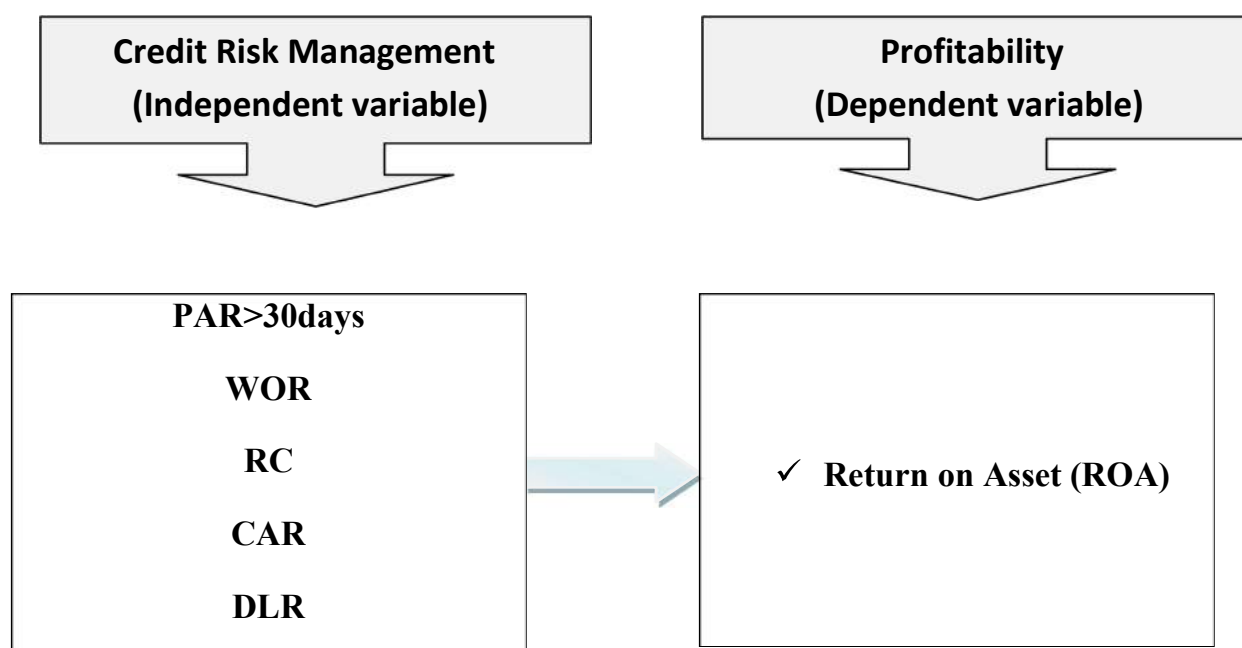
A conceptual framework is a collection of overarching concepts and guiding principles drawn from related disciplines of study and utilized to organize a subsequent presentation (Kombo & Tromp, 2009). A concept is an abstract or overall impression inferred or deduced from a specific instance. It is a research instrument that helps a researcher to develop awareness and understanding of the situation under inquiry and to communicate it.

From Fig.2.1 below, it is evident that the model of this research stands on the foundation of credit risk management. This research has the objective to find out whether there exists a relationship between credit risk and profitability of MFI in Ethiopia. There was the need to

quantify both credit risk and profitability in order to be able to disclose the relationship statistically. To achieve the above aim of the study, the one indicator for profitability and five indicators of credit risk management namely PAR>30days, WOR, RC, CAR and DLR forms the foundation of the model. Profitability represented by ROA is the resultant of the credit-risk management indicators signifying its dependence on credit risk management.

Thus, in order to test the effect of these variables on the performance of MFI'S of Ethiopia, this study develops the following conceptual framework. The study's conceptual framework is developed according to the work "Financial Management: Theory & Practice" by Eugene F. Brigham and Michael C. Ehrhardt: and the work of Kenneth and Charles (2013).

Figure 2.1 Conceptual Framework



Source: Researcher's illustration

Chapter three

3. Research methodology

3.1 Introduction

Research methodology is a vital part of the research discussion because it's the background against which the anthology evaluates the findings and draw conclusions. This chapter presents the research system took up for the study and discusses the approach which will be 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 Ethiopia. To achieve this objective explanatory research design with a quantitative approach is used. Hence, descriptive and explanatory research design enabled the researcher to examine the effect of credit risk management on profitability of micro-finance institutions in Ethiopia.

3.3 Research Approach

Research methods are often categorized into quantitative and qualitative research. (Bryman& Bell (2007, p.28), quantitative research emphasizes quantification of the data collection and analysis. Usually, quantitative research conducts a deductive approach to the relationship between theory and research which focus on testing of theory (Bryman& Bell, 2011, p. 28). It combines practices and norm of the natural scientific model in positivism position and embodies a view of social reality as an external, objective reality. (Bryman& Bell, 2011, p. 28)

In this research, deductive approach is selected which means that testing a theory rather than generating a theory is the area of focus. In order to test the hypothesis, data were collected for the indicators, ROE, ROA, WOR, PAR, RC, CAR, & DLR which are described in a numerical way. The data were collected directly from Ethiopian Microfinance Institutions performance analysis report Bulletins from 2011 – 2022 published by the Association of Ethiopian Microfinance Institutions. The quantitative data and statistical analysis maintained the target conception during a study of social reality. Therefore, quantitative research is more appropriate for this subject.

3.4 Sample Population

The research's population consists of all the 41 Microfinance Institutions in Ethiopia that are registered at the national bank of Ethiopia.

3.5 Sampling Frame

This research considers those micro finance institutions with the age of 10 years and above. Out of the 41 micro finance institutions in Ethiopia, Twenty Eight (28) are found to be with the age of ten and above ten. From Twenty Eight MFIs Seven (7) of them have no full ten year data.

3.6 Sampling Size

From a total of 41 microfinance institutions in Ethiopia, those institutions which are mature (who serve for 12 years and above) is assumed to provide more comprehensive and organized data or information on the study area and are preferred to deliver the best information regarding the performance of selected microfinance institutions in credit risk management, particularly information related to loan repayment performance all 21 institutions which has twelve years data are selected.

