

**EFFECT OF OPERATING LEVERAGE ON THE RELATIONSHIP BETWEEN
LIQUIDITY MANAGEMENT, CREDIT RISK AND LOAN REPAYMENT AMONG
MICROFINANCE BANKS, KENYA**

BY

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DECLARATION AND APPROVAL

Student's Declaration

I certify that this thesis is my original work and has not been presented in any University for examination. The work herein has been carried out by myself and all the sources of information have been acknowledged by way of references

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DEDICATION

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ABSTRACT

Globally, reports indicate that of the loans disbursed in the United States of America, 45% of borrowers default on repayment, 60% of whom eventually end up as non-performing. In India, loan repayment rates experienced rise in default by over 50% between 2017 and 2020. In Ghana, adverse loan repayment was recorded at USD 0.97B in 2015 which grew to USD1.84B by 2018. Uganda recorded about USD.1.215 billion worth of non-performing loans in its MFI sector in 2018, from USD 324 million in 2017. The Kenyan scene recorded steep rise in default from about Kshs.100M in 2015 to over Kshs. 2.7B in 2022. Leverage remains an alternative source of funding available to microfinance banks (MFBs) to plug financial deficiency brought by default-triggered liquidity shortfalls for their operational sustainability. MFBs serve low-end borrowers, prone to fall in default of honouring their loan repayment obligations. The reported adverse loan repayment trend among MFBs reflects a trajectory calling for urgent invention measures. Previous studies on loan repayment have focused on conventional banking institutions, whose operational lending dynamics are significantly distinct from those of MFB. Existing literature is focused towards investigating study parameters associated to profitability, yet its analysis is preceded by loan repayment. Operating leverage (MLG) was a plausible robust moderator since literature demonstrates it influencing the transactional environment of study parameters. Main study objective was to establish effect of operating leverage on the relationship between liquidity management, credit risk and loan repayment among MFBs in Kenya. Specifically, it sought to; analyze relationship between liquidity management (MLDM) and loan repayment (LRP); assess relationship between credit risk management (MCRK) and LRP; determine relationship between MLG and LRP; assess moderating effect of MLG on relationship between MLDM and LRP; and, investigate moderating effect of MLG on relationship between MCRK and LRP among MFBs in Kenya. The anticipated income, credit risk, liquidity preference and moral hazard theories underpinned study objectives. Secondary balanced panel data sourced from audited annual reports of 12 regulated MFBs in Kenya was used. The study covered an eight-year period from 2015 to 2022, yielding 96 data points. Moderated multiple regression was applied to realize the study objectives. Regression results showed; a unit change in liquidity management results in 2.01% significant change in loan repayment ($\beta=0.020110$, $p=0.0085$) with adjusted $R^2=79.7024\%$; credit risk management yields a negative and significant change in loan repayment ($\beta=-0.009874$, $p=0.0260$); operating leverage to loan repayment is positive and insignificant ($\beta=-0.004192$, $p=0.9100$) with adjusted R^2 of 78.5133%; product term of MLDM and MLG yields an inverse significant relationship ($\beta=-0.099417$, $p=0.0109$) with adjusted R^2 of 79.8886% posting an overall computed effect size change in R^2 of 1.36%, calculated to 3.481%. Results indicate MLG fully moderates the relationship between liquidity management and LRP. In conclusion, the interaction term of MLDM and MLG alters the direction of primary relationship between MLDM and LRP. The study recommends MFBs to cautiously use debt capital in their financing options. The regulations for MFBs should streamline their proclamation on acceptable liquidity controls to foster sustainability. Further studies should investigate why credit risk management posts conflicting results when implemented to overcome default.

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LIST OF ABBREVIATIONS

CAMEL	-	Capital Adequacy, Assets Quality, Management Efficiency, Earnings Management, Liquidity Management
CBK	-	Central Bank of Kenya
CLRM	-	Classical Linear Regression Method
LLC	-	Levin, Lin, Chu common root test
LRP	-	Loan repayment
MCRK	-	Mean of Credit Risk Management
ME	-	Management efficiency
MENA	-	Middle East-North Africa
MFB	-	Microfinance Bank
MFI	-	Microfinance institution
MLDM	-	Mean of Liquidity Management
MLG	-	Mean of Operating leverage
MUSERC	-	Maseno University Scientific and Ethics Review Committee
NACOSTI	-	National Committee of Science and Technological Innovations
NPL	-	Non-performing loan
SACCO	-	Savings and Credit Cooperative Societies
SME	-	Small and Micro Enterprises
USD	-	United States of America Dollar

OPERATIONAL DEFINITION OF TERMS

- Borrowings** - Refers to resources taken by microfinance institutions from their corporate lenders, repayable at a premium, with the motive to offset existing cash flow deficiency. It is used as a synonym for corporate loans and a parameter used in the measurement of operating leverage
- Collateral** - Security provided by borrowers to be charged by a financial entity before disbursing a loan as a precaution against the likelihood of non-repayment
- Credit risk** - Credit risk as conceptualized in this study refers to credit risk management which stands for the strategic measures employed by lending entities to mitigate against exposure occasioned by the likelihood of non-payment of disbursed loans. It was one of the independent variables of this study
- Default risk management** - It refers to the measures taken by microfinance banks to overcome the likelihood of failure by borrowers to meet their loan repayment obligations. In the context of this study, it is synonymous with credit risk management
- Double-dipping** -The borrowing practice where individuals obtain funds from more than one source so to spread their liability and conceal their high level of indebtedness to other potential lenders
- Microfinance Bank** -Regulated microfinance institutions that are licensed and supervised by the Central Bank of Kenya
- Microfinance institution** - A registered financial institution which offers not only small loans to microenterprises, SMEs, groups and individuals but also provides other financial services like savings and investment advice to its clients
- Liquidity management** - The extent to which a microfinance banks control its cash and bank balances in form of loans and advances to customers. It was one of the independent variables of this study

- Loan repayment** - The extent and regular nature with which loans advanced by the microfinance banks are repaid consistent with the terms of the signed loan agreement. Rate of loan repayment in this study is synonymously referred to as loan repayment performance, default rate and rate of non-performing loans. It is dependent variable of this study
- Loan repayment performance-** It is the process of evaluating and analyzing how loan transactions impact the cashflow position of microfinance banks. It is synonymously referred to as loan performance or loan repayment
- Management efficiency** -The prudent manner with which recurrent expenses of MFBs are monitored to mitigate against high running costs
- Non-performing loan** -A loan held by microfinance banks that is in default and the borrowers are not repaying as per the terms of the repayment. In this study an NPL will be taken as a loan that does not generate interest whose principal amount remains outstanding for at least 90 days.
- Operating leverage** - The short-term borrowings obtained by microfinance banks necessary to realize adequate reserves in order to meet arising financial obligations. It was the moderating variable of this study

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CHAPTER ONE

INTRODUCTION

1.1 Introduction

In this chapter, the background motivating the study variables of liquidity management, credit risk management, operating leverage and their relationship with loan repayment is provided. The research problem, study objectives and corresponding hypotheses besides the scope of the study, its justification and the conceptual framework of the variables are presented.

1.2 Background of Study

Microfinance banks (MFBs) are financial entities designed to bridge the gap brought about by the inconsistencies in the global financial sector, designed to enhance the socio-economic well-being of the unbanked population (Ademola and Adegoke, 2021; Singh and Gupta 2021; Sangwan, Nayak, and Samanta, 2020). MFBs major source of revenue is interest earned from repaid loans (Benjamin, Paul and Haruna, 2017). Since interest is embedded in the repayment instalments alongside the principal component, repayment of disbursed loans therefore becomes core to MFBs as a prerequisite to adequate and sustainable cash flow for progressive lending (Modisagae and Ackermann, 2018; Mohammed, 2019). MFBs serve to stimulate income-generating activities through issuance of affordable loans and are critical drivers of financial inclusion to developing countries (Cecchi, Koster and Lensink 2021).

The microfinancing concept was conceived in the course of financial sector reforms that took place in the 1990s with the objective of offering effective and sustainable deposit mobilization, promoting competition in the financial markets, enhancing provision of financial services through creation of alternative avenues for the unbanked majority to access formal financial services (Kipasha, 2012). Essentially, it is an upgraded version of informal finance structure of

rotational credit groups. Overtime, microfinancing has undergone systemic, structural and operational transformations to offer deposit and credit lending services similar to those of conventional commercial banks. In order to streamline and entrench operational uniformity, majority of developing countries have introduced reforms and controls through legislation, leading to placing those that offer banking services under the supervision of their mainstream financial regulators. Microfinance remains a key growth parameter among developing countries' economic blueprints on poverty reduction (Hermes, Lensink and Meesters, 2011; Postelnicu and Hermes, 2018) and financial inclusion.

Loan portfolio refers to the different categories of financial assets advanced to borrowers by a financial entity, analyzed together (Maina, Kinyariro and Muturi, 2016). It is regarded the largest and most dominant source of revenue from which MFBs obtain operational cash reserves to fund their operations (Ahmed and Malik, 2015). A loan whose scheduled principal and interest payments has not been realized by the lender for a period of up to 90 days is referred to as a non-performing loan (NPL) (Beck, Jakubik and Piloiu 2015; Boussaada, Hakimi and Karmani, 2020). On the other hand, loans whose instalments continue to be anticipated with payments not delayed past the 90 days' mark are referred to as performing loans (Sangwan, Nayak and Samanta, 2020).

In the United States of America (USA), microfinance entities have progressively introduced use of collateral-lending to address non-repayment. Of the 45% default cases, associated with bank loans, 60% of those in default have been reported to degenerate to non-performing status. Collateral refers to the security provided by loan applicants in form of an asset of value which is then charged to secure the lender's stake in the event of default. It provides relative assurance to financiers to recover defaulted loans either through realizing the charged security by sale (Chakravarty and Pylypiv, 2015; Tadele, 2021) or exerting pressure through threat of loss of valued assets (Maina, Kinyariro and Muturi, 2016). In Singh and Gupta (2021) observed that

the loan repayment is deteriorating with statistics from group borrowers from MFBs indicating a more than 50% rise in default between 2017 and 2020, against disbursement growth of about 21% in the same period. Even though MFBs have been perceived to have contributed to the growth in poor loan repayment rate, by way of reported failure to apply stringent appraisal measures while approving loans to group borrowers, the trend in default spreads to include individual borrowers as well. Default trends in USA, as an influential world economy, are bound to replicate in developing countries such as Kenya.

In India, the spontaneous growth of non-performing loans in a section of that country patronized by many MFIs experienced a sharp rise in default by over 50% between 2017 and 2020, leading to their eventual declaration to bankruptcy (Debnath, 2019). Established MFIs in other parts of the same country have been reported to shun low-end income borrowers given their exposure to loan non-repayment (Sangwan, Nayak, and Samanta, 2020). It has been reported that by opting to concentrate in areas known to be patronized by well-to-do borrowers, Indian MFIs are reported to be biased towards preference for high-end borrowers than the poor who are perceived as risky defaulters.

Ghana has similarly reported a trend of poor loan repayment performance trends, demonstrated by a spike in non-performing loans (NPLs) which has been on the steady rise among MFIs in the recent past (Baidoo, Yusif and Ayesu, 2020). According to the study, NPLs stood at USD1.45B, representing a 19.1% NPL ratio in 2016. This was a 70% spike from USD0.97B NPLs in 2015 at an NPL ratio of 13.1%. In 2017, the ratio enhanced to 21.2%, represented by total NPLs of USD1.81B before adjusting to USD1.84B in 2018. Researchers have recommended the approach of creating awareness by way of financial literacy as a measure to mitigate adverse loan repayment. It is on record that the phenomenon of increased loan default is threatening collapse of affected MFIs in Ghana.

Scholars have weighed in to assess the ideal direction which MFBs ought to adopt in order to sustain meeting their objective as affordable lenders to the unbanked poor majority, while at the same time maintain their going concern status. On this score, there exist divergent propositions in literature with one strand of scholars presenting compelling justification in favour of the need to maintain subsidy-reliant loan products (Esubalew, Hermes and Meesters, 2013). They argue that this is the sure way of ensuring the MFBs stay focused on the primary mission for which MFBs came into being. This category of scholars are the proponents of the “mission drift” debate, a phrase coined to refer to MFBs perceived to be driven by profit-making initiatives, designed to ensure future operational sustainability and not social support targeting financial inclusion of the unbanked majority.

The second strand of scholars are those presenting arguments in favour of the need to have MFBs operate as profitable financial entities (Abebe, 2019). They argue that, like any other financial enterprise, MFBs have the responsibility of ensuring they operate at a profit so to cover for the expenses incurred in the course of discharging the “mission” for which they were structured to achieve. Proponents of this school of thought emphasize that offering cheap loans does not justify failure to collect loan repayments at a premium that is market responsive (Chaudhury, Alam and Dooty, 2022). They justify the need for “market drift” by maintaining that subsidies can no longer be relied upon as a sustainable source of raising adequate capital to fund MFBs’ operations. They contend that with rising competition from conventional banks and other forms of digital lending, MFBs must price their loan products to match existing market dynamics so as to recoup invested capital (Cull, Demirguc- Kunt and Morduch, 2007) and remain functionally sustainable. This study identified with this perspective of the MFBs’ funding debate.

The Kenyan MFBs were placed under the regulation of the Central Bank of Kenya. As a requirement, regulated MFBs file audited financial statements with the regulator who, in the

exercise of their mandate, supervise their operations and release annual supervision reports of the trends in the sector. Consistently, it has been indicated in the supervision reports that the principal revenue-generating activity of MFBS' is lending while the prime source of funds are recovered loan repayments alongside customer deposits and borrowings (CBK, 2017; CBK, 2018; CBK, 2019; CBK, 2020; CBK, 2021; CBK, 2022). The analysis of the accounts receivables, deposits and loans disbursed between 2017 and 2022 is as indicated in Table 1.1.

Table 1.1: Analysis of Trends in Kenyan Microfinance Banks

Particulars	2015 Kshs Billions	2016 Kshs Billions	2017 Kshs Billions	2018 Kshs Billions	2019 Kshs Billions	2020 Kshs Billions	2021 Kshs Billions	2022 Kshs Billions
Gross NPLs	4.264	7.371	9.3	9.891	9.817	12.98	13.798	12.502
% Change in NPLs	81.6%	72.9%	26.2%	6.4%	(.75%)	32.2%	6.3%	(10.6%)
Net Loans	45.749	47.047	42.849	44.179	46.6652	44.179	40.115	39.334
Combined Profit/(Loss) Before Tax	.592	(.377)	(0.622)	(1.437)	(.339)	(2.2)	(.387)	(.980)

Source: CBK Supervision Reports

Table 1.1 indicates the trends of the non-performing loans as viewed against the net loans disbursed. From the year 2015 when NPLs were at the highest in the study period, at 81.6%, the trend has steadily increased and now standing at over Kshs12.5B despite an apparent reduction in the rate of change between the years. Despite a deliberate move by MFBS to substantially cut down on net loans disbursement, as a measure to contain the growing NPL trend (CBK, 2016; CBK, 2017), has maintained an upward surge. The growth in loss in 2018 was attributed to depressed financial income, predominantly from interest on loans (CBK, 2018) while the decrease in combined loss in 2021 was attributed to loan repayment (CBK, 2021). From Table 1.1, it can be inferred that the sustained growth in NPLs, which has not

been overcome even with deliberate mechanisms to cut on the lending trajectory has a significant implication on the growing problem of continued losses witnessed among the Kenyan MFBs. From Table 1.1, it is safe to conclude that both NPLs and losses in MFBs are tied to adverse loan repayment trends.

In attempting to address the loan repayment performance challenge, past researchers have focused attention on liquidity risk, the threat of exposure to inadequate funds, with proposals for lenders to promote innovative mechanisms such as group lending to overcome illiquidity (Cecchi, Koster and Lensink, 2021). Dahir, Mahat and Ali (2018) attempted to address the risks of loan non-repayment by highlighting the mitigation measures which were recommended for financial institutions to adopt in suppressing the phenomenon. Other studies have attempted to advance the gender perspective by recommending that advancing funds to women borrowers, either in groups or as individuals (D'Espallier, Goedecke, Hudon and Mersland 2017; Djebali and Zaghdoudi, 2020; Chaudhury, Alam and Dooty, 2022) promotes compliance to loan repayment as opposed to their male counterparts. Even though the studies have attempted to address repayment mechanisms geared towards loan repayment, they did not focus their attention towards linking liquidity and default.

Liquidity management refers to an institution's ability to adequately provide liquid resources sufficient enough to meet arising financial obligations (Chikoko, 2013). It is an indicator of an entity's ability to meet its current, arising, expected and future financial obligations (Jothr, Hameed and Mohaisen, 2021). It encompasses the structured and deliberate mechanisms adopted by an entity, designed to control the flow of liquid assets in a manner that makes it practical to sustainably meet arising obligations (Bassey, Tobi, Bassey and Ekwere. 2016; Dzapasi, 2020). This is unlike plain consideration of liquidity risk, which is limited in its scope of addressing loan repayment performance. Therefore, liquidity management was to be tested as a predictor variable to loan repayment performance.