LIST OF MICROFINANCE INSTITUTIONS USED IN THE RESEARCH (AGED MORE THAN 10 YEARS)

1	Addis Credit and Saving Institution S. Co.	ACSI
2	Africa Village Financial Services S. Co.	ADCSI
3	Aggar Micro Finance S.Co.	AGGAR
4	Amhara Credit and Saving Institution S. Co.	AVFS
5	Benishangul-Gumuz Micro Financing S.Co.	BENISHANGUL
6	Buusaa Gonofaa Micro Financing S. Co.	BUSSA GONOFA
7	Dedebit Credit and Saving Institution S.C.	DECSI
8	Dire Micro Finance Institution S. Co.	DIRE
9	Dynamic Micro Finance S. Co.	DYNAMIC
10	Harar Micro Finance s.co	HARAR
11	Harbu Micro Financing Institution S. Co.	HARBU
12	Letta Micro Finance Institution S. Co.	LETTA
13	Meklit Micro Finance Institution S. Co.	MEKLIT
14	Metemamen Micro Financing Institution S. Co.	METEMAMEN
15	Omo Micro Finance Institution S. Co.	OCSSCO
16	Oromia Credit and Saving Institution S.Co.	OMO
17	Peace Microfinance Share Company	PEACE
18	Specialized Financial and Promotional Institution S. Co.	SFPI
19	Sidama Micro Finance Institution S.Co.	SIDAMA
20	Vision Fund Microfinance Institution S. Co.	VISION FUND
21	Wasasa Micro Finance Institution S.Co.	WASASA

3.7 Source and type of data

The study took quantitative research approach by using secondary data from Ethiopian Microfinance Institutions performance analysis report Bulletins from 2011 – 2022 published by the Association of Ethiopian Microfinance Institutions. This study uses panel data covering a period of 12 years (2011 – 2022). 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). Given that the aim is to determine if a relationship exists between parameters utilized in credit risk management and parameters utilized in profitability.

3.8 Model specification

Model specification is the process of deciding which independent variables should be included in or removed from a regression equation. The first and most important phase in regression analysis is model definition, which is followed by parameter estimations and interpretation. Our estimations of a model's parameters, as well as our interpretation of them, are contingent on the model's accurate specification (Allen, 1997). The study's econometric model was a multivariate regression model. It's a statistical approach for looking at how variables are related. It's useful for calculating the effects of several simultaneous factors on a single dependent variable. Regression analysis is also useful for calculating the influence of several concurrent variables on a single dependent variable.

The generic objective of the study was to examine if credit risk management influence Return on Asset and return on equity of micro finance institution in Ethiopia. The following multiple linear regression equation will be used to examine the effect of credit risk management on financial performance of micro finance institution in Ethiopia.

$$\text{EQ1 } Y_t = \beta_0 + \beta_i X_{it} + \epsilon_t$$

Equation 1

$$\text{ROA} = \beta_0 + \beta_1 \text{PAR}_{30_{it}} + \beta_2 \text{WOR}_{it} + \beta_3 \text{RC}_{it} + \beta_4 \text{CAR}_{it} + \beta_5 \text{DLR}_{it} + \epsilon_{it}$$

WHERE

ROA return on asset

β_0 is the intercept

(PAR >30 days) Portfolio at risk greater than 30 days

(WOR) Write-Off ratio,

(RC) Risk coverage

(CAR) capital to asset ratio

(DLR) Deposit to loan ratio

3.9 The variables

The profitability indicators employed in this study's regression analysis is Return on Asset (ROA) (Marshall and Onyekachi, 2012).

In this research, six indicators are used to measure the credit risk management. Portfolio at risk greater than 30 days (PAR >30 days), Write-Off ratio (WOR), and Risk coverage (RC), capital to asset ratio (CAR), and Deposit to loan ratio (DLR) which are main indicators used to assess the soundness of the performance of MFIs in Ethiopia.

These ratios were calculated using data from Microfinance Institutions' financial records from 2011 to 2022, which are available in the Association of Microfinance Institutions in Ethiopia's office. The factors that are tested during this investigation are listed in the table below.

	Variable Name	Calculating Method
	ROA	Adjusted Net Operating Income, net of taxes/Adjusted Average Total Asset
Independent Variables	PAR>30 days	Outstanding balance on arrears over 30 days/Adjusted gross loan portfolio.
	WOR	Write-Off amount for a given period/Average gross portfolio

	RC	Adjusted Loan Loss Reserve/PAR>30 days
	CAR	Adjusted total equity/adjusted total assets
	DLR	Voluntary savings/adjusted gross loan portfolio

3.10 Data Validity and Reliability

Regardless of whether the data is quantitative or qualitative, it is necessary to exercise critical thinking. There are two significant variables, validity and reliability, that need to be taken into account when gathering data.

The amount to which the instrument measures what it is supposed to measure is what is meant by "validity" (Allen and Yen, 1979). The extent to which the instrument accurately evaluates or measures the target construct is referred to as content validity. Validity is when the research has relevance to the problem statement (Andersen, 2002). It is defined as the degree of agreement between the theoretical and the empirical conceptual framework

The validity of the data from the MIX market is considered high since this is the most comprehensive and in-depth database in the microfinance industry on MFI performance. Therefore, it is the database most used by researchers and analysts. The articles and reports are considered as valid as well, as these are dealing with aspects that the data cannot always provide and therefore also offer aspects in the analysis of the problem statement. The aspect of validity can, however, be discussed because the industry examined in this paper is new and changing; consequently, there is not as much information about this field as can be found in many established industries.

Reliability is equal to the trustworthiness of the research. It is very important to estimate the compiled data's reliability and remain critical. The paper can be considered reliable since the analytical and system-oriented methods are being used. Data review also includes the financial

statements on the annual bulletin of the Association on Microfinance Institutions in Ethiopia which are audited.

Overall, it is concluded that from an outside point of view the data has a good combination of validity and reliability, thus forming a good foundation for the paper.

CHAPTER FOUR

4. DATA ANALYSIS, PRESENTATION AND DISCUSSION

This chapter discusses the interpretation and presentation of the findings obtained from the regression output on the relationship between credit risk management and profitability of Microfinance Institutions in Ethiopia. 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 Ethiopia from the year 2011 to 2022 with a total of 210 observations. The table shows the mean, minimum, maximum, standard deviation and number of observations for the dependent variable Return on asset (ROA) and independent variables Portfolio at risk greater than 30 days (PAR >30 days), Write-Off ratio (WOR), and Risk coverage (RC), capital to asset ratio (CAR), and Deposit to loan ratio (DLR)

Table 4.1:- Descriptive Statistics

Descriptive Statistics					
Variable	Obs	Mean	Std. Dev.	Min	Max
year	252	2016.5	3.459	2011	2022
roa	252	6.747	9.985	-39	42
par30days	252	6.042	8.275	0	79.8
wor	252	.558	2.417	0	31
rc	252	91.866	64.339	-2.59	484.02
car	252	36.392	27.313	3	280.8
dlr	252	48.592	23.173	14	210
code1	252	11	6.067	1	21

Table 4.1 provides a summary of the average indicators of various financial variables derived from the financial statements of microfinance institutions in Ethiopia from 2011 to 2022. Additionally, the table includes the standard deviation, which measures the dispersion of data

points from their average value. As Brooks (2008) notes, a low standard deviation suggests that data points are closely clustered around the mean, whereas a high standard deviation indicates a wider spread.

The summary data reveals that the average Return on Assets (ROA) for Ethiopian microfinance institutions is 6.747 percent. The ROA has a standard deviation of 9.985, with observed values ranging from a maximum of 42 percent to a minimum of -39 percent.

The Portfolio at Risk over 30 days (PAR > 30 days) has a mean value of 6.042 percent and a standard deviation of 8.275, with values ranging from 0.0 percent to 79.8 percent. The Write-Off Ratio (WOR) shows a mean value of 0.558 percent and a standard deviation of 8.275, with observed values between 0.0 percent and 31 percent.

Risk Coverage (RC) has a mean value of 91.8 percent and a standard deviation of 64.34, with observed values ranging from a minimum of -2.6 percent to a maximum of 484 percent. The Capital Asset Ratio (CAR) has an average value of 36.39 percent and a standard deviation of 27.31, with values ranging from 3.0 percent to 280.8 percent. Finally, the Deposit to Loan Ratio (DLR) has a mean value of 48.59 percent and a standard deviation of 23.17, with values ranging from a minimum of 14 percent to a maximum of 210 percent.

This summary provides a comprehensive overview of the key financial indicators used in the analysis, highlighting both central tendencies and variability within the data.

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 in order 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

Pairwise correlations						
Variables	(1)	(2)	(3)	(4)	(5)	(6)
(1) roa	1.000					
(2) par30days	-0.222	1.000				
(3) wor	-0.239	0.335	1.000			
(4) rc	0.086	-0.118	-0.094	1.000		
(5) car	0.020	0.005	0.126	-0.084	1.000	
(6) dlr	-0.083	0.136	0.022	-0.049	-0.197	1.000

4.2.2 Test for Heteroscedasticity assumption ($\text{var}(u) = \sigma^2 < \infty$)

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 Breusch-Pagan test we can check if there is Heteroscedasticity. Here are the outputs from STATA for Breusch-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	4.25	0.039

As we can see from the above table 4.3, the sig-value for fitted values of ROA the sig-value for 0.0039 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 ROA. In general if we have linear regression model with Heteroscedasticity, then the OLS estimators are still unbiased and consistence.

4.2.3 Test for absence of Autocorrelation

The correlation between errors terms should be zero is another fundamental tenet of a regression model. This implies that the error term must be random and devoid of any form of pattern. Autocorrelation exists when the error terms across observations are correlated with each other. Autocorrelation is the term used to describe a phenomenon where there is a covariance between the residuals and it is non-zero.

Table 4.4: Wooldridge test for autocorrelation in panel data

Test Method	Dependent variable	Value
Wooldridge test	ROA	0.0000

According to wooldrige 2002 it is important to test serial correlation for panel data. If you find it, you should also compute the fully robust standard errors that allow for arbitrary serial correlation across time and heteroscedasticity.

4.2.4 Normality test

Before running regression analysis on any data set, the data must be normally distributed. The normality test conducted for both models indicated that the variables were all normally distributed. A histogram as indicated in Appendix showed that the data set was normally distributed.

4.2.5 Testing for Linearity

According to Burton, (2021), the linearity assumption states that a model cannot be correctly specified if the independent variables in the model do not share, collectively, a linear relationship with the dependent variable. Trying to fit an estimate of OLS which is a linear estimate to a data that is non-linearly related will result in the model being incorrect and hence unreliable. This study uses the restricted Ramsey Regression Equation Specification Error Test

(RESET) whether non-linear combinations of the fitted values help explain the response variable.

Table 4.6: Restricted Ramsey RESET test for model specification

H0	Variables	F	Prob > F
Model has no omitted variables	Fitted values of ROA	1.96	0.1665

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 .0687.

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

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).

A. Breusch and Pagan Lagrangian multiplier test for random effects

```
roa[code1,t] = Xb + u[code1] + e[code1,t]
```

Estimated results:

```

              |      Var      sd = sqrt(Var)
-----+-----
    roa |    99.70457    9.985218
       e |     72.5354    8.516772
       u |     22.49652    4.74305

Test:    Var(u) = 0

          chibar2(01) =    57.73
        Prob > chibar2 =    0.0000
```

The above figure from STATA output show a Breusch-Pagan poolability test for both dependent variables, the P- value for both models are less than 5% level of significance. Hence we do reject the null of zero company heterogeneity. Hence between the pooled regression model or random effects model, we select the random. In both of the above test we select the random regression model in favor of FE and RE models. So we need to conduct the Hausman test to see whether a FE or RE model to Evaluates the consistency of an estimator when compared to an alternative, less efficient estimator.

Hausman (1978) specification test for ROA

	Coef.
Chi-square test value	4.7
P-value	0.4536

The p value is greater than 0.05 random Effect is a more consistent estimator than fixed Effect

4.4 Regression analysis results

Two distinct hypotheses have been created in order to fulfill the two major study objectives indicated in chapter one. And two regression analyses are carried out to test those possibilities. The next Section provides a summary of the hypothesis' findings.