Credit risk management describes the deliberate measures taken to overcome the risk that expected cash flows emanating from loans issued by MFBs may not be forthcoming (Saunders and Cornett, 2011). It is variously referred to in literature as default risk management (Boahene, Dasah and Agyei 2012; Chikalipah, 2018; Tadele, 2021). Credit risk management involves preventive measures of mitigating losses such as conducting loan appraisals, performing know-your-customer tests, sharing of customers' credit information, social network guarantees among other attempts intended at mitigating default likelihood (...). In Kenya, it has been shown that credit risk among financial institutions significantly influence by suppressing loss of liquid assets on account of defaults (Maina, Kinyariro and Muturi, 2016). This finding is consistent with those in Lalon, (2015); Warsame, (2016); Paulino, Mwambia and Kithinji, (2018). Additionally, it has been shown that the risk of default increases with weak collateral committed by borrowers (Paulino *et al*, 2018). This takes place where limited information is available to support valuation reports for collateral with which loans are taken. However, this phenomenon is not common with MFBs given that most of the loans advanced are largely unsecured.

In seeking to address failed loan repayments by borrowers among MFBs, past studies have attributed such losses to laxity among credit staff (Torban, 2020). Other studies observed independent operational attributes with respect to financial performance (Orichom and Omeke, 2020), with yet other scholars narrowing to risk control and analysis (Obamide *et al.*, 2015; Warsame, 2016). Existing studies have attempted to analyze credit risk management as a stand-alone variable with either loan repayment performance or financial performance. However, the state of loan repayment in MFBs, unlike conventional banks whose loans are predominantly secured by collateral, requires a comprehensive outlook such that the inflow of funds is matched with the corresponding cautionary measures necessary to incentivize streamlined lending and recovery. By keeping an eye on compensating measures to protect microfinance

banks (MFBs) from the risk of non-repayment, it is argued in this study that credit risk management measures ought to be blended with attempts to preserve liquidity arising from recovered loans. In the transactional environment where credit risk management and loan repayment operate, there is evidence that the two parameters have no economically meaningful relationship, but it is empirically known that both significantly influence default probability (Imbierowicz and Rauch, 2013). However, the perspective of analysis that would best provide the appropriate framework within which to link default prevention measures and non-performing loans' trends is one that isolates credit risk management and tests its relationship with loan repayment. This is the conceptualization adopted in the framework of this study.

Operational leverage refers to the short-term borrowings undertaken by financial entities to bridge depressed cash reserves so as to sustain uninterrupted financial engagements (Oketch and Musau, 2018). This is a category of the broad concept of leverage which generally entails inclusion of externally acquired financial resources in the running of business enterprises in the short-run. Leverage relates to the extent to which firms use borrowed resources to augment internally generated funds. The other two forms of leverage include financial leverage and combined leverage. Financial leverage is the use of long-term borrowed financial resources to finance the capital requirements of a given entity, normally in excess of one year while combined leverage encompasses the firms' use of a cocktail of short and long-term funding sources.

MFBs have been reported to employ borrowings to plug cash-flow deficiencies. Since reliance on government grants is no longer a reliable destination from which funds can flow into MFBs (Erica and Pande, 2008; Tadele, 2021), there is evidence that focus has shifted to conventional commercial bank lenders to bridge the funding gaps whenever they arise. Even though this move can well be justified as being the next available option to addressing non-repayment of loans in the face of their natural exposure, triggered by their largely uncollateralized loan books

(Sangwan *et al.*, 2020), there is a perspective to borrowings that upsets MFBs cashflow sustainability.

Studies have been conducted to vouch for the importance of leverage (Cull, Dermiguc and Morduch, 2007), with some scholars observing that repayment of loans was affected by shocks on borrowers (Godquin, 2004). The study suggests further that leverage has been shown as a means towards uninterrupted lending. There is evidence that low-leveraged firms are associated with high default rates (Choudhary and Anil, 2023). One of the explanations advanced to explain this development is the inadequate monitoring mechanisms employed to supervise loanees whose loans have overdue repayment accounts. Jote (2018) reports operating leverage as one among determinants of loan repayment. There is empirical evidence disclosing that leverage has either weak but significant relationship with loan repayment performance or positively associated with finance management. It is not disputed, though, that it strongly influences the environment where loan repayment interacts with liquidity management and credit risk management. The reported inconclusive findings isolated operating leverage as a plausible moderator between the primary relationships subsisting between the latter variables, liquidity management and credit risk amangement and loan repayment performance. Moderation was vital in this study as it sought to establish robust findings in the interaction amongst primary relationships of the study variables of liquidity management, credit risk and loan repayment.

The subject of loan repayment has been extensively covered in literature from the perspective of gender (Jote, 2018; Sangwan, Nayak and Samanta 2020;), target market orientation, purpose of loan (Adusei and Appiah 2011) and repayment history (Postelnicu and Hermes, 2018). The closest of studies conducted to assess loan repayment performance was focused on securitized loans issued by conventional banks (Sile, Olweny and Sakwa, 2019). Hitherto, there is no known empirical study that has tested the moderation effect of operating leverage on the

relationship between liquidity management, credit risk and loan repayment among microfinance banks in Kenya.

1.2 Problem Statement

Loan repayment among microfinance banks (MFBs) remains a problem, as every indication points to the likelihood that the reported losses among Kenyan regulated firms are associated to non-performing loans' (NPLs) trends. From 2015, just about four of the twelve regulated MFBs have been posting profits, with the NPL profile growing from about Kshs.4.264B in 2015 to a colossal Kshs. 12.502B in 2022. Previous studies have focused on liquidity and credit risk management but from the perspective of their influence on financial performance and firm profitability separately, not loan repayment. Since majority of empirical work was modelled around conventional commercial banks, addressing liquidity without extending to encompass the parameter of its management eliminates the perspective of the conscious and deliberate strategies taken to sustainably preserve funds so as to meet their arising obligations. Connected to the funds preservation initiative is the missing link in literature that addresses loan repayment from the angle of MFBs' concerted strategies to protect themselves from the risk of potential losses due to default. It is hypothesized that the sustained losses trend reported among MFBs in Kenya between 2015 and 2022 are associated to adverse loan repayment outcomes. Loan repayment is a firm performance indicator. Firm performance is measured by profitability, among other attributes. Besides, loan repayment is associated with the liquidity of financial entities to the extent that it is one among the source contributors. Profitability and firm liquidity are primary parameters which influence financial performance. Therefore, analyzing loan repayment provides the foundational framework on which an institution's financial health can be appropriately measured. As anchors to the financial inclusion agenda of developing countries, MFBs attract immense attention to the Kenyan government and industry investors since they target to serve the unbanked majority. The reported loss-making trajectory

among MFBs is therefore a threat to investment safety in much the same way as it exposes the beneficiaries' convenient access to sustainable savings and access to cheap credit. Even though attempts have been made in literature to focus on loan repayment performance in the context of liquidity exposure and credit risk control separately, the twin interplay of managing liquidity assets and default control against repayment of loans has not been assessed. Further, operating leverage has been reported as a fall-back option by MFBs to plug liquidity shortfalls. However, its influence on loan repayment within the operating environment of the interplay between liquidity management and credit risk management as parameters that respectively facilitate prudence in funds-flow and controls against potential risk of loss due to loan default remain unknown. Therefore, this study sought to fill this knowledge gap by investigating the moderation effect of operating leverage on the relationship between liquidity management, credit risk and loan repayment among MFBs in Kenya.

1.3 Objectives of the Study

The main objective of this study was to assess the effect of operating leverage on the relationship between liquidity management, credit risk and loan performance among microfinance banks in Kenya. Specifically, the objectives were:

- i. To analyse the relationship between liquidity management and loan repayment among microfinance banks in Kenya;
- ii. To investigate the relationship between credit risk management and loan repayment among microfinance banks in Kenya;
- iii. To determine the relationship between operating leverage and loan repayment among microfinance banks in Kenya;

- iv. To assess the moderating effect of operating leverage on the relationship between liquidity management and loan repayment among microfinance banks in Kenya;
- v. To investigate the moderating effect of operating leverage on the relationship between credit risk management and loan repayment among microfinance banks in Kenya

1.4 Hypotheses of the Study

H₀₁: There is no statistically significant relationship between liquidity management and loan repayment among microfinance banks in Kenya

H₀₂: There is no statistically significant relationship between credit risk management and loan repayment among microfinance banks in Kenya

H₀₃: There is no statistically significant relationship between operating leverage and loan repayment among microfinance banks in Kenya

H₀₄: Operating leverage has no moderating effect on the relationship between liquidity management and loan repayment among microfinance banks in Kenya

H₀₅: Operating leverage has no moderating effect on the relationship between credit risk on loan repayment among microfinance banks in Kenya.

1.5 Scope of the Study

In this study, scope was analyzed with regard to area, time and subject. In respect of area, the study was conducted in the Republic of Kenya, targeting the twelve regulated microfinance banks in the country. The time period covered January 2015 up to December 2022. The choice of 2015 as the base year was informed by the period when the adverse loan repayment trajectory began manifesting among regulated MFBs. On subject scope, the study was limited to the broad field of finance and the subfields of micro-lending, liquidity management, credit risk

management and operating leverage. According to Kharti (2014), micro-lending refers to the provision of financial resources through extension of affordable loans to the largely unbanked poor in the society. Operating leverage relates to the acquisition of borrowings to augment cash flow deficiencies so as to promote an entity's capacity to meet arising financial obligations. Credit risk management is a sub-set of financial risk management which focuses on measures undertaken to mitigate the potential likelihood of failure by loanees to offset their loan obligations whenever they fall due. Liquidity management is defined as the practice of establishing structures which provide assurance of availability of cash and cash equivalents so to facilitate adequate and sustainable firm operations.

1.6 Justification of the Study

Before this empirical investigation, existing research work undertaken on lending financial institutions focuses their attention on financial performance and profitability. The dominant empirical evidence involving the study variables, namely; liquidity management, credit risk management, operating leverage and loan repayment have not been analyzed with a view to addressing the critical role which internally generated liquid assets play to the sustainability of firm operations. This study is key as it contributed immensely to practice and empirical evidence in finance in the following areas. Firstly, the theoretical concept of liquidity management was analyzed against loan repayment. This is a significant departure from existing work where the broader liquidity risk concept that majority of past studies have extensively investigated was chiefly associated with profitability. Secondly, theoretical postulations on credit risk were expanded by this study in its conceptualization so as to relegate the debate to the practical aspect of credit risk management, in an environment that has no collateral safeguards to recovery. No known study had explored these constructs in this unique perspective. Thirdly, by exposing loan repayment to the product term of liquidity management and operating leverage as a moderator, the findings of this study were robust and gave practical

insights to managerial interventions designed to secure MFBs from adverse external borrowing. Unlike in previous studies, this thesis has put up a strong case for exploiting collection of internal funds which is cheap and less risky, as an alternative before considering borrowings. Fourthly, the moderation test of operating leverage on liquidity management provided a broader scope of analyzing loan repayment for which no known study has attempted to exploit. Fifthly, the findings provide a comprehensive outlook of both extremes of loan repayment outcomes which then provides a balanced platform against which corrective measures can be initiated for sound practical sustainable interventions among MFBs.

1.7 Conceptual Framework

A conceptual framework depicts a pictorial outline displaying the interaction amongst study constructs from the perspective of the researcher (Borg, 2005).

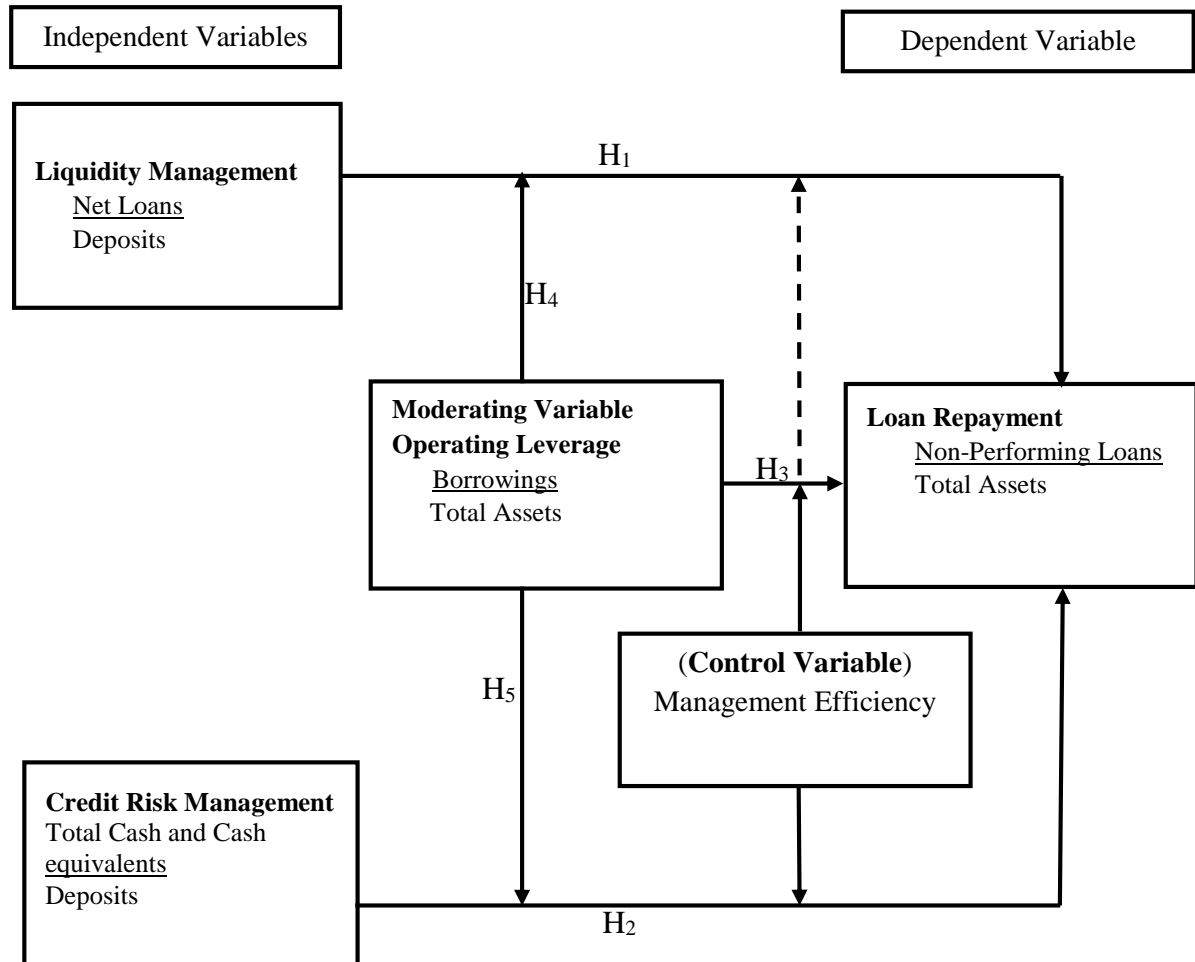


Figure 1.1: Effect of operating leverage on the relationship between liquidity management, credit risk and loan repayment

Source: Adapted from Gatimu *et al.*,(2018)

The study adapted the conceptual framework in Gatimu, Muturi and Oluoch (2018) which was designed to study how NPL management practices interacted with recovery of loans among deposit taking SACCOs in Kenya. In Gatimu *et al.*,(2018), the explanatory variables were practices of loan recovery agencies, restructuring, credit monitoring and guaranteeing policy while the response variable was performance of loans from Saccos. The independent and dependent variables were moderated by Sacco size. Gatimu *et al.*,(2018) is relevant in conceptualizing the intended study since it tested loan features which are qualitative parameters

against NPLs which were measured quantitatively. The modification of the framework in Gatimu *et al.*, (2018), lies in the change of independent variables to quantifiable constructs. Besides, this study has altered the manner in which the moderating variable, operating leverage, separately interacts with the respective relationships of the independent variables, liquidity management and credit risk management and the dependent variable, loan repayment. In addition, management efficiency has been introduced in this study as a control variable of the independent variables, which was not considered in Gatimu *et al.*, (2018).

When the non-performing loans to total assets ratio is high, it is an indicator of lower credit quality, meaning an upsurge in non-repayment of existing loans and hence poor loan repayment performance (Umar and Sun, 2016). The contrary position is desirable as it depicts high credit quality, signifying improved loan repayment levels and effectively sustainable flow of internally generated funds within MFBs.

CHAPTER TWO

LITERATURE REVIEW

The theoretical and empirical literature relating to the prime study variables are analyzed in this chapter. More precisely, reviewed past studies examine the existing theoretical and empirical evidence on liquidity management, credit risk management, management efficiency and loan repayment with the view to delineate related studies and crystallize missing knowledge.