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

Regression results

roa	Coef.	St.Err.	t-value	p-value	[95% Conf	Interval]	Sig
par30days	-.205	.079	-2.61	.009	-.359	-.051	***
wor	-.524	.251	-2.09	.037	-1.016	-.031	**
rc	.007	.01	0.66	.506	-.013	.026	
car	.017	.023	0.75	.454	-.027	.061	
dlr	.009	.03	0.31	.758	-.049	.068	
Constant	6.606	2.373	2.78	.005	1.955	11.257	***
Mean dependent var		6.747	SD dependent var			9.985	
Overall r-squared		0.080	Number of obs			252	
Chi-square		16.515	Prob > chi2			0.006	
R-squared within		0.057	R-squared between			0.147	

*** $p < .01$, ** $p < .05$, * $p < .1$

Model Summary

The model summary revealed a coefficient of determination (R^2) of 0.14 (14%). This meant that a change in profitability which is measured in terms of ROA could be explained by 14% change in the explanatory variables

Regression result and discussion

The coefficients presented in Table 4.7 of the study reveal crucial insights into the regression analysis. Notably, Par30days emerges with a significant negative effect on Return on Asset (ROA), indicated by a beta value of -0.205 and a t value of -2.61, which attains significance at the 5% level. This aligns with prior research conducted by Cull, Demirgüç-Kunt, and Morduch (2007), emphasizing the inverse relationship between elevated levels of PAR > 30 days and financial performance. Their study underscores how such levels are indicative of heightened loan default risks, leading to diminished ROA for institutions.

Building upon this foundation, Muriu's (2011) dissertation conducts a detailed examination of the determinants of Microfinance Institution (MFI) profitability, focusing specifically on credit risk indicators like PAR > 30 days. The findings reaffirm the adverse impact of higher PAR ratios on both ROA, emphasizing that MFIs with superior credit risk management practices, reflected in lower PAR > 30 days, tend to enjoy enhanced profitability.

Furthermore, the research by Otieno, Nyagol, and Onditi (2016) sheds additional light on the topic, revealing a robust negative correlation between credit risk management, particularly PAR parameters, and both ROA performance measures. This underscores the critical significance of effective credit risk management strategies in bolstering financial performance across financial institutions.

The analysis reveals that the Write off ratio (WOR) also exhibits a significant negative impact on Return on Asset (ROA), evidenced by a beta value of -0.524 and a t value of -2.09, which achieves significance at the 5% level. This aligns with research by Bogan (2012), who

emphasizes that institutions maintaining lower write-off ratios tend to exhibit superior profitability metrics, including Return on Equity ROA. This phenomenon can be attributed to effective credit risk management practices, which contribute to minimizing write-offs, thereby preserving higher net incomes and optimizing asset utilization.

Additionally, Nawaz (2010) investigates into this topic in the context of microfinance performance, specifically examining the role of subsidies. The findings underscore a significant negative correlation between the write-off ratio and profitability measures. Elevated write-off ratios are associated with diminished ROA, indicative of poorer loan portfolio quality and heightened credit losses. This highlights the pivotal role of prudent credit risk management in safeguarding financial health and sustainability within financial institutions.

The Capital Asset Ratio (CAR) has a positive but insignificant effect on Return on Asset (ROA). Hermes and Lensink (2011) discuss the broader impacts of various financial ratios on the sustainability and performance of Microfinance Institutions (MFIs). Their study indicates that while capital adequacy is crucial for risk management and regulatory compliance, its direct impact on profitability measures such as Return on Equity ROA may be mediated by other variables like credit risk management and operational costs.

Muriu's (2011) dissertation further explores the determinants of MFI profitability, including capital asset ratios. The findings suggest that although capital asset ratios are essential for the overall stability of MFIs, their impact on ROA may not be as pronounced as factors such as loan performance and cost efficiency. This implies that while maintaining adequate capital is important, it is the effective management of loans and operational costs that more significantly drive profitability in MFIs.

RC has negative and insignificant effect on ROA. Bogan, V. (2012) discusses the relationship between financial performance and various financial ratios in microfinance institutions. The study finds that while risk coverage ratios are important for assessing financial health, their

direct impact on profitability measures such as ROA is often mediated by other operational factors and overall management practices.

Deposit to loan ratio has positive and insignificant effect on ROA. The findings Muriu, P. W. (2011): suggest that while certain ratios like the capital asset ratio are important for stability, their direct impact on profitability measures such as ROA may not be as significant compared to factors like loan performance and cost efficiency. This can be extended to imply that other ratios, like the DLR, might also have an insignificant direct impact on ROA. Nawaz, A. (2010) also support DLR might be one of the ratios that do not significantly affect ROA directly.

From the above table the following regression equation was established

$$\text{ROA} = 6.606 - 0.205\text{par30days} - 0.524\text{WOR} - 0.007\text{RC} + 0.017\text{CAR} + 0.009\text{DLR}$$

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
There is a significant impact of PAR>30 days on Return on Asset (ROA) of MFIs in Ethiopia	Accept
There is a significant impact of WOR on Return on Asset (ROA) of MFIs in Ethiopia.	Accept
There is a significant impact of RC ratio on Return on Asset (ROA) of MFIs in Ethiopia.	Reject
There is a significant impact of CAR ratio on Return on Asset (ROA) of MFIs in Ethiopia.	Reject
There is a significant impact of DLR ratio on Return on Asset (ROA) of MFIs in Ethiopia.	Reject
There is a significant impact of LAR ratio on Return on Asset (ROA) of MFIs in Ethiopia.	Reject

CHAPTER FIVE

5. CONCLUSIONS AND RECOMMENDATIONS

5.1 Summary

At the beginning of the research, it was explained that the study was conducted to examine credit risk management on the profitability of microfinance institutions in Addis Ababa. To test the relationship between two abstract concepts, we used proxies for them. The study has chosen ROA as the proxies for profitability. Whereas, five indicators of credit risk management namely PAR> 30 days, WOR, RC, CAR, and DLR are used as independent variables to measure the amount of credit level of the MFIs. This was done by collecting data from 21 microfinance in Ethiopia and their annual report for the period from 2011 to 2022 which was published by the Association of Ethiopia Microfinance Institution (AEMFI) was used as the main sources of data. To maintain the data validity and robustness of the regressed result of the research, the Classical Linear regression Model (CLRM) assumptions tests which include Normality, linearity, Multicollinearity, Heteroscedasticity, and Autocorrelation were tested. The study made hypotheses and regression tests for the dependent variables ROA, based on the 12-year data. Then, multiple linear regression was used to test these hypotheses, and tests of significance using t-tests indicated varying levels of significance amongst the independent variables as well as when combined, against the dependent variable.

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

5.2 Conclusion

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

Portfolio at Risk > 30 Days (PAR 30)

The study founds Portfolio at Risk > 30 Days (PAR 30) ratio has a negative and significant influence on both Return on Asset (ROA). It implies that one should expect PAR 30 to increase in step with overall portfolio growth. As the loan portfolio grows the anticipation of loan loss will increase adversely affecting the profitability of MFIs.

Write-off (WOR)

According to findings, Write-off (WOR) ratio has negative and significant influences on both Return on Asset (ROA).

Risk Coverage ratio (RC)

The other indicator, the Risk ratio (RC) ratio has negative and has no significant influence on asset (ROA).

Capital asset ratio (CAR)

According to findings, the capital asset ratio has a positive but insignificantly influence on return on asset (ROA)

Deposit loan ratio (DLR)

According to findings, the Deposit loan ratio (DLR) ratio has not a statistically significant effect in explaining the profitability of MFIs measured in terms of ROA.

5.3 Recommendation

Based on the result, the best ways to reduce arrears are to follow up on past-due loans quickly, establish solid support networks, update and enforce credit policies, concentrate the services of credit officers in a particular geographic area, refrain from lending to start-up companies, and

offer financial incentives to credit officers. In extreme cases of arrears, MFIs should suspend lending to new customers until portfolio quality improves. They should also determine if clients are able and willing to make repayments to determine the best course of action.

1. Implement more rigorous credit assessment and monitoring processes to reduce the percentage of loans/assets that become overdue by more than 30 days (PAR>30 days). This could include improving credit scoring models, conducting regular borrower assessments, and providing timely support to borrowers at risk of default.
2. Strengthen policies and practices related to working capital management, particularly in managing receivables efficiently. This might involve setting stricter credit terms, optimizing collection processes, and reducing the time taken to convert receivables into cash.
3. Provide training programs for staff and management on effective credit risk management techniques and working capital optimization strategies. This ensures that employees are equipped with the necessary skills and knowledge to implement best practices.
4. Invest in technology solutions that can streamline credit assessment, monitoring, and collection processes. This may include implementing digital platforms for loan management, credit scoring algorithms, and automated reminders for borrowers.
5. Explore opportunities to diversify funding sources to reduce dependency on short-term financing and mitigate liquidity risks. This could involve accessing long-term funding options or establishing partnerships with other financial institutions.
6. Educate borrowers on financial literacy and the importance of timely repayments. This can help reduce default rates and improve overall portfolio quality.

An MFI can be destroyed by a microfinance portfolio with extremely low debts that show rapid growth in arrears within a few months. Managers must closely monitor compliance with rules once they have been implemented. If something isn't functioning, the institution needs to figure out what's wrong and fix it as soon as possible. The alternative is bankruptcy.

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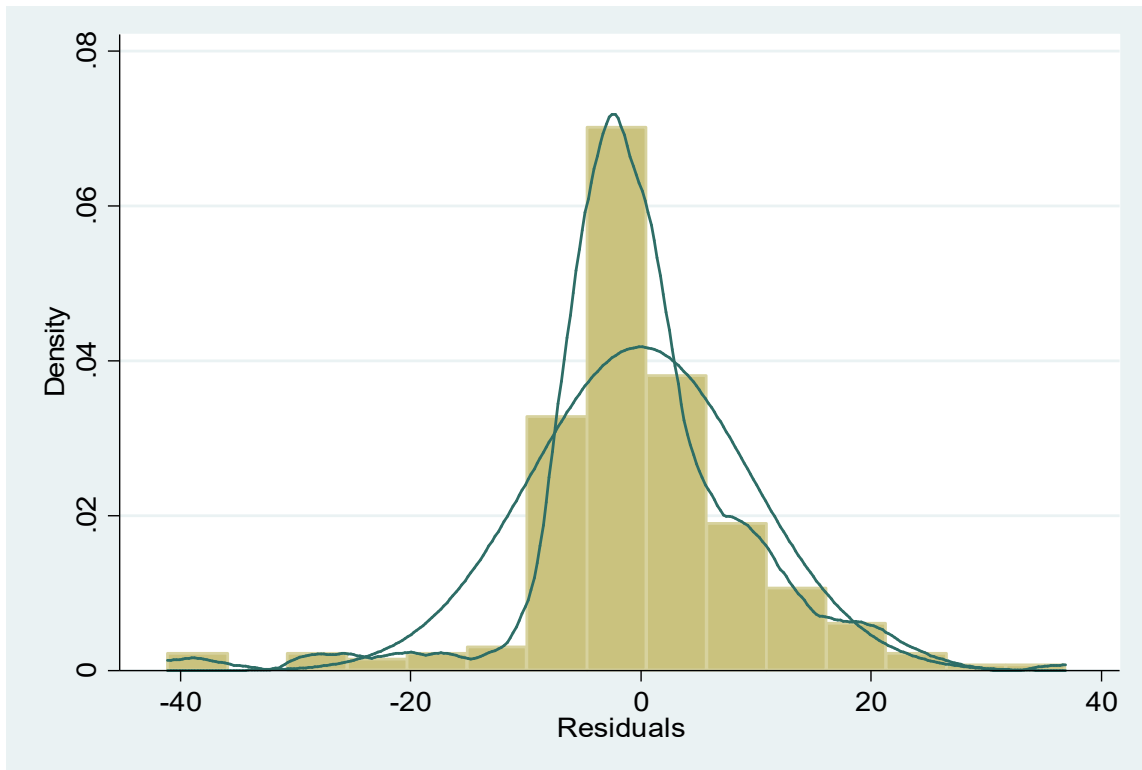
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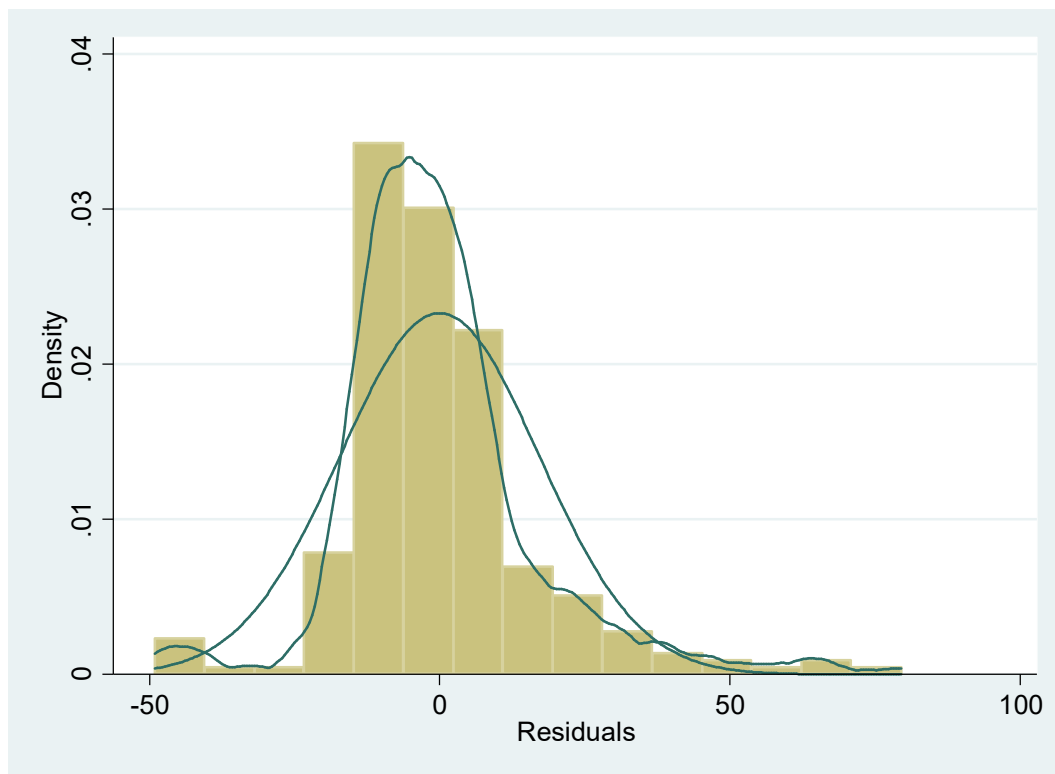
APPENDIX