2.1 Theoretical Literature Review

A theory refers to a set of an interrelated thought lines framed into hypotheses or prepositions depicting the relationship between the variables (Creswell and Plano, 2011) adequate enough to aid in predicting the phenomena as it occurs in the world. They provide an outline explaining the general relationships as espoused by the researcher in seeking relate the study variables, data analysis framework and justification for the research design to be adopted for the study(Kombo and Tromp, 2009). The choice of a theory is informed by the manner in which it would aptly fit in explaining the behaviour of phenomena under study, while simultaneously linking the current to past findings. The theories grounding the study objectives are discussed below;

2.1.1 Anticipated Income Theory

This theory was propounded by Prochanow (1944). It states that irrespective of the borrower's business, a financial entity programmes the liquidation of disbursed funds by factoring the income as projected from the viewpoint of the borrower's income. It provides a platform for banking entities to regard long term loans as avenues for raising the much-needed liquidity for purposes of onward lending (Elsharif, 2016). Term loan in this regard includes the period

exceeding one year but less than five years. The theory presupposes that by the time of disbursing the loan, a financial entity such as an MFB, factors the anticipated earnings of the loanee besides the provided security.

This theory posits that the management of financial institutions regard loan repayment as a prime source of liquidity (Alshatti, 2015). It seeks to connect three key components; reliance on loan repayment as a source of liquidity for financial entities, the regular nature with which repayment instalments are honoured, and, the sources from which borrowers obtain financial resources used to offset their loan obligations (Aghanifor, 2016). With respect to conventional banks, this theory introduces the broad perspective with which a lending entity projects loan repayments from the income generated from the financial activities of the borrower. It places the firm in a position to organize its cashflow projections such that the capacity of loan repayment by the borrowers is premised on their estimated anticipated income and that security, if any, serves to cover for the worst case of default.

The foundational argument by Prochanow (1944) while deriving the theory held that the incoming funds to a financial institution is primarily pegged on the borrowers' earnings. This limb of the theory suggests that loan repayment is conditional to whether or not the loanee will realize their expected earnings from invested funds derived from the funds so advanced. This perspective subjects banking institutions' liquidity position to circumstances beyond their control, with the only remedial recourse being resorting to borrowings. Past theoretical arguments on anticipated income theory have been focused on the connection linking bank earnings with borrowers' revenue projections, leading to the justification of preventive mechanisms such as the famous aggressive lender-initiated loan appraisal programmes. This involves establishing the loanees' repayment discipline in past borrowings, through scrutinizing past banking data and ascertaining earnings forecasted from funds to be disbursed.

Attempts by past studies of this theory have been grounded in the presumption of the fallback alternative available to conventional commercial banks to plug cashflow deficits through overnight lending or support from the Central Bank to cushion them from illiquidity. To the extent of reliance on liquid assets necessary to keep financial institutions afloat, sound liquidity management facilitates a sustained flow of funds required for lending to qualified loan applicants. Additionally, when collection of loaned funds is pegged on the earnings of borrowers from their respective investments, it is theoretically hypothesized in this study that measures will be engaged by lending institutions to closely and regularly monitor the performance of such businesses.

The priori assumption of this study with regard to this theory was that all revenue accruing from investments associated with funds obtained as loans from microfinance banks will be prioritized to offset outstanding loan obligations. The appropriateness of this theory in anchoring liquidity management and repayment of loans is drawn from the practical viewpoint with which it reflects on the deliberate decision by borrowers to offset loan repayments upon receiving from their investment destinations. It provides a sound platform to orient the theoretical arguments justifying the interconnection subsisting between liquidity management at institutional level and its relationship with loan repayment.

On the other hand, one of the assumptions of the anticipated income theory is that borrowers will be dedicated to align the use of loans with the purposes for which funds were borrowed. Past studies have used this theory to explain the adverse possibilities where funds borrowed are, to begin with, not repaid at all. This could be due to dishonesty either on account of premeditated default or because borrowers divert loans to other undisclosed ventures. Secondly, past literature attributes missed loan recovery in the context of anticipated income to partial performance of investments made with borrowed funds, but which eventually fail due to incompetence or changed business climate. In both of these perspectives, justification has

been advanced for lending firms to consider use of borrowings to supplement their future liquidity needs as a way to overcome the undesired lending outcomes.

To justify external borrowings, scholars have advanced arguments for the need to outsource credit so to supplement arising deficit on account failed loan collections. These researchers argue that lenders ought to maintain stop-gap mechanisms to plug funding deficiencies so as to cover for opportunity costs associated with loss of trust by borrowers. This perspective though, limits its scope of focus to the convenience that borrowed funds avail to financial institutions. Scholars that have interrogated the anticipated income theory have hitherto not theoretically accounted for the likelihood that when financial institutions engage the use borrowed funds in loaning out to their members, they create a second layer of potential default. This study theoretically argues that when lending financial institutions fail to recover short-term borrowed funds utilized to lend to its customers, they join the cycle of adverse lender-borrower outcomes. The series of this escalated relationship can well be distilled from the perspective of the anticipated income theory.

This study sought to improve the debate of this theory by hypothesizing that the primary relationship between liquidity management and loan repayment can be externally moderated by operating leverage. Enhancing the direction of the relationship between liquidity management and loan repayment would imply that borrowings yield to high repayment of loans. Theoretically, this is the desirable position which would embolden the justification of onboarding short-term debts to supplement lending firms' liquidity position. Contrary findings would theoretically dispel the urge to influence arguments in favour of short-term borrowings. In this regard therefore, this theory was as well used to support theoretical arguments supporting employment of operating leverage to moderate the interaction between liquidity management and loan repayment. Therefore, this theory anchored the first and fourth objectives of this study.

2.1.2 Credit Risk Theory

Credit risk is the exposure to loss brought about by the likelihood of non-repayment occasioned by the depressed financial integrity of a counter-party (Liu, Mirzaei & Vandoros, 2014). Default risk precedes credit risk. The risk accruing to the lender includes loss of principal and interest. Propounded by Robert Melton in 1974, the theory proposes a model designed to help assess the a firm's exposure by hypothesizing its equity as a call option on existing assets. This model is sometimes referred to as "structural model". It has been demonstrated that this option-theoretic framework can be characterized for any type of borrower and used as the basis for default modelling.

This theory has been extensively applied in the conventional banking industry to justify the measures taken to protect loopholes in credit issuance processes so as to protect lenders from run-away cases of delinquency and non-performing loans. Borrowers are believed to hold more information which is critical to be brought to the knowledge of lenders to facilitate flowless understanding before loan issuance. However, failure to craft approaches to extract these details from borrowers works to the detriment of lenders and exposes them to direct losses in form of NPLs. Unlike conventional commercial banks who have nation-wide customer bases and more elaborate technological and human capacity, MFBs face the challenge to mount fool-proof interventions while evaluating the performance of their borrowers. Past studies have used this theory to interrogate the usefulness of historical loan appraisal measures such as peer to peer controls in advocating for group lending. Others have interpreted the influence of MFBs in the financial lending space, arguing that they provide a platform of inbuilt checks and balances which makes their processes borrower-driven and therefore less risky to MFBs.

This study adopted this theory to advance the argument that the duty of care to protect MFBs from adverse exposure of loan repayment remains their outstanding responsibility. This theory laid the appropriate framework to analyze the efforts taken to ring-fence MFBs from interacting

with borrowers whose credit history is tainted and the influence of short-term loans taken to fill the gap occasioned by defaults. Therefore, the credit risk theory anchored the second and fifth objective of this study.

2.1.3 Liquidity Preference Theory

Grounded from the celebrated Keynesian theory, liquidity preference has been used to make a finding that a higher loan to deposit ratio is testament to an active intermediary role played by financial institutions. It has been argued that in modern post-Keynesian economies, financial institutions are not mere intermediaries but creators of deposits through loans (Werner, 2014). The advancement of this theory projects banks as entities with capacity to create the need for borrowers to deposit money in order to qualify for loans but financial institutions do not necessarily need money to disburse loans. It is theoretically argued in the endogenous money theory that money is created out of nothing. Culham (2019) argues that Keynes theory of liquidity preference conceptualized the rate of interest in very natural monetary terms, that is, the price of having money now than later. Of the motives identified by the original theory, that is, transactional, financial, precautionary and speculative, the precautionary motive stands out as the driver for the need to hold money to meet arising obligations. But, do MFBs have the ability to spare liquid resources while simultaneously and satisfactorily meet their short-term loaning obligations?

According to Culham (2019), Keynes theory of liquidity preference was not conclusive in bringing out the meaning of liquidity. He posits that liquidity refers to the price-protection component in money. Most fundamentally, and with respect to the conceptualization of this study, money used for transactional purposes ought to be predictable so as to protect the financial entities against unlikely shocks associated with illiquidity. Disbursement of loans is a core responsibility of a financial institution. It follows therefore that liquid assets in form of

cash or cash equivalents must not only be available for sustainable operations but also as a way of building the confidence of borrowers. This study held the view that borrowers build confidence in institutional stability and based on that score, determine whether or not to be committed and consistent with their arising obligations with a view to maintain cordial relations for current and future financial transactions.

From the framework of the transactional and precautionary nature of maintaining stable liquidity, this theory served to anchor the first and fourth objective. For the first objective, this theory informed the researcher's priori expectation that in keeping with borrowers' anticipation of being promptly served, they remain committed to repaying their loans whenever such obligations fall due and owing. This is in anticipation of maintaining an impeccable credit history which is necessary at the point of loan appraisal for future borrowing. On the financial institutions part, the mechanics of this theory were helpful in justifying the need to keep liquid resources available within the entity not only for loaning but also to provide sound financial stability and assurance of meeting loaning obligations without resorting to external borrowing. The theory therefore, served to anchor the first and fourth objective of this study.

2.1.4 Moral Hazard Theory

This theory was propounded by Merton, (1974). It views borrowers as withholding critical information upon getting advanced financial resources out of the inspiration that no much loss is directly shouldered by them. This theory has been used in the insurance industry to depict the reckless behaviour with which insured parties sacrifice caution when facing danger by failing to take mitigation measures to limit or avoid risk to loss.

Past studies have exhaustively applied the moral hazard theory in different perspectives (Kumar, and Sensarma, 2017; Masanyiwa, Chusi and Haji,2022; Sangwan, Nayak and Samanta, 2020). In the context of the conceptualization of this study, there are scholars who

applied the moral hazard theory in explaining the wanton behaviour by borrowers who relegate the duty of care once issued with loans that have collateral to secure lenders interest. Studies have examined the moral hazard phenomenon to explain how group members ride on the joint-liability associated with group-lending by cascading their obligations to group members (Sangwan, Nayak and Samanta, 2020). This theory has been employed while investigating the loan default but from the borrowers' perspective. It was reported that joint account holders were associated with recurrent default as the responsibility of repayment kept shifting from party to the other, leaving no one directly taking responsibility. This perspective did not factor financial institutions as borrowers in circumstances of plugging liquidity shortfalls.

Brehanu and Fufa (2008) used moral hazard theory while undertaking a study to interrogate the causes of delayed remittances to MFBs. It was reported low cases of moral hazard were witnessed among low value borrowers than high value loanees. The study did not extend to cover the extent to which the theory would apply to third party lenders, such as commercial banks, when they give loans to MFBs for onward lending to other borrowers.

There are studies that have attempted to interrogate operating leverage and loan repayment from the lenses of the moral hazard theory but used qualitative constructs from respondents that were conveniently sampled (Nzogang, Wampa and Nimpa, 2014). This study used the moral hazard theory to explain the loan repayment phenomenon in the context of the liquidity management initiatives by MFBs as engaged alongside the credit risk management interventions designed to safeguard their fund reserves.

Theoretical arguments anchored on borrowers' relegation of repayment responsibility have concentrated on the circumstances around the loanees' behavioural attributes and the effects such actions extend to affect MFBs. However, it is safe to conclude that whenever MFBs borrow to lend, they join in the moral hazard debate but at a secondary level. This study

theoretically predicted that repayment behaviour of borrowers incorporates implications on how MFBs subsequently fulfil their twin obligation of honouring their loan commitments while sustaining disbursements to successive loan applicants. Balancing the two liquidity-reliant responsibilities presents moral hazard implications on the part of the MFBs. The situation may be exacerbated by the likelihood of inadequate internally generated liquidity to sustain MFB operations independent of reliance on borrowings. This study contributed to theory by interrogating the adverse effects of loan repayment from this theoretical standpoint. This theory underpinned the third and fourth objectives.

2.1.5 Liquidity Management

Liquidity management refers to the structured oversight with which funds flow within a financial entity are organized and cautiously monitored to ensure arising obligations are sustainably met (Adusei, 2021). Managing liquidity is central in ensuring financial health of an entity (Jean-Loup, 2017). Abdul-Rahman, Sulaiman and Said (2017) posit that the managing liquidity is the ultimate barometer of a financial entity's capacity to sustainably meet its obligations. Prudent management of liquid assets, restores institutional credibility, builds borrowers' confidence and aligns financial priorities of MFBs sustainably in a focused and predictable fashion (Bassey, Tobi, Bassey and Ekwere, 2016; Sathyamoorthi, Mapharing and Dzimiri, 2020).

Liquidity management incorporates initiatives and mechanisms designed to deliberately align MFBs institutional funding needs with projected revenue. This thesis adopted the theoretical standpoint that liquidity management precedes and forestalls liquidity risk. Whereas theoretical postulations in past studies link liquidity risk as directly correlating with institutional returns and profitability, this study adopted the priori assumption that liquidity management introduces the prudence with which liquid assets are controlled and monitored to overcome the likelihood

of loss occurrence. As a preventive mechanism therefore, it is the postulation of this thesis that liquidity management precedes liquidity risk and seeks to prevent the chances of loss by promoting prudent monitoring of internally generated liquid assets. Consistent with past theoretical postulations, this study presupposed that liquidity management is positively correlated to loan repayment. This is because increase in prudent management of funds stimulates corresponding mechanisms to strengthen the collection framework of borrowed funds. This then triggers the creation of a pool of funds from which enhanced lending can be made from internally generated resources without the need for borrowing externally or the risk of failure to meet arising obligations as and whenever they fall due and owing.

This study adapted its variables from the banking model which focuses of capital adequacy, asset quality, management efficiency and liquidity (CAMEL) (Abebe, 2019). It is a supervisory tool used to assess the financial soundness of financial institutions. Liquidity management, the last component of the CAMEL model was conceived by this study as the prime determining factor for the sound operation of MFBs. In determining of cash flow sustainability by financial institutions, past studies have used liquidity management ratios of cash ratio, that is, the ratio obtained by dividing the sum of all liquid forms of cash and close attributes thereof, divided by the sum of current liabilities (Bassey *et al.*, 2016; Mishra and Pradhan, 2019; Tahu and Susilo, 2017).

Studies that have attempted to focus on liquidity management were much focused on liquidity risk and its influence on financial performance (Kharti, 2014; Musiega, 2018; Adusei, 2021). The theoretical application of liquidity, liquidity risk and liquidity management are distinct in application, literature and practice. This study measured liquidity management using financial ratios and tested its relationship with loan repayment, before exploring to assess the influence of operating leverage on the primary relationship of liquidity management and loan repayment among MFBs.

2.1.6 Credit Risk Management

Credit risk management refers to mechanisms designed to overcome the risk that funds loaned out shall not be repaid within the specified time period. This is regarded as the likelihood of loss of money on account of potential default on due and payable loans (Ahmed and Malik, 2015). Credit risk management is a measure necessitated by the reality that loanees fall in default and remain in such breach of their repayment obligations over a period of time. There is an inherent perspective of risk whenever MFBs issue loans. Increase in default rates frustrate the financial objectives of MFBs. Studies on credit risk management identify it as the most profound intervention targeted at arresting the threat to the ability of financial institutions to sustain their operations using internally generated liquid assets. It responds to the adverse changes in the operating environment triggered by financial distress among borrowers (Mishra and Pradhan, 2019).

The priori expectation of this study was that when credit risk management ratio is high and favourable, loan repayment would be low on account of reduced non-performing loans. That is to say, whenever aggressive interventions are put in place to mitigate the likelihood of default, it was expected that borrowers would be under pressure to honour their obligations and consequently result in high loan repayment. Therefore, increase in credit risk management was expected to trigger corresponding increase in loan repayment and vice versa.

Much as efforts are devised to mitigate its effects, credit risk may not entirely be eliminated. Credit risk has different angles of focus. The first is exposure, that is, the extent to which a party so faced with the risk of default stands to suffer adverse consequences (Brown and Moles, 2014). The second is the likelihood or probability that a party with an obligation to honour a specified financial duty fails to do so. Lastly, credit risk can be viewed from the perspective of the amount of money capable of being recovered should a default experience take place. The

focus of this study incorporated the first and second perspectives and narrowed down to investigating the effect of the credit risk mitigation measures employed by MFBs on loan repayment by borrowers. Additionally, the study ventured to test the extent to which borrowings made by MFBs influenced the interaction between loan repayment and the second independent variable, credit risk management.

2.1.7 Operating Leverage

Operating leverage refers to the acquisition of borrowed financial resources for purposes of supporting arising shortfalls in funding obligations of an entity (Abebe, 2019). Financial entities borrow to plug cash deficits so as to overcome shortcomings that come with the inadequate cash resources both for the short and long term. Operating leverage is limited to borrowing short-term to fund working capital deficit while financial leverage involves borrowing for the long term with the motive to finance the capital base of the firm (Bagh, Razzaq, Azad, Liaqat and Khan, 2017). Empirical literature on leverage and various financial parameters presents mixed and inconclusive results. Whereas some researchers report that the relationship between leverage and loan repayment is positive and statistically significant, others disclose that leverage and profitability have a negative and statistically significant relationship (Kiliswa and Bayat, 2014). Better still, some researchers report an inverse and statistically insignificant relationship between leverage and profitability (Uddin, 2022; Harisa *et al.* 2019; Lestari, Tariganb, and Pohanc, 2021). At the same time, Kartikasari and Merianti (2016) together with Shahchera and Valizadeh (2018) reveal that leverage is positively and significantly related with profitability.

Theoretically, it is argued in this study that loan repayment precedes profitability of financial entities. In this regard therefore, it goes without saying that leverage influences the environment where loan repayment as a dependent variable interacts with liquidity management and credit

risk management. Consequently, the reported inconclusive findings effectively isolate leverage as a plausible moderator in the interaction between liquidity management, credit risk management and loan repayment.

2.1.8 Loan Repayment

Loans represents the highest segment of liquid assets owned by lending financial entities (Salifu *et al.*, 2018). In the context of this thesis, loan repayment relates to the extent to which the frequency cycle of disbursed financial assets by MFBs to borrowers are repaid within the scheduled timelines as set out in the borrowing agreements. Defaulting on loans upsets cashflow projections and interfere with the capacity of MFBs to lend to deserving loan applicants (Jote, 2018). The concept of loan repayment encapsulates, *inter alia*, the number of borrowers, rate of recovery for on-time and late-payments by loanees and recovery of arrears (Basel, 2006). According to Bank for International Settlements (2016), NPLs refers to the cumulative principal and interest relating to borrowed money whose repayment schedules are overdue for a period in excess of three calendar months or 90 days. Like other lending entities, MFBs determine to manage their loan portfolio with diligence since it forms the principal financial asset besides embedding enormous risk, if not well monitored (Ahmed and Malik, 2015).

2.2 Empirical Literature Review

This section reviewed past studies conducted as recorded in existing literature regarding the study variables; liquidity management and loan repayment; credit risk and loan repayment and; management efficiency and loan repayment.

The purpose for the review is to compare, contrast, critique, synthesize and draw conclusions using previous studies while comparing with the intended study.

2.2.1 Liquidity Management and Loan Repayment

Beck, Jakubik and PiloIU (2015) initiated a study focused on highlighting empirical determinants of non-performing loan (NPL) ratios with a view to address bank asset quality, which had sharply deteriorated. The dependent variable was measured by the ratio of NPLs to total (gross) loans while loan loss provisions and loss given default were among other variables operationalizing the dependent variable. The study used panel data drawn from different countries. Fixed effect estimations were used in analysis to address time-constant unobserved heterogeneity that was present in the different countries involved in the study. Lending rates were used as a liquidity management mechanism to detect their influence on default. It was reported that lending rates were positively correlated with non-performing loans ($R^2 = 0.434$, $p = 0.018$). The results indicated that decline in the liquidity management mechanisms significantly contributed to increase in NPLs. The study was at a cross country level and not at firm-level, which was undertaken after the global financial crisis between 2008 and 2009.

Khaled (2019) undertook a study which sought to establish whether excess bank liquidity impacts on non-performing loans in Bangladesh. The study used secondary data obtained from financial statements of Bangladeshi's commercial banks as was obtained from the country's Central Bank between 2007 and 2017. Using simple linear regression, the study found out that increase in excess bank liquidity results in reduction of non-performing loans ($\beta = -.435$, $p = 0.000$), suggesting, high liquidity gives rise to sustained scrutiny on loan applications, leading to reduction in non-performing loans. The study attributed the findings to the likelihood that excess liquidity strengthens the loan approval procedures such that loan applicants are subjected to comprehensive pre-disbursement appraisal procedures, leading to low cases of default and hence, reduced cases of non-performing loans.

Sangwan, Nayak and Samanta (2020) sought to establish the repayment behaviour among MFB borrowers in India. The study was undertaken at a period that had reported growing loan non-repayment trends that threatened the sustainability of the MFB sector in India. The study approach was focused on assessing household trends, comparing liquidity control initiatives and non-performing loans. The study based on primary data and concluded that MFBs are sustained by a continuous flow of financial resources generated by the pool of saved funds. The researchers reported that the sustained culture of attracting liquid assets defines the liquidity position of MFBs. It was concluded that weak liquidity control is a major contributor to non-performing loans. The scope of the study did not cover the need to report on tangible perspectives of liquidity control that are measurable quantitatively to overcome the run-away loan non-repayment trend.

Bassey, Tobi, Bassey and Ekwere (2016) undertook a study on liquidity management and the performance of banks in Nigeria. The study was a desk-stop review of journal publications which relied on analysis carried out by the Central Bank of Nigeria. Data analysis was by way of simple regression. Liquidity management was proxied by cash ratio and bank deposits while performance was measured using cash reserve ratio and bank investments. The results showed that there was a weak significant positive relationship between cash ratio and cash reserve requirements ($R^2 = 0.13$, $p = 0.000$), suggesting that even though cash deposits influence reserves, the impact is relatively weak. At the same time, a positive relationship was reported between cash ratio and bank investments ($\beta = 0.74$, $p = 0.000$). Based on the reported findings, the study recommended the need for financial institutions to maintain optimal liquidity levels in order to be favourably positioned to respond to arising financial obligations in an effective and efficient manner. At the same time, the researchers recommended that as a way of addressing the threat of holding idle liquid assets, money market investment should be considered to optimize returns and mitigate against pilferage. The conceptualization of the

dependent variable in the study, performance, was taken in broad and non-specific for appropriate generalization purposes.

In yet another study conducted in Nigeria, Muhammad, Ibrahim and Sulaiman (2020) undertook a study on loan characteristics, loan repayment and performance of small and medium enterprises in Kano Metropolitan. The study was motivated by a sustained loss-making trajectory among microfinance institutions, which was perceived to be on account of non-repayment of loans by borrowers. The study used simple random sampling to collect primary data using structured questionnaires from respondents. Data analysis was achieved using correlation and multiple regression. Loan characteristics were measured by loan size and loan tenure. The findings disclosed that loan size was positively correlated with loan repayment (adjusted $R^2 = 0.676$, $p = 0.000$). Similarly, loan tenure and loan repayment were positively and significantly correlated (adjusted $R^2 = 0.561$, $p = 0.000$). Based on the findings of the study, the researchers recommended that whenever financial institutions consider disbursing loans to borrowers from among small and medium enterprises, they should prioritize their level of income so as to enhance prospects of loan repayment. There was a mismatch in the data collected and study constructs adopted for the study as the analysis would have yielded better findings using quantitative financial ratios.

Chinweoda, Onuora, Ikechukwu, Ikechukwu and Ngozika (2020) investigated how liquidity management interacted with the performance of deposit banks. The study period covered 2011 to 2017, involving 18 banks listed at the Nigerian Stock Exchange. Judgmental sampling technique was used to settle for the 18 banks from a possible 21. The study used *ex post facto* design and proxied liquidity management by financial ratios, including that of liquidity while performance was measured by return on assets and equity. The study reported a positive and significant relationship between liquidity ratio and performance. Regression results between capital adequacy, asset quality and liquidity ratios respectively against ROA revealed a weak

positive but significant relationship between the study variables ($\beta = 0.184$, $p = 0.048$; $\beta = 0.014$, $p = 0.015$; $\beta = 0.590$, $p = 0.041$). On the basis of the findings, the study recommended implementation of strong liquidity management measures so as to minimize on potential default risk. However, *ex post facto* research findings are prone to improper interpretations due to weak controls on the independent variables. Besides, hypotheses testing in *ex post facto* studies is rare as it may lead to predicting a spurious relationship between the dependent and independent variables.

Khan and Dewan (2017) explored the impact of informal financing on repayment of microloans. The comparison was an inquiry on the apparent influence associated with money obtained from convenient sources that are informal networks as opposed to structured mainstream alternatives. The study used questionnaires which captured micro data from households. The results indicated that repayment of microloans was negatively associated with informal loans, provided they are obtained at cheap interest rates. At the same time, the study reported a positive relationship between the number of MFB loans taken and loan repayment. The study conclusion indicated that the higher the number of loans disbursed, the higher the number of loan repayments.

Dzapasi (2020) carried out a study to assess liquidity management and financial performance. The setting of the study was to analyze the dynamics of liquidity management when the economic environment is experiencing turbulence. The study was grounded on the positivism research philosophy and adopted a mixed research methodology, by combining the use of qualitative and quantitative data. The study adopted purposive sampling data collection technique from five dominant financial institutions in the banking sector. Questionnaires with a mix of open and closed ended questions collected primary data as secondary data from published financial statements formed the panel data recorded for analysis. The adopted measure of liquidity management was the current ratio while return on equity proxied financial

performance. Panel data, yielding 25 observations, comprising of a cross section of five banks focused for a period of five years between 2014 to 2018, was also used to evaluate study variables. The analysis of the data collected was evaluated using linear regression. Results indicated that current ratio explains 78% of changes in return of equity ($R^2 = .781019$, $p = .0000$). The conclusion of the study findings indicated that liquidity management strongly influenced the nature of performance of financial institutions. The researcher proceeded to recommend synergy amongst all regulatory players who influence policy among financial entities to emphasize implementation strategies designed to promote effectiveness in liquidity management initiatives.

Sathyamoorthi, Mapharing and Dzimiri (2020) analyzed how liquidity management interacted with financial performance among the mainstream banking institutions in Botswana. The study was designed to respond to the dilemma as to whether prudential measures emphasizing liquidity management automatically yielded a stream of profitability to banks. Panel data from all the country's commercial banks' published financial records were taken for a period of nine years. They surrogated liquidity management using six different financial ratios. The researchers adopted descriptive research design, employing regression analysis and pearson correlation to disclose the direction of relationships between variables. Return on assets and return on equity measured financial performance. The researchers exclusively analyzed liquidity ratios against profitability ratios. The results showed that the relationship of loan to deposits ratio was negative, though significant with both return on assets and return on equity ($r = -.530$, $p = .000$; $r = -.641$, $p = .000$) while loan to total assets ratio similarly reports a significant inverse relationship with the dependent variable ($r = -.451$, $p = .000$; $r = -.573$, $p = .000$). This means when the bank liquidity management increases by a single unit, its profitability drops significantly between 53% to 64%. The significant proportion of banks' profitability emanate largely from interest on loans. The reported findings would have provided

a more comprehensive outlook had loans repayment formed part of the study objectives. This perspective though, was outside the scope of this study.

Khan and Kazi (2016) set out to establish the extent to which microloans influenced the repayment behaviour of borrowed loans among Bangladeshi's MFBs. A mix of qualitative and quantitative data was used, with respondents being conveniently sampled from selected MFBs' members that had displayed loan recovery deficiencies for the study period of five years between 2010 and 2015. One of the objectives of the study compared the repayment trends among microloans by the generic individual borrowers to group members. The results indicated that high microloans gave rise to high loan repayment levels. The results showed a statistically significant relationship ($R^2 = 0.0383$, $p = 0.001$) between microloans and traditional MFB loans. The respondents in this study were conveniently sampled, making the results not easily generalizable due to the likelihood of biased results.

Salifu, Zakiya, Rahman and Sualihu (2018) in a study carried out in Ghana, used case study design to examine loan repayment determinants among entities categorized as small and medium enterprises. This was a case study design, initiated to interrogate the repayment trends attributed SMEs operating in rural areas. Data was collected using questionnaires from respondents who were randomly sampled from a pool of defaulters. The study measured loan repayment through computing a percentage of repaid loans. This was worked out by computing the fraction of the repaid component which was divided by the total loan disbursed to every target respondent before converting them into percentages. Descriptive statistics was adopted to analyse the data collected with results indicating a negative association between issuance of low value loans and loan repayment ($r = -0.875$, $p = 0.000$). In their concluding remarks, the researchers observed that the findings could have been as a consequence of defects in the lending policy which yields inaccurate disbursement considerations leading to high non-performing loans.

Shakatreh (2021) investigated the interaction between liquidity management ratios and listed industrial firms' profitability. The study used simple regression to analyze the relationship between the study variables. It was reported that of the three ratios used to measure liquidity management (trading ratio, quick liquidity ratio and cash ratio), there was a negative relationship ($\beta = -.774$, $p=.0000$) between trading ratios and return on assets (ROA), which measured profitability. Cash ratio and quick liquidity ratios returned a positive correlation with profitability, at $\beta = .779$; $p = .0000$ and $r = .789$; $p = .0000$ respectively. The study focus was on establishing how the dependent variable, profitability, is influenced by liquidity management. Profitability is a consideration of the performance of an entity at the end of a defined trading period and whose behaviour is determined by several other variables.

Muhammad, Ibrahim and Sulaiman (2020) undertook a study in Nigeria on loan characteristics, loan repayment and SME performance. The SMEs were regarded in a manner similar to microfinance institutions (MFIs) which grant credit to clients who do not offer security. The study obtained data by use of questionnaires from respondents and results indicated have a positive significant relationship between loan size tenure as it related to loan repayment ($R^2=0.676$, $p=0.0000$; $R^2=0.561$, $p=0.0000$). Since the study established that liquidity management mediates loan size and tenure as against loan repayment, it recommended need to critically focus on the income of a loan beneficiaries before determining the amount of loan to be granted and the length of time to take before full repayment. This, according to the study would enhance loan repayment.

Zafrizal, Yakob and Low (2021) evaluated how liquidity risk impacted on the banking efficiency of rural financial entities in Indonesia. The investigation used leverage as a moderator, with specific reference to the short-term borrowings that take place amongst banks. The study which was anchored on the bad management theory and argued that imprudently managed financial institutions do not closely monitor their running costs, leading to losses and

exposure to liquidity loss. It used random effect regression analysis to test static panel data covering 2012 to 2016, obtained from published financial statements of rural banks in the country. Liquidity was measured using liquidity ratio while borrowings were decomposed as loan to deposit ratio. The results indicated that the intersection of liquidity and the moderating variable, borrowings had a significant coefficient of 0.0880. The model of the study had an adjusted R^2 of 0.3158. It was concluded that even though liquidity risk was negatively related with management efficiency ($\beta = -0.297$, $p = 0.000$), the relationship was moderated by borrowings to $\beta = 0.0880$, $p = 0.000$).

Postelnicu and Hermes (2018) carried out a study that examined microfinance performance from the prism of social capital. The study adopted a cross country analysis and was designed to link microfinance performance to the concept of social networks. It explored the benefits accruing to MFBs, courtesy of adopting individual networks to entrench the saving culture, which eventually provides the much-needed liquidity to these financial entities. The findings of the investigation showed that sound liquidity is positively correlated with group lending. The informal networks in groups were reported to be the motivator behind impressive loan repayment. The sound liquidity reported in firms involved in the study was associated to the strong bonds in the member groups. The study made a unanimous recommendation which advocates for group lending as a definite management strategy towards overcoming liquidity challenges among MFBs. However, industry specific measures designed to overcome the loan repayment challenges beyond social networks were not covered in the study.

Jote (2018) ventured to investigate loan repayment determinants among MFBs in Ethiopia. This was so as to establish the extent to which they would realize their profitability and sustainability goals. This was a case study design, with samples established using stratified random method method, as MFB members were categorized as either committed loan payers or defaulters. Additionally, secondary data was obtained from the MFBs on the history of loan

repayments by existing borrowers at the time of the study. Data was analyzed by binary logistic model and results showed only six of the ten study variables statistically influenced the probability of loan default in a significant way. These included the anticipated income by borrowers from investments made with procured loans and the lending method. Based on the findings, the stud recommended training borrowers on prioritizing loan repayment.

Sharma, Bijoy and Sahay (2022) undertook a study in India to investigate issues in liquidity management in Indian banking system. It explored the various interventions by policy makers in their quest to sustain optimal liquidity. Using the auto-regressive distributed lag regression, the study focused on among other interventions, the impact of the lending and deposit rates on liquidity deficit. The study findings show that lending rates reported an insignificant change on liquidity deficit, while increasing deposit rates positively impact on liquidity deficit.

Alshati (2015) assessed the effect of the liquidity management on profitability among banks in Jordan. The study used secondary panel data and operationalized liquidity management by measuring it using the acid test ratio. The fundamental focus of the study was on bank profitability, which is its capacity to generate revenue over cost. Profitability was measured using return on equity (ROE) and return on assets (ROA). The results showed that that increase in the quick and investment ratios of the available funds respectively lead to proportional increase in profitability. Its perspective of liquidity was not centered around establishing the manner in which funds-lending financial entities were influenced by the performance of loans so disbursed.

Adusei (2021) set out to study the nexus between liquidity and financial performance of MFIs. The study focused on the period between 2010 to 2018 and using panel data. The categories of MFIs comprised of 224 non-governmental organizations (NGOs), 183 non-bank MFI, 70 SACCOs, 37 MFBs, 9 rural banks, and 9 other MFIs that do not fall in any of the cited

categories. The study adopted least squares dummy variables technique owing to its ability to bring out fixed effects for ease of comprehension and interpretation. In the model, dummy variables were used to account for the differences between the different categories of MFIs used in the study. Besides, all the independent variables in the model were lagged for one year to cater for reverse causality and consistent interaction between explanatory and explained variables. The reported findings indicated a negative but statistically significant effect between liquidity management and financial performance. Of significance to this study, the results further indicated that in the presence of credit risk, the relationship between the key study variables shifts to the positive regime.