1. NORMALITY GRAPHS

Dependent variable: Return on asset Histogram



Dependent variable: Return on Equity- Histogram



2. Summarized data of dependent and independent variables from the selected Microfinance institutions.

MFIs	year	ROA	PAR>30 days	WOR	RC	CAR	DLR
ACSI	2011	6.6	1.46	0	123.35	28	17
ACSI	2012	7.1	1	0	81.8	28	60
ACSI	2013	6	0.73	0	83.2	27	57
ACSI	2014	6	0.6	0	95.52	24	83.2
ACSI	2015	8	0.86	0	95.47	24	80
ACSI	2016	9	0.9	0	96.1	26	83
ACSI	2017	5	0.34	0	94.65	23	95
ACSI	2018	5	0.26	0.01	101	22	88
ACSI	2019	3	3.04	0.01	66.81	24	78
ACSI	2020	3	5.59	0.01	162.79	24	81
ACSI	2021	14	5.8	0	76.4	25	96
ACSI	2022	14	5.8	0	76.4	25	96
ADCSI	2011	3.1	3.78	0	53.81	49	29
ADCSI	2012	3.4	2.5	0	54	39	53
ADCSI	2013	3	2.98	0	57	41	76
ADCSI	2014	8	2.94	0	61.1	25	74.3
ADCSI	2015	7	2.51	0	42.1	21	71
ADCSI	2016	10	2.94	0	74.1	25	74
ADCSI	2017	17	1.89	0.09	86.03	39	71
ADCSI	2018	19	1.29	0.12	122.03	35	60
ADCSI	2019	5	7.44	0.01	57	33	58
ADCSI	2020	4	9.26	0.12	83.28	28	37
ADCSI	2021	20	5.1	0	69	31	44
ADCSI	2022	14	5	0	105	53	44
AGGAR	2011	8.1	9.26	0	21.68	28	17
AGGAR	2012	8.9	7.5	0	23.5	26	74
AGGAR	2013	9	5.43	0	39.13	28	33
AGGAR	2014	12	2.91	0	57.63	39.9	48
AGGAR	2015	11	2.84	0	53.51	44	41
AGGAR	2016	12	2.4	0	58.3	41	48
AGGAR	2017	12	0.63	0	84.91	51	34
AGGAR	2018	12	0.6	0.25	77.18	54	28
AGGAR	2019	7	7.53	0.15	87	43	37
AGGAR	2020	9	25.47	0.25	326.97	48	29

AGGAR	2021	16	14.8	0	163	53	46
AGGAR	2022	18	12	0	86	59	42
AVFS	2011	-1.8	7.39	0	10.81	56	38
AVFS	2012	3.2	9.5	9.5	13.2	55	40
AVFS	2013	-2	4.37	4.37	37.76	44	40
AVFS	2014	-11	3.6	2.6	66.89	147.7	36.7
AVFS	2015	-16	3.91	2.6	66.89	120	32
AVFS	2016	-11	3.7	2.6	66.89	48	37
AVFS	2017	-7	3.04	0.1	54.57	53	42
AVFS	2018	3	3.94	0.11	18.26	53	44
AVFS	2019	-15	19.18	0	76.68	35	43
AVFS	2020	-11	35.58	0.91	76.69	22	113
AVFS	2021	-12	38.1	31	93.2	60	86
AVFS	2022	3	15.7	2.6	89	41	54
BENISHANGUL	2011	-2.5	29.83	2.76	109.52	36	43
BENISHANGUL	2012	1.1	37.6	0	82.4	27	47
BENISHANGUL	2013	5	34.19	0	91.66	36	48
BENISHANGUL	2014	2	24.27	0	103.45	31.3	34.1
BENISHANGUL	2015	3	25.14	1.28	86.9	29	31
BENISHANGUL	2016	2	13	0	92	31	34
BENISHANGUL	2017	0	9.18	1.61	85.07	27	51
BENISHANGUL	2018	0	7.84	1.4	100.9	26	51
BENISHANGUL	2019	3	3.43	0.25	107	25	46
BENISHANGUL	2020	3	18.52	1.4	54.27	19	42
BENISHANGUL	2021	13	18	0	78.3	21	24
BENISHANGUL	2022	24	12	0	86	26	44
BUSSA GONOA	2011	14.1	0.68	0	87.59	53	16
BUSSA GONOA	2012	23	0.6	0	76.3	46	18
BUSSA GONOA	2013	7	0.44	0	101.79	39	20
BUSSA GONOA	2014	12	0.8	0	82.43	280.8	34.6
BUSSA GONOA	2015	12.4	0.88	0	83.5	275	32
BUSSA GONOA	2016	12.8	0.81	0	83.5	81	35
BUSSA GONOA	2017	7	0.38	0	129.63	43	36
BUSSA	2018	5	0.27	0	289.37	35	44