Previous studies (Kariuki Muturi and Njeru, 2021, Khan and Dewan, (2017), Sathyamoorthi, Mapharing and Dzimiri, 2020, have linked liquidity management to financial performance and posted mixed results. Muhammad, Ibrahim and Sulaiman, (2020) and Dzapasi, (2020) used primary data and mixed methodology to analyse liquidity management, loan repayment and performance using correlation research design reported positive relationship between loan repayment and performance. On the contrary, Khan and Dewan, (2017), Sangwan, Nayak and Samanta, 2020 employed primary data and descriptive research design to investigate informal financing and repayment behaviour among borrowers yielding a negative relationship. Moreover, other studies (Kariuki, Muturi and Njeru, 2021 and Bassey, *et al*, 2016) applied simple regression to assess liquidity management and financial performance and reported a positive relationship. Khaled (2019), while using simple linear regression to test liquidity and nonperforming loans reported an inverse relationship between the study variables.

From the aforementioned, it is evident that majority of the studies have focused on liquidity and financial performance while others investigated liquidity management and non-performing loans. The methodologies adopted were dissimilar, ranging from use of primary data, secondary data through descriptive research design and simple linear regression analysis. The

results are mixed and inconclusive as there is no consensus on the relationship between liquidity management and loan repayment. This study employed secondary data and hierarchical multiple regression methodology to investigate liquidity management and loan repayment, with a preposition that, loan repayment precedes financial performance.

2.2.2 Credit Risk Management and Loan Repayment

Baidoo, Yusif and Ayesu (2020) ventured to establish how financial literacy as a credit risk factor related to loan repayment. It was designed to moderate the risk of credit through management of borrowers' financial knowledge and investigated its relationship with loan repayment in Ghana. Qualitative data from borrowers was regressed for interpretation. Financial literacy was taken by the study to mean the ability by consumers of financial resources to effectively understand and make sound financial decisions, to mitigate potential cases of failure to honour loan repayment obligations. Binary probit regression model was used to analyze the dataset. Findings revealed that there was significant and positive relationship between financial literacy, as a credit risk management mechanism on loan repayment.

Chong (2021) carried out a study in Malaysia to establish determining factors to loan delinquency. The study collected data using questionnaires administered to borrowers from microfinance entities and banks. The study was premised on establishing the prevalence of the risk to pay loans between conventional banks and MFIs with a view to propose preventive strategies. It used qualitative attributes that are borrower-related as factors influencing the risk to non-repayment of loans. Data analysis was done through logistic regression to derive study results. It was reported that the rate of loan delinquency among MFIs compared to conventional banks was 9.3% higher. Additionally, 35% of the sampled participants were in arrears on their loan obligations. As a mitigation to delinquency, the study recommended enforcement of collateral as a requirement at the point of loan application. Charged securities were

recommended since they serve as a compelling reminder against failure to repay loans for fear by borrowers of the consequence of sale to realize the outstanding loan arrears in case of potential default

Ademola and Adegoke (2021) examined the socio-economic factors influencing loan repayment in Nigerian MFBs. The study used purposive sampling to identify MFBs in populated parts of Nigeria from whom target respondents, comprising of credit officers and their customers were selected for participation. Multiple regression analysis synthesized data that was collected using structured questionnaires. The study focused on average monthly income alongside loan size and repayment mode among the choice surrogates of the independent variables. The results indicated that interest rates were negatively related with loan repayment ($\beta = -0.112$, $p = 0.012$), suggesting that lower interest rate charged on loans yields to higher loan repayment rate. It recommended that repayment periods should be made longer to allow for adequate time to honour loan obligations. Additionally, the researchers recommended significant reduction of loan interest to motivate loan repayment. Loan interest had been used as a credit risk management measure to profile borrowers and align them to their repayment ability.

Sikira (2021) ventured to investigate credit risk management mechanisms of recovery of disbursed loans in a case study design in Tanzania. The study was focused on examining the Tanzanian loan recovery procedures among the MFBs. Both primary and secondary data was used, with 50 of the targeted 84 respondents credit officers being the purposively sampled. Semi-structured questionnaires were used in collecting qualitative data. Secondary data collected was in form of reports and other relevant literature which was analyzed using descriptive statistics. The results indicated that the most implemented method employed to mitigate credit risk against loan default was direct contact, followed by phone call reminders.

Singh and Gupta (2021) in a study carried out in India sought to establish repayment of loans to MFBS from group borrowers. The study gathered data from primary sources using questionnaires administered to group borrowers. Data collected from focused group discussions was analyzed using Tobit regression. Qualitative attributes of peer pressure and peer guaranteeing stood out as the prime credit risk management mechanisms adopted by MFBS to overcome the likelihood of default. Loan size was used in the study as a credit risk management measure. It was hypothesized that loan size was positively associated with increase in default rate. From the study findings, it was observed that risk to default is compounded by the double-dipping phenomenon, which essentially refers to the practice of borrowing from multiple sources. Lending to groups was highlighted as a means of vetting loanees and regarded effective in managing credit risk.

Khan, Siddique and Sarwar (2020) undertook a study on determinants of NPLs among Pakistan's listed banks for the period between 2005 and 2017. Using panel data, the study used both random and fixed effects regression to analyze the study variables. The study used operating efficiency, in much the same context as credit risk management was used as a construct in this study, to assess its relationship with non-performing loans. It was hypothesized that operating efficiency was positively correlated with NPLs. The results showed that credit risk management had a negative relationship with NPLs ($\beta = -.0804$, $p = .000$) using random effect model while fixed effect indicated $\beta = -0.0910$, $p = .000$. This finding indicates as credit risk management increases, there is corresponding significant decrease in non-performing loans. The hypothesis of the study to the extent that operating efficiency was positively correlated with NPLs failed to be accepted. According to the research findings, credit risk management is negatively correlated with non-payment of loans.

Oliver, Alvarado and Veronesi (2021) set out to explore the role of gender on credit risk inherent in the loan portfolio of microfinance banks (MFBS). Even though the study site was

in Spain, the motive was designed to apply to several developing countries which have a prominent cover of MFBs. The five-year data used in the study was between 2010 to 2014, comprising of both primary and secondary sources. Random effect panel data estimation model was adopted. The results indicated a positive and significant relationship between female loan officers and female borrowers. Further it was reported that female loan officers acted as mediators between loan portfolio quality and credit risk. Portfolio at risk in excess of 30 days was used to test the robustness of the mediating relationship between the study variables, which was found unchanged.

Ahmed and Malik, (2015) examined how practices of credit risk management influenced loan performance among MFIs. Collection policy surrogated credit risk. The study used primary data obtained from credit management staff which was assessed using the Likert scales. Multiple regression analysis was used to establish the relationship between the variables under observation. Findings indicated that both collection policy and risk control for credit customers positively relate with loan performance ($R^2 = 0.556$) but the relationship was insignificant. In recognition of the weaknesses of the findings, the study recommended future studies to replicate the study using secondary data.

Tadele (2021) undertook a study on whether credit risk was affected by MFIs' board structure in Sub Saharan Africa. The inquiry employed pooled Ordinary Least Squares on unbalanced panel data and used non-performing loans as a measure of credit risk. The study interrogated the nexus between the experience level of top managers of MFIs with the likelihood of non-repayment of loans. The findings showed that credit risk was high in MFIs with lean board structures, especially where the top managers did not possess sound work experience in financial management matters.

Postelnicu and Hermes (2018) carried out a qualitative inquiry on the loan performance among MFIs from a social capital standpoint. Social capital was used in the study to eliminate asymmetric information. This was achieved by obtaining soft information from loanees' repayment capacity. Additionally, the study employed the group lending model, which essentially onboards joint liability to help mitigate against loan losses. The focus of the study was aligned towards assessing credit risk associated with group lending and comparing the influence amongst group members with respect to joint borrowing. The findings of the investigation showed that social capital was a key inspiration towards achieving compliance in loan repayment.

Chikalipah (2018) set out to investigate the relationship between credit risk and loan size in Sub Saharan African banks. This was the anchor objective of the inquiry designed to test the assertion by a host of researchers in favour of the preposition that the bigger the loan, the lower the credit risk. MFBs across many countries were involved in the study, for the period between 1995 to 2013, using the generalized method of moments (GMM) as the suitable estimator of dynamic panel data set. The findings showed that there is a positive correlation between credit risk and loan size. This means therefore, that contrary to the reigning position in the banking sector, the higher the loan, the higher the credit risk. The study, which used dynamic two-step system and the fixed effects estimator, revealed that when loan size increases by 1%, credit risk equally increased by between 0.03% to 0.4%.

Karekezi and Butera (2018) ventured to establish the relationship between credit risk and loan repayment performance of SACCOs in Uganda. The study adopted a cross-sectional research design and used both qualitative and quantitative approaches to answer the research questions. All the SACCOs in Umurenge area were involved in the study. The findings indicated that there was a statistically significant positive relationship between credit risk and loan repayment performance ($r=0.704$, $p=0.000$), with an R^2 of 0.548. The study reported that SACCOs

experience difficulty in loan recovery with their portfolio at risk shifting from 0.38% to 0.51% between 2017 and 2018. The study findings revealed an increasing trend in loan defaults among semi-formal financial institutions. Credit risk as used in the study limited its focus to the dangers of exposure occasioned by potential non-repayment but not on the corrective mechanisms to prevent it.

Orichom and Omeke (2020) investigated the relationship between credit risk management and financial performance in Uganda's MFBs. Adopting the agency theory, the study design included use of simple random sampling to collect data from MFBs involved. Purposive sampling was used to select the respondents that included the credit officers, managers and accountants of the various categories of participating MFIs, which included various categories of MFIs. Qualitative data was obtained using semi-structured questionnaires that adopted the Likert-scale for analysis. The reported findings show that there was a significant and positive relationship between credit risk management and financial performance ($\beta = 0.529$, $p = 0.01$). Financial management is a broad component, to which loan repayment is a contributor. Measuring credit risk management by assessing stakeholder opinion is bound to yield inconclusive results as job security fears among respondents may influence their responses in the data collection tools.

Musiega (2018) while conducting a study on influence of credit risk on financial performance of Kenyan commercial banks used non-performing loans as a measure of credit risk. The study used both primary and secondary data. Primary data was obtained from respondents who were senior bank managers in charge of credit risk matters. Secondary data comprised of panel data from commercial banks covering a period of between 2006 to 2015. The results indicated that a 1% increase in banks' gross non-performing loans results in a 0.37067 per cent decrease in return on assets. This outcome indicates that there is a negative relationship between banks' non-performing loans ratio as a measure of credit risk and return on assets. Credit risk as a

measure of non-performing loans speaks to the inherent danger associated with default. However, credit risk management is a mechanism of robust steps designed by an entity to overcome credit risk occurrence.

Karanja (2019) set out to investigate how credit risk influenced lending performance in Kenya using descriptive survey research design. The study relied on purposively selected sample of credit managers of banks whose response was captured in both structured and unstructured questionnaires. The findings disclosed that credit risk positively influence bank's lending performance significantly. The various constructs of credit risk used in the study were; credit risk control ($r=0.576$, $p=0.000$), credit risk monitoring ($r =0.673$, $p=0.000$), credit risk measurement ($r= 0.683$, $p=0.000$), credit risk identification ($r=0.562$, $p=0.000$). The results imply that there was a positive significant relationship between credit risk and lending performance. Lending performance is dedicated at establishing the level of growth or decline in the amount of loans issued. Loan repayment performance on the other hand is focused on the manner in which the practice of disbursing loans is undertaken to establish the repayment frequency of the loans so disbursed. Arriving at a position to determine the direction of relationship between the primary variables of credit risk and loan performance is best determined from the empirically supported use of secondary data than reliance on qualitative findings which are open to respondent-bias.

Otieno, Nyagol and Onditi (2016) examined the relationship between credit risk and financial performance of MFBs. The study findings indicate that credit risk observed from the perspective of portfolio at risk and loan loss provision ratio had a significant but negative correlation ($r=-0.6882$, $p=0.0000$). The study concluded that maintaining low PAR stimulates financial performance. This suggests that credit risk, factoring portfolio at risk impacts on the financial performance of MFIs, but in the opposing direction, indicating that the higher the credit risk, the lower the financial performance. The study scope however, did not extend to

surrogate the concept of financial performance so as to bring out loan performance as a central contributor to the financial performance of MFIs.

Maina, Kinyariro and Muturi (2016) assessed the influence of credit risk management practices on loan delinquency in SACCOS in Meru County, Kenya. The study used data collected using questionnaires administered upon credit officers of SACCOs and adopted a descriptive research design. The results indicated that there exists a strong relationship between credit risk controls, collection policy and loan delinquency in SACCOs.

Empirical evidence on the relationship between credit risk have focused on its influence on financial performance (Orichom and Omeke, 2020; Otieno *et al*, 2016). Others have focused on credit risk brought about by non-performing loans among MFIs and reported it as a major impediment to viable and sustainable growth (Moti et al, 2012; Ahmed and Malik, 2015; Chikalipah, 2018). MFIs rely on the scheduled repayment by borrowers of loans due to sustain the chain of their arising obligations. Whenever loanees fall in arrears for a protracted period, the recovery prospects wane with the consequence of exposure to credit risk. Credit risk is reportedly high in small loans than in large ones (Chikalipah, 2018) but studies have not directly linked such risk to loan repayment. Studies focusing on the relationship between credit risk and loan repayment have associated female borrowers with high repayment rates than their male counterparts (Ayayi, 2012; Agier and Szafarz, 2013), but no known attempt has been made to focus on credit risk exposure from the prism of default among semi-formal credit providers.

It has been shown that delinquent loans are more prevalent among MFBs than conventional commercial banks. Much as this may be attributed to the calibre of borrowers between the varying clusters of lending institutions, there is evidence that credit risk management and loan repayment have been analyzed separately among MFBs in a cocktail of perspectives. Reviewed

literature analyzed credit risk either against financial performance, lending performance or profitability. The studies investigating financial performance present contradicting outcomes, with some reporting significant but negative correlation and others indicating a correlation between credit risk and financial performance. The juxtaposition in the findings presents a lacuna in empirical literature which needs to be investigated.

Extant literature has focused on credit risk management in diverse ways, ranging from risk evasion (Orichom and Omeke, 2020; Karanja, 2019; Khan, Siddique and Sarwar, 2020), mitigation (Tadele, 2021; Postelnicu and Hermes, 2018) and preventive (Baidoo, Yusif and Ayesu, 2020; Otieno, Nyagol and Onditi, 2016). Credit risk management as analyzed in various financial contexts has in reviewed empirical work has presented contradicting findings. Whereas some studies reported positive relationships between credit risk management and loan repayment (Baidoo, Yusif and Ayesu, 2020; Ahmed and Malik, 2015), there are findings to the effect that it has negative and significant relationships with parameters that measure loan repayment such as non-performing loans (Musiega, 2018; Khan, Siddique and Sarwar, 2020; Ademola and Adegoke, 2021). Moreover, majority of studies used primary data (Chong, 2021; Singh and Gupta, 2021) with a few mixing both primary and secondary (Musiega, 2018; Sikira, 2021).

This study analyzed credit management and its relationship with loan repayment using panel data as a preventive measure to the likelihood of loss of internally generated liquidity. The study contributed to literature on microfinancing by assessing mechanisms employed by MFBs to overcome loan recovery inconsistencies that are likely to upset their liquidity and deposits position.

2.2.3 Operating Leverage and Loan Repayment

Choudhary and Jain (2021) undertook a study on corporate stress and bank non-performing loans in Pakistan. The study analyzed credit registry data from the Central Bank to obtain data with which it was designed to establish the likelihood of banking institutions engaging with customers who were already in default with other lenders and how this affected their leverage ratio. It was reported that banks with low leverage ratios report comparatively high default rates, which is compounded by low loan monitoring. This is attributed to credit dealings with customers who already have existing active default history.

Feng, Li and Peng (2021) undertook a study in China to estimate the effect of competition on leverage of banking firms. The relationship of the study variables was explained using the contingent claims analysis, which uses organizations' market value of assets and liabilities so to arrive at more accurate findings on borrowings and asset position. The study set out to ascertain how leverage and the default position impacted the competition status of commercial banks. Leverage and default risk were respectively measured by contingent asset to liability ratio and book asset to liability ratio. It was reported that aggressive competition eases firms' credit constraints and triggers more use of debt financing and thereby increasing leverage. From the findings of the study, it was concluded that enhanced competition among banking financial institutions improves credit conditions which translates in reduction of finance costs that effectively reduce the credit risk of banks on account of the ensuing low uncertainty of firm operations. Leverage in financial institutions has been analyzed from the context long-term borrowing which reflects in the firms' capital structure (Feng *et al.*, 2021).

According to Anderson *et al.*, (2014), testing the primary relationship between the moderator and the dependent variable provides the baseline mechanism necessary to mount the argument for which a study sets out to investigate in the context of the supporting theoretical basis. They

posit that theoretical justification of the nature and direction of the main relationship between the moderator and the dependent variable makes it possible to sensibly interpret the interaction effect, especially in the event of conflict in significance levels of the direct and interaction effects.

Short-term borrowings help microfinance banks to supplement their liquid reserves in order to be able to respond to arising borrowers' needs. However, money obtained from external sources comes at a premium which has two significant effects. Firstly, it limits the amount of interest receivable to the financial entity as charged on loans issued. Secondly, it limits the leegroom by MFBs to charge reasonably cheaper loans which would otherwise serve as an incentive to stimulate borrowers to patronize loan products from MFBs. It is theoretically hypothesized that when MFBs use borrowings to fund loans, two possible outcomes arise. Firstly, there is pressure to enforce loan collections since additional staff are hired to follow up on loans and secondly, the pressure on MFBs to honour its short-term debt obligations pile pressure on it which is further cascaded to borrowers.

In Murphy *et al.*, (2014), it is reported that even though there exist unsettled empirical arguments against over-reliance on tests of statistical significance while discussing moderation results (Cohen, 1994; Schmidt and Hunter, 1997; Cortina & Dunlap, 1997; Murphy *et al.*, 2014), discussing descriptive results helps reduce the likelihood of misinterpreting results. Either way, operating leverage was expected to have a positive relationship with loan repayment such that it was anticipated to result in reduction of non-performing loans and thereby lower the loan repayment ratio.

2.2.4 Operating Leverage on the relationship between Liquidity Management and Loan Repayment

According to Baron and Kenny, (1986), a moderator is that quantitative or sometimes qualitative variable that has the ability to affect either the strength or alter the direction of the relationship between an independent and dependent variable within a correlational analysis. It is known from empirical findings that leverage influences the environment where loan repayment interacts with liquidity management (Godquin, 2004; Kiliswa and Bayat, 2014), as it expected to improve availability of liquid assets and thus sustain funds flow for optimum functionality of financial entities.

Mahmood, Han, Ali, Mubeen and Shahzad (2019) investigated the moderating effects of leverage and firm size on the relationship between working capital and profitability in China. The study employed the generalized method of moments to give meaning to the assembled panel data. The results indicated that leverage moderated the relationship between working capital and profitability, with firms that are highly levered reporting an influence that was positive and significant. This outcome was attributed to the weight of massive debts that were being experienced by firms with high leverage and that they only managed to access additional credit at premium interest rates. On the contrary, leverage influenced the relationship of the study variables in a negative and significant manner for firms with low leverage. This was explained as obtaining on account of the many options that such firms enjoy in sourcing for cheaper alternative financing.

Ojiako, Idowu and Ogbukwa (2014) investigated loan repayment behaviour among cooperative farmers in Nigeria. Data was collected from primary sources by way of questionnaires which were structured. Data analysis was done through descriptive statistics by way of correlation alongside multivariate regression. The study selected loan size and loan interest as institutional variables which proxied loan repayment behaviour which were measured with the proportion

of actual loan repaid. The results reported that there was negative significant correlation between loans repaid and the proportion of loans borrowed ($\beta = -0.25$; $p = 0.01$). These results implied that increasing loan size may not by itself trigger enhanced loan repayment. The study recommended that lending firms do adopt loan products which embed borrower education and their livelihood choices in order to address loan repayment challenges. The study compared behavioural attributes of borrowers against the quantitative elements of loans. In all, the juxtaposition of the study metrics provided room for inaccurate findings, making them unreliable for generalization.

Nzogang, Wamba and Nimpa (2014) undertook a study to establish the determinants of loan delinquency in urban MFBs in Cameroon. The study was undertaken against the backdrop of a sustained trend in failure of disbursed loans to borrowers. The investigation adopted logit regression analysis and used data collected in one month, focusing on both borrower and firm related factors influencing delinquency. Using adverse selection and moral hazard theories, the researchers considered borrower factors to include loss of business revenue to sustain repayments, diversion of funds to unplanned ventures and failure rate of start-up businesses. On the other hand, institutional factors included inadequate capital to sustain disbursement of loans to qualified loan applicants, poor recovery strategies and staff complacency in loan recovery initiatives. Regression analysis was used to measure the relationship amongst the study variables. The results indicated that both borrower and institutional related factors affected loan repayment. The dominant findings of the study was that ladies aged between 35-45 and that had other complimentary sources of income aside from those for which they took loans had the least loan default incidences. Also, the danger of information asymmetry and moral hazard was exacerbated when borrowers used common collateral to secure multiple borrowings.

Mpogole, Mwaungulu, Mlasu and Lubawa (2012) undertook a study on multiple borrowing and loan repayment among microfinance banks in Tanzania. The study was focused on MFBs and was undertaken with the motive of establishing reasons for multiple borrowing and the effects thereof on loan repayment. The results indicated that over 70% of MFBs' customers were servicing loans taken from more than one MFB simultaneously. Cited among the reasons for multiple borrowing was insufficient funds from certain MFBs to meet the desired volumes of loans applied for. The upshot of multiple borrowing resulted in cases of serial defaulting on offsetting arising loan obligations due to pressure from the lenders. The study employed survey questionnaires in collecting primary data from the sample of 250 respondents. The study used regression analysis to the extent of establishing determinants of loan contracts but no econometric software was involved in the analysis as it was beyond the scope of the study.

Garmaise (2015) undertook a study in the United States of America on the relationship between borrower misreporting and loan repayment in mortgage lending financial institutions. It adopted a behavioural-based approach to analyze how inaccurate disclosure of details relating to borrower assets contributed to loan delinquency. Using panel data, the study records that misreporting and delinquency were strongly associated. The foundation for the justification of the study was the need to establish whether or not there was a correlation between non-performing loans and the difficulty to recover defaulted loans on account of gaps traced to incorrect information captured on loan application forms. The focus of the study was to isolate disclosure weaknesses contributing to loan recovery difficulties in established economies.

Cecchi, Koster and Lensink (2021) posit that some scholars hold the view that MFBs by their very nature are entities whose mission is social in nature while others advocate for the business model view. Those fronting this perspective argue that the funds running MFBs should eternally emanate from subsidies that are government-sponsored or non-governmental organizations. This school of thought views MFBs as firms bound with a social duty to remain

non-profit making entities in order to achieve the mandate of supplying cheap resources designed to grow the economy through stimulating investment activity at the bottom of the social pyramid perceived to be carrying several unbankable citizens. It is this category of scholars that project MFBS operating outside such social and moral parameters as transacting with a motive away from the mission that brought MFBS into being. It is from this background that they have branded 'uncompliant MFBS' as engaging in a 'mission drift' for operating outside defined social structures.

Omondi (2020) investigated the determinants of financial performance of MFIs in Kenya. Using exploratory research design, the study used the CAMEL approach and reported that though liquidity had a positive effect on the financial performance of MFIs ($\beta = 0.020$) it was insignificant ($p=0.792$). Operating leverage was simultaneously reported as having a negative but significant influence on the MFBS performance ($\beta = - 0.032$; $p= 0.000$). This indicates that increase in operating leverage leads to decrease in financial performance of MFBS. This position may hold true in circumstances where performance is suffocated by repayment of borrowed funds which leave no cash available to strengthen the financial base of MFBS. These results however, do not disclose the extent to which internally generated funds by way of recovered loans are exploited with a view to offset the adverse position.

Kassim and Rahman (2017) investigated how default risks are managed in Bangladesh. The study was qualitative in nature as it conducted semi-structured interviews on 40 respondents from Grameen Bank who were identified using convenience sampling technique. The results indicated that among the reasons for non-performing loans in microfinance banks were; inadequate recovery follow-up mechanisms after disbursement, absence of business training to borrowers, short repayment periods which proved unsustainable and absence of mechanism to detect multiple borrowing. Using the moral hazard theory, the study established that concealing multiple business sources, focus on basic needs, multiple repayment engagements were cited

as prime contributors to the risk of non-repayment of loans on the part of borrowers. Recommendations were made alongside the identified weaknesses as mechanisms towards overcoming non-repayment of loans.

Gupta and Hansman, (2021) analyzed leverage by seeking to draw distinctions between the adverse selection theory and the moral hazard theory with respect to mortgage borrowers. Specifically, the study attributed moral hazard to the causal relationship between loan size and default in loan repayment. The study used panel data from mortgage lenders comprising of the size of mortgage loan disbursed and defaulting borrowers. The reported results indicated a positive correlation between leverage and loan non-repayment ($\beta = .917$, $p = .064$ at 1% confidence level). According to the researchers, just about 40% of this relationship is attributable to the moral hazard phenomenon, with the majority being associated to adverse selection.

Jihadi, Vilantika, Hashemi, Arifin, Bachtiar and Sholichah (2021) analyzed the moderating effect of corporate social responsibility on the relationship between liquidity, leverage and profitability on firm value among listed firms in Indonesian Securities Exchange. Twenty-two firms were purposively sampled and data of their financial operations analyzed using multiple linear regression. Financial ratios were used to surrogate the study variables. Leverage was highlighted as one among the financial metrics which are helpful in assessing an institution's ability to meet arising financial obligations in the short run. The reported findings showed that both leverage and liquidity had a positive and significant relationship with firm value; $\beta = 0.320$, $p = 0.000$ and $\beta = 0.488$, $p = 0.000$ respectively. Based on the study results, the researchers recommended corporate social responsibility moderated the relationship between the study variables and firm size.

Despite approving of the important role played by MFBs in transforming society in general and economic growth in particular, proponents of the mission drift debate however, do not appear to offer tangible and long-term solutions to the debate rather than for drifting away from their core objective availing affordable resources to the needy and unbanked poor. The change in focus, referred to as “mission drift” has been informed by the forces that MFBs need to contend with maintaining relevance in the midst of competition and pressure by shareholders to enhance their sustainability.

Butsili and Miroga (2018) investigated the how leverage influenced the profitability of MFIs in Kakamega County. This was a census study involving all the MFIs in the county from which questionnaires were administered to respondents drawn from the four participating MFIs. Descriptive and inferential statistics were used to analyze the data collected. It was reported that debt equity ratio, which surrogated leverage, was positively and significantly related with profitability ($\beta = .719$, $p = 0.000$).

Reviewed literature reveals that there is no consensus in the application of operating leverage as a parameter that influences financial relationships. Results from various empirical assignments on the influence of operating leverage remain mixed and inconclusive. It has been shown that leverage yielded positive and significant relationships with loan repayment (Gupta and Hansman, 2021; Mpogole *et al.*, 2012), liquidity (Jihadi *et al.*, 2021) and profitability (Butsili and Miroga, 2018). Other findings however, reveal negative and significant relationships between operating leverage and loan repayment (Ojiako, Idowu and Ogbukwa, 2014) and financial performance (Omondi, 2020). When used as a moderator, operating leverage was reported to weaken the relationship between liquidity and corporate social responsibility (Dewi *et al.*, 2021) while it strengthened the relationship between working capital and profitability (Mahmood *et al.*, 2019). This study employed operating leverage as a

moderator between liquidity management and loan repayment, which are distinct constructs directly focused and specific to financial obligations associated with microfinance banks.

2.2.5 Operating Leverage on the relationship between Credit Risk Management and Loan Repayment

Credit risk management involves strategic measures taken by a financial entity to mitigate the challenges associated with the likelihood that borrowers would default on their loan obligations. While MFBs are expected to have adopted steps to such adverse occurrences, there are intervening circumstances facing the financial entities whose cumulative impact may influence the outcome of the corrective initiatives taken. Studies have been undertaken to investigate the interventions financial organizations engaged in lending business to manage the shortfall in funds brought about the loss of funds, adequate enough to sustain MFBs operations.

Viswanadham (2015) set out to investigate the determinants of non-performing loans in Tanzanian commercial banks. This was a case study of the NBC Bank whose data was collected using interviews and questionnaires. Credit risk management was measured by interest rates and lending supervision capacity. It was reported that there existed a positive relationship between interest rates and non-performing loans, suggesting that as commercial banks adjusted interest rates upwards to overcome default cases, bad borrowers are attracted to take loans leading to more delinquent loans being registered. At the same time, a positive relationship was reported as existing between bank's supervision capacity and non-performing loans. This implied that close monitoring by the credit department served to eliminate default cases, leading to reduced default cases. It was recommended that for banks to sustain asset quality, close monitoring in the credit department was to be balanced with their profitability projections. The study scope did not include the role played by borrowed funds which were recognized as an alternative in cases of adverse loan repayment outcomes.

Cathcart, Dufour, Rossi and Varotto (2018) undertook a study on the differential impact of leverage on the default risk of small and large firms, using data obtained from financial firms. The study focused much on financial leverage and its impact on the credit risk modeling of bank loans. The study reported that financial leverage has a bigger impact on the default on loans among small firms than in established corporations.

Di Patti, D'Ignazio, Gallo and Micucci (2015) undertook a study on the role of leverage in banks' solvency with specific focus on loans. The study linked deterioration in credit quality to economic circumstances that triggered depressed returns due to non-performing loans. Leverage was positively associated with default ($\beta = 0.10$, $p = 0.000$). The study was however, conceptualized to focus on macroeconomic factors and mirrored default from the angle of the influence of financial leverage, which is a capital-oriented parameter.

Shahid, Gul and Naheed (2019) analyzed credit risk and financial performance of Pakistani banks, from the side of influence of leverage on the study parameters. The study adopted the use of secondary data obtained from 24 banks between 2010 and 2017. The data was analyzed using financial ratios, with leverage and non-performing loans being the surrogates of credit risk management. The results indicated that non-performing loans ratio, measured by the ratio of non-performing loans to gross loans was inversely related to financial performance ($\beta = -0.169$, $p = 0.000$) while leverage was inversely related to financial performance ($\beta = -0.088$, $p = 0.000$). The model yielded an adjusted R^2 of 0.124, suggesting the study parameters only accounted for 12.4% change in financial performance.

Taiwo *et al.*, (2017) analyzed credit risk management and the lending growth patterns among Nigerian deposit money banks. Multiple linear regression was used to analyze time series data collected from the financial statements of the firms that participated in the study. The study was modeled on the theoretical foundation of the commercial loan theory, which proposes that

banks should only lend short-term self-liquidating forms of loans. It was reported that enhanced credit management boosts investor confidence and leads to growth in loanable funds and increased profitability. However, credit risk management initiatives registered an insignificant impact on total loans growth. The study recommended that strict adherence to credit appraisal policies as a measure to eliminate risky borrowers from accessing loans.

Musa and Nasieku (2019) analyzed the effect of credit risk management on loan performance among Kenyan commercial banks. They used multiple linear regression to assess data collected from audited financial statements of listed commercial banks. The study findings indicated that high loan deposit ratio gives rise to better loan repayment performance amongst listed commercial banks ($\beta = .641$, $p = 0.000$). Additionally, it was reported that loan loss provision coverage ratio is positively associated with better loan repayment ($\beta = .687$, $p = 0.000$). They recommended that banks should be hedged against moral hazard and adverse selection risks while advancing loans to borrowers to minimize non-performing loans.

Reviewed studies indicate that operating leverage has variously been associated with credit risk and loan repayment in different circumstances, yielding conflicting outcomes. Whereas some studies have focused on operating leverage as a parameter measuring funds introduced into the business (Di Patti *et al*, 2015), this was conceptualized to cover macroeconomic outcomes whose level of influence among parameters is distinct from the independent nature with which study variables relate in normal business circumstances. Other studies have focused on operating leverage while highlighting loan repayment outside the meaning of its role as a source of liquid assets to financial entities.

This study used operating leverage as a moderator of the relationship between credit risk management and loan repayment with a view to isolate the outcomes of its influence on the primary relationship in order to assess its influence on the mitigation measures adopted to overcome default.

2.2.6 Summary of the literature and identified gaps

Existing empirical evidence involving liquidity management, credit risk management and loan repayment analyzed the variables separately and with distinct objectives unrelated with those of this study. Those that were conceptualized to investigate closely related perspectives instead yielded inconclusive and mixed outcomes. Whereas one school of thought adopted the view that aggressive loan recovery initiatives holds the key to mitigate default, there is an emerging perspective that favours conventional banking-like approaches which are primarily focused on profiling borrowers. It is not in dispute though, that the structural and foundational basis defining the business domain of mainstream banking and MFBs are dissimilar and at variance. Loan repayment has been given a wide-berth in past empirical investigations. In its place, preference has been centered on profitability, financial performance and non-performing loans as choice drivers towards the sustainability of financial institutions. It is argued in this thesis that repayment of loans takes place before profitability analysis, which is a parameter contributing towards financial performance.

This study sought to contribute to the body of literature in micro financing by arguing that loan repayment precedes profitability and financial performance and that non-performing loans are just but a metric to assess how adverse or favourable repayment outcomes manifest. With regard to funding, studies have been undertaken to assess the importance of leverage as a measure to strengthen financial strength of financial institutions. However, there is paucity of knowledge with respect to the impact of borrowings on the sustainability of the liquidity of financial institutions dedicated to serving the unbanked poor. Additionally, the role played by operating leverage in the interplay involving liquidity management as an internal funds' preservation mechanism on one hand and credit risk management as a loss prevention intervention is yet to be empirically investigated.