GONOFA							
BUSSA GONOFA	2019	4	3.86	0.02	63.5	29	41
BUSSA GONOFA	2020	4	5.64	0	231	31	38
BUSSA GONOFA	2021	10	7.5	0	171	33	40
BUSSA GONOFA	2022	7	3	0	164	25	42
DECSI	2011	1.9	2.16	0	99.72	24	53
DECSI	2012	2.5	4.5	0	72.4	25	61
DECSI	2013	1.55	5.88	0	82.47	22	70
DECSI	2014	3	0.82	0	414.45	21.5	77
DECSI	2015	14	1.43	0	226	19	74
DECSI	2016	12	1.5	0	91	22	77
DECSI	2017	-1.82	1.18	0.13	60.68	13	130
DECSI	2018	6	1	0.12	72.24	25	128
DECSI	2019	2	10.06	0	56	14	114
DECSI	2020	1	5.49	0.12	110.46	11	99
DECSI	2021	1.9	2.16	0	99.72	24	53
DECSI	2022	2.5	4.5	0	72.4	25	61
DIRE	2011	-6.2	23	14.53	75.62	65	44
DIRE	2012	3	79.8	0.8	68.4	62	97
DIRE	2013	2	6.65	0	87.1	57	78
DIRE	2014	9	11.6	0	71.27	46.6	54
DIRE	2015	8	11.54	0	71.27	41	49
DIRE	2016	9	9.2	0	71.27	47	54
DIRE	2017	10	1.89	0.01	75.63	28	89
DIRE	2018	12	1.54	0.01	75.63	25	95
DIRE	2019	7	4.76	0	106.95	27	106
DIRE	2020	11	15.42	1.05	38.96	29	109
DIRE	2021	42	11.3	0	77	27	93
DIRE	2022	26	2	0	86	31	67
DYNAMIC	2011	3.6	0	0	27.92	46	59
DYNAMIC	2012	0	0	0	44.4	29	38
DYNAMIC	2013	-22	32	1.6	63	35	71
DYNAMIC	2014	-22	7	1	62	10.5	60.8
DYNAMIC	2015	-22	7.58	0	59	32	42
DYNAMIC	2016	-21	5.6	0	64	10	61
DYNAMIC	2017	-2	2.61	3.2	46.62	78	27

DYNAMIC	2018	0	2.74	2.14	46.62	72	34
DYNAMIC	2019	14	4.73	0	34	61	43
DYNAMIC	2020	7	7.04	0.06	103.7	62	46
DYNAMIC	2021	14	4.3	0	89	44	66
DYNAMIC	2022	8	2	0	95	29	35
HARAR	2011	0.4	8.72	0	15.39	34	90
HARAR	2012	1.5	17.4	0	65.6	31	53
HARAR	2013	2	6.45	0	96.66	26	40
HARAR	2014	1	5.67	0	84.9	19.5	40.9
HARAR	2015	5	5.87	0	84.9	20	35
HARAR	2016	7	5.67	0	84.9	19	41
HARAR	2017	1	2.92	0.4	84.9	22	70
HARAR	2018	2	1.81	0.25	84.9	16	38
HARAR	2019	0	3.98	0	79.96	11	30
HARAR	2020	0	2.33	0.06	99.86	9	31
HARAR	2021	5	4.3	0	71.5	6	25
HARAR	2022	7	3	0	78	3	27
HARBU	2011	11.6	0.43	0	178.5	52	36
HARBU	2012	12	3.3	0	76.3	33	35
HARBU	2013	1	8.36	0	70.39	31	37
HARBU	2014	9	4.92	0	47.68	34.5	45.3
HARBU	2015	16	4.21	0	47.68	29	41
HARBU	2016	19	4.82	0	87.68	34	45
HARBU	2017	1	2.57	0.15	90.74	22	41
HARBU	2018	3	1.74	0.1	131.47	19	37
HARBU	2019	7	4.08	1.69	49.88	22	35
HARBU	2020	6	3.57	0.12	54.85	24	32
HARBU	2021	30	2.8	0	158	18	28
HARBU	2022	31	2	0	88	14	23
LETTA	2011	19.2	2.09	0	82.5	66	41
LETTA	2012	8.8	7.7	0	12.9	39	38
LETTA	2013	2	3.96	0	45.34	34	42
LETTA	2014	0	5.49	0	44.98	43.6	44.4
LETTA	2015	6	5.89	0	44.98	42	39
LETTA	2016	8	5.24	0	44.98	44	44
LETTA	2017	10	9.74	2.45	52.42	31	32
LETTA	2018	-39	9.07	5.31	62.03	22	46
LETTA	2019	-31	4.29	0	150.59	15	14
LETTA	2020	-31	16.41	0.09	162.02	10	63