CHAPTER THREE

RESEARCH METHODOLOGY

The adopted methodology comprising of research design, study area, target population, data collection and sources thereof, analysis, presentation and specification of models for the study are discussed under this chapter.

3.1 Research Design

Research design entails the composite of the framework that was adopted in carrying out the actual research process. It comprises of declaratory statements stating the methods adopted in ensuring relevant data is economically but accurately sourced with a view to address the study objectives (Gujarati (2013). Research design is influenced by the research philosophy to guide the study. Philosophy has implications on the what, how and why research is to be carried out

The researcher adopted the positivist research paradigm, which presumes that the researcher-maintained independence and objectivity in searching for social reality. Positivism allows for empirical testing of theories and generalization of research outcomes (Carson *et al*, 2001). The research study used statistical methods for data analysis and thus adopted the inferential approach to research so as to form a data base from which to infer characteristics or relationships of the population. Correlational research design was used since quantitative measures of the study variables were delineated without researcher interference. Correlational research design was the most suitable design because the study involved measurement of parameters in order to estimate the extent to which they relate or the identifiable pattern in which they change.

3.2 Study Area

This site for this study was in Kenya, an East African country with its headquarters based in the city of Nairobi. The city is the both the administrative and commercial hub of the country and the east African region, lying at an altitude of 1700 metres above sea level. The city is home to the regulator of the MFBs, the Central Bank of Kenya and the headquarters of many regulated microfinance banks. Kenya is a premier developing country and among the leading nations in Africa with respect to microfinance banking.

3.3 Target Population

Population in research is the entire composite of elements of focus capable of being involved in a study (Mugenda and Mugenda, 2003). Target population therefore is the wholesome perspective of objects, people, entities and participants as conceived by the researcher viewed as fitting a common specified descriptive mark as espoused in the conceptualization of the researcher (Kothari, 2004). By the time of this study, there were 14 microfinance banks (MFBs) in Kenya from which only those that had been consistently supervised and regulated from 2015 and 2022 were selected to participate in the study. The base year was selected because it was the period when the adverse loan repayment trajectory began manifesting among regulated MFBs.

3.4 Census Study

This study adopted census sampling approach by incorporating all the 12 regulated MFBs that fitted the selection criteria of determining the appropriate participating banks in this study. According to Singh and Masuku (2014), census is the most recommended study design to adopt whenever the population consists of 200 or less participants. This facilitates elimination of errors that would arise as a consequence of inappropriate sampling while at the same time avails all data necessary for the research exercise. Kothari (2004) adds that it is the researcher's

responsibility to delineate parameters that participants in a census should meet in order to be included for data collection. The period 2015 was selected since it was the earliest possible regulation period that yielded the highest number of qualifying MFBs which have never been dropped from regulation. Two MFBs that were dropped from regulation were excluded from the study as they are no longer participants in the industry within the meaning of this study. The other two that were added within the study period were new in the industry and therefore incapable of adversely influencing study findings. This consideration was adopted since it provided for the longest possible longitudinal and market-wide cross-sectional study through adoption of balanced panel data. Cavana *et al.*, (2000) posits that balanced panel data is regarded as responsive and sensitive to movements that take place between two observation points with robust outcomes, capable of generalization. The list of the MFBs that were involved in this study are annexed in the appendix section of this thesis report.

3.5 Data Collection

3.5.1. Sources of Data

The study adopted use of secondary data collected from annual financial reports of the twelve regulated MFBs from 2015 to 2022, yielding 96 data points. Only microfinance banks that were regulated by the Central Bank of Kenya and had consistently posted results for the study period were included in the study. The data sources included analyzed financial information from regulated MFBs alongside information as filtered and recorded in the CBK handbooks, sourced from their website over the research period. Secondary data obtained from audited financial reports were found adequate and consistent for reliability since they are a dependable source of data with information that is vetted, verified and officially vouched for as being representative of the true prevailing reflection of the study objects (Kothari, 2004).

3.5.2 Instruments of Data Collection

The study employed use of data collection sheets to record quantitative information relating to identified study constructs as sourced from the audited financial statements of MFBs involved in the study as held with the CBK. Document review was used to cross-check captured numerical data on the sheets for verification and authentication as to accuracy. The data collection sheet is attached in the appendix section of this thesis report.

3.5.3 Data Collection Procedure

Data was collected from MFBs website and that of the CBK. Financial statements were used to obtain quantitative information for purposes of computing ratios to be used during the analysis. Secondary data provides the advantage of being collected from several primary sources and for reasons other than research (Cooper and Schindler, 2010). The detailed content and strict collection procedures make it appropriate to yield reliable outcomes upon analysis. The financial statements obtained from the CBK consolidated sheets of the individual microfinance banks (MFBs) available from the CBK representing published accounts for the entire period while under regulation, being 2015 to 2022. Information obtained from the CBK records is regarded not only as authentic but authoritative as it undergoes comprehensive verification and scrutiny so as to meet specified established standards.

3.6 Data Analysis and Presentation

Data in this study had the cross-section dimension and time-series component. This necessitated the adoption of hierarchical panel data analysis technique. It has been highlighted that panel data estimation technique provides higher degrees of freedom and overcomes the potential problem of multicollinearity (Hsiao, 2005). This yields to observations that are more reliable and efficient. The analysis of data was undertaken using EViews-12 Statistical Package. Descriptive statistics were computed so as to assess data characteristics including

means, frequencies and standard deviations (Field, 2018). Subsequently, moderated multiple regression (MMR) was used to test and report the research hypotheses including that for the moderated hypothesis. The MMR involves developing a regression model that predicts the outcome Y based on a predictor X, a second predictor Z hypothesised to be a moderator, and the product term between X and Z, that carries information on the moderating effect of Z on the X-Y relationship (Aguinis *et al.*, 2017). Moreover, the regression coefficient for the product term XZ represents information concerning the moderator effect.

The moderator variable can further be distinguished on how it influences the endogenous variable. A case of pure moderation is confirmed if the moderator variable only interacts with the exogenous variable X, but itself does not exert any direct influence on the endogenous variable y. Besides, there is quasi-moderation if the moderator variable additionally exerts a direct influence on the endogenous variable Y (Sharma *et al.*, 2015). Mean-centring of predictor variables when dealing with interaction terms was done. This was relevant to address the issue of multicollinearity (Field, 2018) and thus help achieve the objective of making the interpretation of the first-order coefficients meaningful by the technique of re-scaling (Aguinis & Gottfredson, 2010). Also, independent of the type of the actual moderation relationship within the interaction model, the interaction term as well as the predictor and the moderator variable have to be integrated. Moreover, the interpretation of the first-order effects was made within the interaction model. Management efficiency was used as a control variable to mitigating endogeneity problems. The t-test was used to analyse the relationship between the study variables. The results were then presented in form of tables and figures.

3.7 Study Variables and Model Specification

3.7.1 Variables specification

All the variables of the study were measured using financial ratios. The dependent variable, loan repayment was measured by net non-performing loans to total assets which signifies the rate of loan repayment (Boussaada, Hakimi and Karmani., 2020). The lower the ratio, the higher the loan repayment and vice versa. The independent variable, liquidity management was measured using net loans to customer deposits (Shrestha, 2018; Osei, 2019; Sandino, 2019; Mishra and Pradhan, 2019; Sathyamoorthi *et al.*, 2020). A low net loans to customer deposits indicates that the MFB maintains sufficient funds to meet arising obligations and other contingencies.

3.7.2 Model Specification

Correlation analysis was used to test variables that may be highly correlated so as to eliminate multi-collinearity, a phenomenon that is prevalent in time series data. Data used comprised time series and cross-sectional, which were then pooled into a panel data set and estimated using panel data regression. The data set was tested for stationarity at levels. The reason to stationarize data was to obtain a meaningful sample mean and variance which can show future behaviour if series is stationary but if series is consistently increasing, it instead leads to likelihood of underestimating the mean (Jaroslava and Martin, 2005).

Model 3.1 is the panel regression model that was used to test the primary relationship between the independent and dependent variables;

$$LRP_{it} = \beta_0 + \beta_1 MLDM_{it} + \beta_2 MCRK_{it} + \beta_3 ME_{it} + \mu_{it} \dots \dots \dots \text{Model}$$

3.1

Where;

β_0 : The intercept

LRP = Loan repayment; measured by the ratio of net non-performing loans to total assets

MLDM = Liquidity Management; measured by the ratio of net loans to customer deposits

MCRK = Credit Risk Management; measured by the ratio of total cash and cash equivalents divided by customer deposits

ME = Management efficiency; measured by the ratio of staff expenses and directors' emoluments to total assets, being the control variable.

β_1, β_2 and β_3 = Regression coefficients

μ_{it} = The error term

i = cross-section, representing the number of MFBs in the study

t = time-series, representing annual data per MFB under study

To test for moderation, the study adopted the approach as recommended by Baron and Kenny (1986). Operating leverage was used to test the moderation effect of liquidity management, credit risk on loan repayment among microfinance banks in Kenya.

First, the primary relationship between the moderator, operating leverage was tested to ascertain its relationship with the dependent variable, loan repayment using the panel regression model 3.2 as shown;

$$\mathbf{LRP}_{it} = \beta_0 + \beta_1\mathbf{MLDM}_{it} + \beta_2\mathbf{MCRK}_{it} + \beta_3\mathbf{ME}_{it} + \beta_4\mathbf{MLG}_{it} + \mu_{it} \dots \dots \dots \text{Model}$$

3.2

Where;

β_0 = The intercept,

LRP = Loan repayment; measured by the ratio of net non-performing loans to total assets

MLDM = Liquidity Management; measured by the ratio of net loans to customer deposits

MCRK = Credit Risk Management; measured by the ratio of total cash and cash equivalents divided by customer deposits

ME = Management efficiency; measured by the ratio of staff expenses and director's emolument to total assets, being the control variable.

MLG = Operating leverage; measured by the ratio of borrowings to total assets

$\beta_1, \beta_2, \beta_3$ and β_4 = Regression coefficients

μ_{it} = The error term

i = cross-section, representing the number of MFBs in the study

t = time-series, representing annual data per MFB under study

The process of conducting moderation first entails determining whether the interaction coefficient terms of liquidity management and operating leverage (MLDM * MLG) and credit risk management and operating leverage (MCRK * MLG) were statistically different from zero.

Model 3.3 was the panel regression model to assess the moderating effect of operating leverage on the relationship between liquidity management and loan repayment among microfinance banks in Kenya

$$LRP_{it} = \beta_0 + \beta_1 MLDM_{it} + \beta_2 MCRK_{it} + \beta_3 ME_{it} + \beta_4 MLG_{it} + \beta_5 MLDM_{it} * MLG + \mu_{it} \dots \dots \dots \text{Model}$$

3.3

Where;

β_0 : The intercept,

LRP = Loan repayment; measured by the ratio of net non-performing loans to total assets

MLDM = Liquidity Management; measured by the ratio of net loans to customer deposits

MCRK = Credit Risk Management; measured by the ratio of total cash and cash equivalents divided by customer deposits

ME = Management efficiency; measured by the ratio of staff expenses and directors' emoluments to total assets, being the control variable.

MLG = Operating leverage; measured by the ratio of borrowings to total assets

MLDM*MLG=The interaction between liquidity management and operating leverage

$\beta_1, \beta_2, \beta_3, \beta_4,$ and β_5 = Regression coefficients

μ_{it} = The error term

i = cross-section, representing the number of MFBs in the study

t = time-series, representing annual data per MFB under study

$LRP_{it} = \beta_0 + \beta_1 MLDM_{it} + \beta_2 MCRK_{it} + \beta_3 ME_{it} + \beta_4 MLG_{it} + \beta_5 MCRK_{it} * MLG + \mu_{it} \dots$ Model

3.4

Where;

β_0 : The intercept,

LRP = Loan repayment; measured by the ratio of net non-performing loans to total assets

ME = Management efficiency; measured by the ratio of staff expenses and directors' emoluments to total assets, being the control variable.

MLDM = Liquidity Management; measured by the ratio of net loans to customer deposits

MCRK = Credit Risk Management; measured by the ratio of total cash and cash equivalents divided by customer deposits

MLG = Operating leverage; measured by the ratio of borrowings to total assets

MCRK*MLG=The interaction between credit risk and operating leverage

$\beta_1, \beta_2, \beta_3, \beta_4,$ and β_5 = Regression coefficients

μ_{it} = The error term

i = cross-section, representing the number of MFBs in the study

t = time-series, representing annual data per MFB under study

3.8 Diagnostic Tests

Diagnostic statistics are methods used to establish existing challenges inherent in the data set to be used or the model adopted for the study (Eyduvan, Ozdemir and Alarslan, 2005). This step was critical ahead of subjecting data to regression so as eliminate the likelihood of violation of the established classical linear regression models' (CLRMs) assumptions. Besides, the procedure provides the opportunity for corrective intervention measures to be undertaken so as to arrive at valid results capable of generalization. It was also to assert that the tests were an appropriate model chosen for analysis in the event that CLRMs assumption were not compromised. Estimating the regression models when the CLRMs assumptions are violated result in inefficient, inconsistent parameter estimates. The common tests to ascertain conformity to the requirements of linear regression, according to Field, (2000), include; Unit Root test for stationarity, normality, model specification, heteroskedasticity and multicollinearity.

3.8.2 Unit Root Test

Time series data is said to be stationary if its mean and variance are established as being constant over time and that the value of covariance is dependent not on the actual time of its computation but the lag or period of variation (Gujarati, 2013). It is key to test for stationarity for the time series since it provides the platform to analyze the behaviour of individual elements covered for the specified period. This obviates the possibility of erroneous generalization to other time periods. Additionally, the process eliminates the occurrence of producing spurious regression which is brought about whenever regression is performed using nonstationary time series.

Null hypothesis under unit root tests indicates that the time series used in the study has a unit root, meaning, it is non-stationary. The alternative hypothesis is that the time series is stationary, implying that it has no unit root. The significance level was at 5%, meaning any variable with a probability of below 0.05 would result in rejecting the null hypothesis. In this study, unit root tests were conducted on the variables using Levin, Lin, Chu (LLC) common root test.

The summary of the results were as indicated in Table 3.1

Table 3.1: Levin, Lin, Chu Common Root Test Results on the Study Variables

Study Variable	Statistic	Prob.
LRP	1.80567	0.0355*
MLDM	7.02793	0.0000*
MCRK	3.46507	0.0003*
MLG	5.91322	0.0000*
ME	11.0877	0.0000*

** Represent significance at the 0.05 level.*

Source: Field Data, 2023

From the results in Table 3.1, all the variables of the study were found to be stationary at levels. The results indicate that all the variables of the study had probability levels of below 0.05, suggesting the null hypothesis was rejected and the alternative hypothesis accepted. This implies that the data for all the variables across the time period of the study were determined as stationary and hence met the threshold to be used for regression purposes and that there was no fear for spurious regressions.

3.8.3 Testing for Normality

Generalization of findings is only possible when the assumption that residuals are normal is successfully achieved (Gujarati,2013). In this study, regression-standardized residuals were shown in form of histograms and presented with a tabular summary of accompanying diagnostic statistics. The measures of kurtosis, skewness and Jarque-Bera tests of normality were adopted to test for normality. Kurtosis is a measure of relative peakedness or flatness of a given sample distribution while skewness measures the degree of asymmetry of such distribution. Tabachnick and Fidell (2007) provides that data whose kurtosis value for the residuals is 3.0 or close to 3.0 and skewness value is 0 or close to 0, is regarded to be normally distributed. For Jarque-Bera tests, Gujarati (2013) posits the rule of thumb as being that the residuals are normally distributed. Normal distributions under Jarque-Bera tests return a zero value and in case the distribution is not normal, the statistic assumes increasingly large values. The preference for Jarque-Bera test was informed by the recommendation of Gujarati (2013) who asserts that it is more comprehensive in testing normality than to the graphical alternative. The results of the normality test are shown in Figures 3.1, 3.2 and 3.3 for Models 3.1, 3.3 and 3.4 respectively.