LETTA	2021	-3	0.1	0.2	97	46	73
LETTA	2022	-3	0.1	0.2	97	46	73
MEKLIT	2011	6.5	21.33	7.72	34.6	28	32
MEKLIT	2012	9.5	10.2	5.9	26.7	34	29
MEKLIT	2013	10	7.39	0	29.72	34	27
MEKLIT	2014	9	5.95	0	57.3	39.8	28.3
MEKLIT	2015	9	6.1	0	57.3	39	21
MEKLIT	2016	9	5.95	0	57.3	40	28
MEKLIT	2017	8	3.43	0.15	30.89	42	33
MEKLIT	2018	27	2.83	0.13	23.72	42	38
MEKLIT	2019	7	2.31	0	41	41	41
MEKLIT	2020	7	22.99	0.06	59	39	35
MEKLIT	2021	18	7.5	0	21.6	35	32
MEKLIT	2022	28	4	1	74	26	27
METEMAMEN	2011	0.5	12.83	7.01	17.73	80	24
METEMAMEN	2012	0.6	4.6	0	39.4	61	18
METEMAMEN	2013	7	3	0	43	56	25
METEMAMEN	2014	6	2.58	0	41.37	65	53.9
METEMAMEN	2015	6	2.58	0	41.08	52	32
METEMAMEN	2016	6	2.1	0	73.12	54	37
METEMAMEN	2017	17	1.01	0.08	65.85	50	56
METEMAMEN	2018	19	0.82	0.12	131.49	48	56
METEMAMEN	2019	7	2.85	0.15	96	33	48
METEMAMEN	2020	7	4.52	0.06	67	33	38
METEMAMEN	2021	22	2.8	0.5	131	25	25
METEMAMEN	2022	35	3	0	136	24	30
OCSSCO	2011	5.4	3.52	0	52.91	26	51
OCSSCO	2012	6.5	3.2	0	21.3	29	58
OCSSCO	2013	4	2.77	0	70.86	24	56
OCSSCO	2014	4	3.49	0	60.98	19.6	60.6
OCSSCO	2015	8	3.2	0	69.84	28	54
OCSSCO	2016	6	3.2	0	73.12	27	61
OCSSCO	2017	18	2.05	0.08	65.85	22	59
OCSSCO	2018	17	1.56	0.06	65.85	20	54
OCSSCO	2019	4	2.54	0.12	168.9	18	41
OCSSCO	2020	3	14.91	0	92.12	20	42
OCSSCO	2021	7	9.1	0	79	48	44
OCSSCO	2022	7	9.1	0	79	48	44
OMO	2011	1.4	15.16	0	81.04	24	45

OMO	2012	2.6	9.4	0	81.3	18	53
OMO	2013	3	1.73	0	87	16	58
OMO	2014	2	0.9	0	330.7	14.6	57
OMO	2015	4	6.24	0	248	12	49
OMO	2016	2	2.1	0	73.12	18	57
OMO	2017	2	3.82	0.09	60.09	8	71
OMO	2018	2	2.55	0.06	60.09	11	64
OMO	2019	2	2.55	0.06	60.09	11	64
OMO	2020	2	6.66	0	60.61	15	81
OMO	2021	9	7.7	0	76.9	18	210
OMO	2022	18	5	0	97	18	100
PEACE	2011	9.3	0.34	0.55	81.75	44	29
PEACE	2012	6.5	0.1	0	71.3	45	29
PEACE	2013	4	0.14	0	84.8	44	33
PEACE	2014	5	0.13	0	326.93	43.6	33.9
PEACE	2015	6	0.11	0	326.93	38	28
PEACE	2016	5	0.13	0	226.3	45	34
PEACE	2017	24	0.09	0	326.93	43	42
PEACE	2018	17	0.07	0	326.93	33	44
PEACE	2019	6	0.04	0.06	484.02	32	42
PEACE	2020	4	6.27	0.1	187	74	40
PEACE	2021	8	2.8	0.4	165	23	35
PEACE	2022	16	3	0	169	20	32
SFPI	2011	6.8	5.99	0	-2.59	46	43
SFPI	2012	7.6	2.7	0	85.8	43	37
SFPI	2013	8	1.93	1.32	99.4	36	28
SFPI	2014	8	1.06	0	167.54	38.5	28.4
SFPI	2015	17	1.06	0	145	32	24
SFPI	2016	18	1.02	0	169	37	28
SFPI	2017	33	0.76	0	167.54	34	42
SFPI	2018	4	0.62	0	167.54	32	42
SFPI	2019	3	1.51	0	132.94	19	39
SFPI	2020	5	5.91	0	189	21	36
SFPI	2021	24	3.1	0	143	20	34
SFPI	2022	7.6	2.7	0	85.8	43	37
SIDAMA	2011	1.9	4.09	0	100	28	48
SIDAMA	2012	4	4.1	0	100	26	52
SIDAMA	2013	3	12.15	0	52	20	43
SIDAMA	2014	5	9.85	2.37	56.94	33.1	43

SIDAMA	2015	6	1.03	0.21	56.45	27	37
SIDAMA	2016	5	0.92	0.21	58	30	43
SIDAMA	2017	7	4.71	1.39	81.15	33	56
SIDAMA	2018	7	3.56	1.05	81.15	35	50
SIDAMA	2019	4	6.76	1.06	37.91	39	52
SIDAMA	2020	5	21.91	0.1	35	42	48
SIDAMA	2021	21	27	0	68	40	33
SIDAMA	2022	23	8	0	98	40	33
VISION FUND	2011	-2.6	2.11	1.52	41.06	48	16
VISION FUND	2012	1.3	1.4	0	64	48	31
VISION FUND	2013	6	1.78	0.29	67.2	48	34
VISION FUND	2014	4	6.58	0.23	67.21	52.1	47.7
VISION FUND	2015	3	5.24	0.23	69.1	49	42
VISION FUND	2016	4	6.58	0.23	71	51	48
VISION FUND	2017	25	2.75	0.1	72.54	51	47
VISION FUND	2018	22	1.69	0.06	72.54	37	43
VISION FUND	2019	7	3.48	0.1	75.1	36	47
VISION FUND	2020	6	3.95	0.01	76	34	42
VISION FUND	2021	28	3.1	0	79	32	40
VISION FUND	2022	27	3	0	91	28	40
WASASA	2011	6.4	2.25	0.9	92.01	35	28
WASASA	2012	7.5	1.3	0.3	104.9	32	25
WASASA	2013	6	0.52	0.11	89.9	32	36
WASASA	2014	5	0.71	0.16	78.55	29.7	32
WASASA	2015	13	0.83	0.14	94	28	21
WASASA	2016	15	0.73	0.14	98	32	32
WASASA	2017	21	0.46	0.1	94.97	27	41
WASASA	2018	15	0.45	0.1	94.97	29	49
WASASA	2019	2	5.88	0	99.97	27	43
WASASA	2020	1	5.71	1.05	95	26	43
WASASA	2021	11	2	0.5	94	26	47
WASASA	2022	9	2	0.3	89	19	44