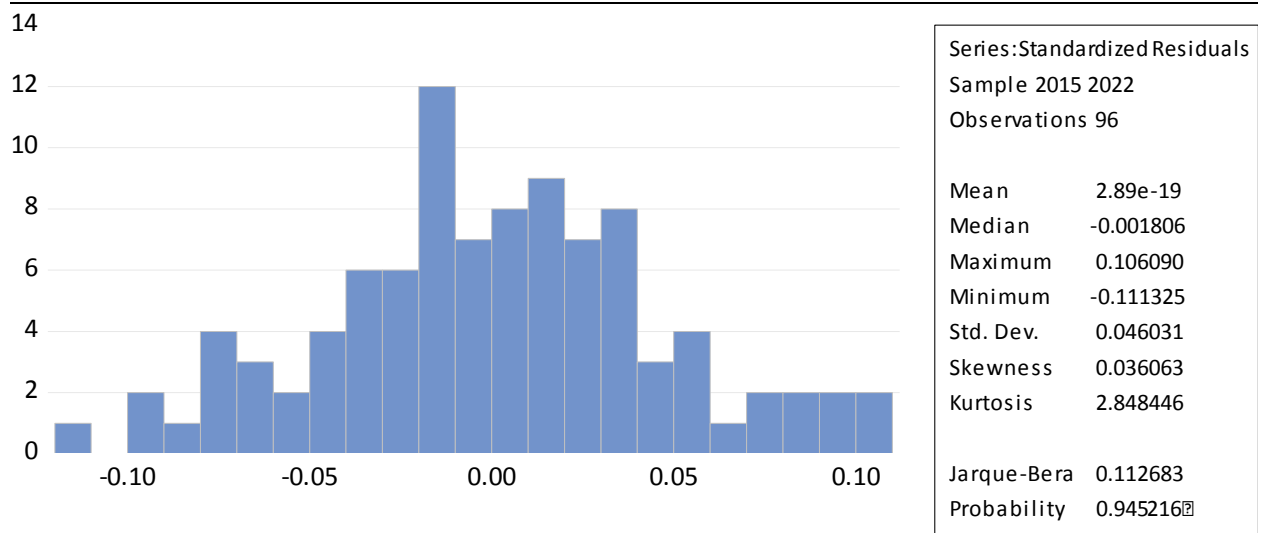


Figure 3.1: Results on the Test of Normality of the Primary Model 3.1

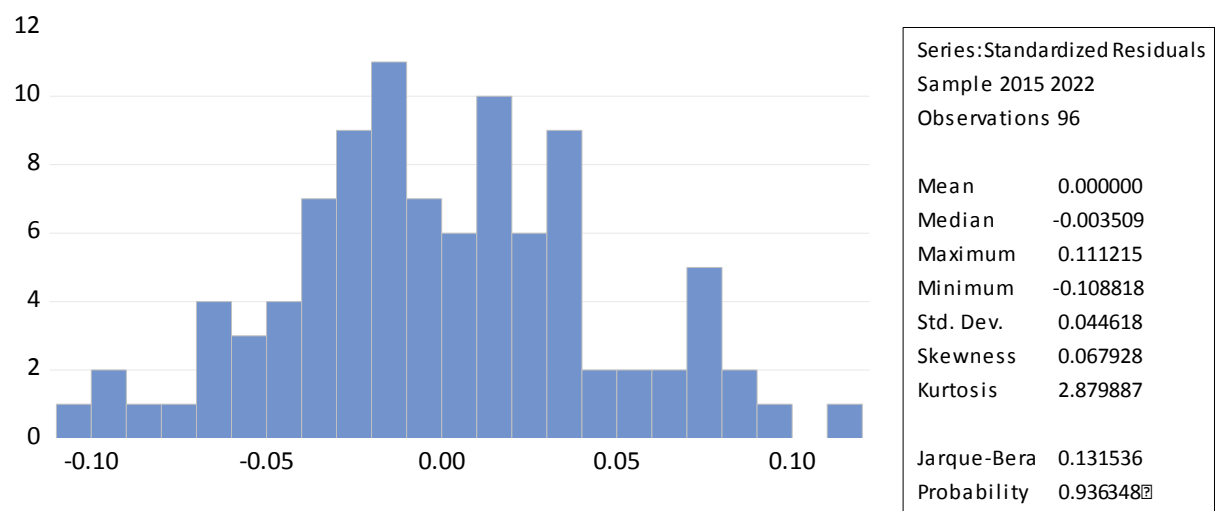


Figure 3.2: Results on the Test of Normality of the Residual Model 3.3

Source: Field Data, 2023

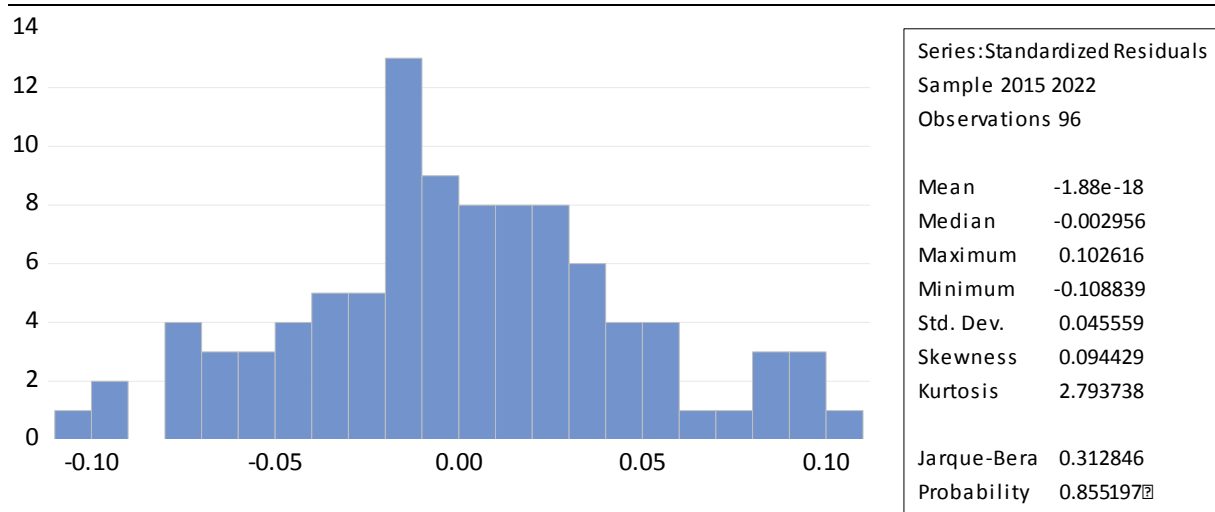


Figure 3.3: Results on the Test of Normality of the Residual-Model 3.4

Source: Field Data, 2023

In Figure 3.1 for Model 3.1, the skewness value is 0.036063 which is close to zero while kurtosis is 2.848446, which is close to 3. Jarque-Bera statistic is 0.112683 which is close to 0. Figure 3.2 shows that in Model 3.3, the skewness value is 0.067928 which is close to zero, while the kurtosis value is 2.879887, which is close to 3. The Jarque-Bera statistic is 0.131536, which is close to value zero. At the same time, Figure 3.3 for Model 3.4 indicates the skewness value is 0.094429 which is close to zero, while the kurtosis value is 2.793738, which is close to 3. The Jarque-Bera statistic is 0.312846, which is close to value zero. The overall analysis indicates that the parameters as suggested in Tabachnick and Fidell (2007) are satisfied and therefore the assumption for data normality is met.

3.8.4 Model Specification Test

Before determining the best regression method to use, it was critical to establish whether the predictor variables are endogenous, meaning, whether there exists correlation between the predictor variables and the error term. Since this thesis adopted panel data analysis, the Hausman specification test was adopted to detect endogenous regressors and determine the

best model to be used, as between fixed effect and random effect model. Under Hausman testing, the null hypothesis suggests adoption of random effect while the alternative hypothesis indicates that the fixed effect model is preferred for analysis.

To select the model to use in analysing the basic Models 3.1, 3.2 and 3.3 of this study, a Hausman test was undertaken. The results were as presented in Table 3.2.

Table 3.2: Hausman Test Results for Model 3.1

Test Summary	Chi-Sq. Statistic		Chi-Sq. d.f.	Prob.
Cross-section random	9.294250		3	0.0256
Variable	Fixed	Random	Var(Diff.)	Prob.
ME	0.428569	0.305039	0.004086	0.0533
MLDM	0.022004	0.032111	0.000014	0.0070
MCRK	-0.010829	-0.006535	0.000003	0.0188

Source: Field Data, 2023

Table 3.2 reported a significant chi-square statistic of 9.294250, $p = 0.0256$. The results suggest that the null hypothesis failed to be accepted and the alternative hypothesis failed to be rejected. Therefore, the Fixed Effect model was used to analyse Model 3.1 of this study.

Table 3.3: Results for Hausman Test-Model 3.2

Test Summary	Chi-Sq. Statistic		Chi-Sq. d.f.	Prob.
Cross-section random	16.729484		4	0.0022
Variable	Fixed	Random	Var (Diff.)	Prob.
ME	0.430196	0.259565	0.005419	0.0205
MLDM	0.023331	0.035438	0.000020	0.0074
MCRK	-0.009853	-0.004979	0.000006	0.0380
MLG	-0.039820	-0.029730	0.000484	0.6466

** Represent significance at the 0.05 level*

Source: Field Data, 2023

Table 3.3 reported a Chi-Square statistic of 16.729484 whose p-value was significant ($p = 0.0022$). This implies that at 5% degrees of freedom, the Chi-Square statistic is significant and therefore the null hypothesis failed to be accepted and the alternative hypothesis failed to be rejected. In effect, the Fixed Effect model was adopted to analyse Model 3.2 of this thesis.

In order to select between the Fixed or Random Effect model for analysing the models 3.3 and 3.4 for the interaction terms of this study, a Hausman test was carried out for the respective models and the results were as depicted in Tables 3.4 and 3.5 respectively.

Table 3.4: Results for Hausman Test-Model 3.3

Test Summary	Chi-Sq. Statistic		Chi-Sq. d.f.	Prob.
Cross-section random	14.189343		5	0.0145
Variable	Fixed	Random	Var(Diff.)	Prob.
ME	0.417275	0.240547	0.005548	0.0177
MLDM	0.020175	0.026658	0.000016	0.1071
MCRK	-0.008991	-0.003643	0.000006	0.0312
MLG	-0.002464	0.053616	0.000834	0.0522
MLDM*MLG	-0.039637	-0.091253	0.000272	0.0017

* Represent significance at the 0.05 level.

Source: Field Data, 2023

The Chi-Square statistic as per Table 3.4 is 14.189343 and significant at $p = 0.0145$. This therefore indicates that the null hypothesis for the model failed to be accepted and therefore the fixed effect model was used to estimate the relationship of the variables in the interaction model between liquidity management and loan repayment.

Table 3.5 : Results for Hausman Test-Model 3.4

Test Summary	Chi-Sq. Statistic		Chi-Sq. d.f.	Prob.
Cross-section random	17.283749		5	0.0040
Variable	Fixed	Random	Var(Diff.)	Prob.
ME	0.428685	0.258114	0.005391	0.0202
MLDM	0.023400	0.035457	0.000020	0.0077
MCRK	-0.007502	-0.002844	0.000008	0.0952
MLG	-0.043050	-0.032210	0.000521	0.6349
MCRK*MLG	0.018744	0.017339	0.000123	0.8990

The Chi-Square statistic as per Table 3.5 is 17.283749 and significant at $p = 0.0040$. This therefore indicates that the null hypothesis for the model failed to be accepted and therefore the fixed effect model was used to estimate the relationship of the variables in the interaction model between credit risk management and loan repayment.

3.8.5 Heteroskedasticity Test

The moderated regression analysis was done using the Generalized Least Square (GLS) cross-section weighted method with the cross-section coefficient covariance method. According to Gujarati (2013), GLS yields best linear unbiased estimators (BLUE) and thus obviates the need of testing heteroskedasticity as the standard errors of the regression results reported took care of the heteroskedasticity problem.

3.8.6 Multicollinearity Test

A multicollinearity condition exists whenever there is high, but not perfect, correlation between two or more explanatory variables (Wooldridge, 2010). Data that has multicollinearity is regarded redundant and overlapping. Besides, increase in multicollinearity brings with it the difficulty in explaining the associations between the study variables. This phenomenon makes it difficult to explain effects of any such variables so as to make logical findings and inferences (Wonsuk *et al.*, 2014)

There is no clear empirical agreement defining the level of correlation that causes multicollinearity. Shettima (2016) reports the conflict in the position as espoused by Hair *et al.*, (2006) and Kennedy (2008). Whereas Hair *et al.*, (2006) posits that correlation coefficient below 0.9 may not cause serious multicollinearity problem, Kennedy (2008) suggests that any correlation coefficient above 0.7 could cause a serious multicollinearity problem leading to inefficient estimation and less reliable results. Variance Inflation Factors (VIF) indicate the

increase in variance that can be attributed to multicollinearity (Greene, 2012). The rule of thumb is adopted from the assertion by Gujarati (2013) that multicollinearity can be a problem if and only if one of the VIF values exceeds 10. In this thesis, multicollinearity was tested by way of VIF and the results were as indicated in Table 3.4.

Table 3.6: Testing for Multicollinearity using VIF

Variable	Coefficient Variance	Uncentered VIF	Centered VIF
C	0.000101	11.93314	NA
ME	0.013354	12.00036	1.067218
MLDM	5.93E-05	1.536852	1.536852
MCRK	2.11E-05	1.549386	1.549386
MLG	0.001367	1.061358	1.061358

Source: Field Data, 2023

As shown in Table 3.6 all the centered VIF values lie below 10, suggesting the explanatory variables did not present multicollinearity challenges.

3.9 Ethical Consideration

In this study, ethical consideration expected of research studies, with regard to consent, confidentiality and privacy was strictly upheld. According to Saunders *et al.*, (2009), ethics are the norms and or standards of behaviour that guide and inform moral choices about our behavior and our relationship with others.

To meet this requirement, the researcher obtained an introductory letter from the School of Graduate Studies of Maseno University, disclosing the motive of the researcher while seeking to collect data for purposes of this research study. Subsequently, the Maseno University Scientific and Ethics Review Committee vetted and approved the research proposal before providing the researcher with the permission to proceed for data collection. Additionally, the

researcher applied for a research permit was from the National Committee of Science and Technological Innovations (NACOSTI) before collecting data.

In observing the ethical requirements, data obtained from the Central Bank of Kenya (CBK) website was coded to conceal the identity of the microfinance banks from whom the data used in this study was sourced. The findings of this study would be ultimately shared with CBK and NACOSTI, consistent with licensing requirements for ethical purposes. The authority letter from MUSERC and License from NACOSTI are annexed to this report as Appendix II and III respectively.

CHAPTER FOUR

RESULTS AND DISCUSSION

The results realized together with corresponding discussion organized per each study objective are presented in this chapter. To begin with, descriptive statistics followed by trend analysis of the study variables for the period of investigation is analyzed before regression analysis for the objectives are presented and discussed. Last are the results and discussion pertaining to the moderating effect of operating leverage on the relationship between liquidity management loan repayment are presented.

4.1 Descriptive Statistics

Table 4.1 presents the descriptive statistics relating to the study variables of loan repayment, liquidity management, credit risk management, operating leverage and management efficiency.

Table 4.1: Descriptive Statistics on Loan Repayment, Liquidity Management, Credit Risk Management, Operating Leverage and Management Efficiency for the MFBs

	LRP	MLDM	MCRK	MLG	ME
Mean	0.058497	2.78E-15	1.92E-15	3.57E-16	0.083282
Median	0.033344	-0.169709	-0.185046	-0.018073	0.072043
Maximum	0.372642	6.781433	14.36709	0.464642	0.306122
Minimum	-0.183333	-1.452363	-1.694078	-1.009125	0.011299
Std. Dev.	0.089479	1.118274	1.742627	0.171827	0.053644
Skewness	0.768780	3.042879	6.402868	-1.598525	1.637485
Kurtosis	4.947896	16.94806	51.14514	14.04435	6.185074
Jarque-Bera	24.63355	926.3389	9927.766	528.7951	83.48050
Probability	0.000004	0.000000	0.000000	0.000000	0.000000
Sum	5.615750	2.63E-13	1.71E-13	3.39E-14	7.995032
Sum Sq. Dev.	0.760619	118.8010	288.4913	2.804831	0.273379
Observations	96	96	96	96	96

Key: *LRP*= Loan repayment; *MLDM* = Liquidity Management; *MCRK* = Credit Risk Management; *MLG* = Operating leverage; *ME* = Management Efficiency

Source: Field Data, 2023

From Table 4.1, the loan repayment of the MFBs in Kenya, measured by net non-performing loans to total assets had a mean of 0.058497 with a maximum of 0.372642 and a minimum of -0.183333. This implies that non-performing loans to total assets ratio has a 5.8% component of liquidity management. The reported mean compares favourably with 9.1% reported in Boussaada *et al* (2020) on liquidity management and loan repayment performance among Middle East-North Africa (MENA) financial institutions but unfavourably with 13% as reported by Mohammad *et al* (2020) on liquidity management and loan repayment for conventional banks. The differences could be as a result of the panel data lengths and respective samples used in the various studies. On the other hand, liquidity management measured by the ratio of net loans to customer deposits had a mean of 2.78E-15 with a standard deviation of 1.118274 while the mean for credit risk management, being the ratio of cash and cash equivalents to customer deposits was 1.92E-15 with a standard deviation of 1.742627. Further, the mean for operating leverage, being the ratio of borrowings to total assets, was 3.57E-16 with a standard deviation of 0.171827 while the mean for management efficiency, being the ratio staff expenses and directors' emoluments to total assets, used as a control variable was found to be 0.083282 with a standard deviation of 0.053644 during the study period.

4.2 Trend Analysis on the Study Variables

Trend analysis provides a graphical outline of the pattern taken by particular study variable elements so as to predict the direction and behaviour over a period of time. Trend analysis of the sampled microfinance banks (MFBs) was conducted on each study variable for the dependent variable loan repayment, independent variables of liquidity management, credit risk management and moderating variable, operating leverage. The findings were as follows;

4.3.1 Loan Repayment

The trend depicting the behaviour of the dependent variable, loan repayment, across the period of the study was as presented in Figure 4.1.

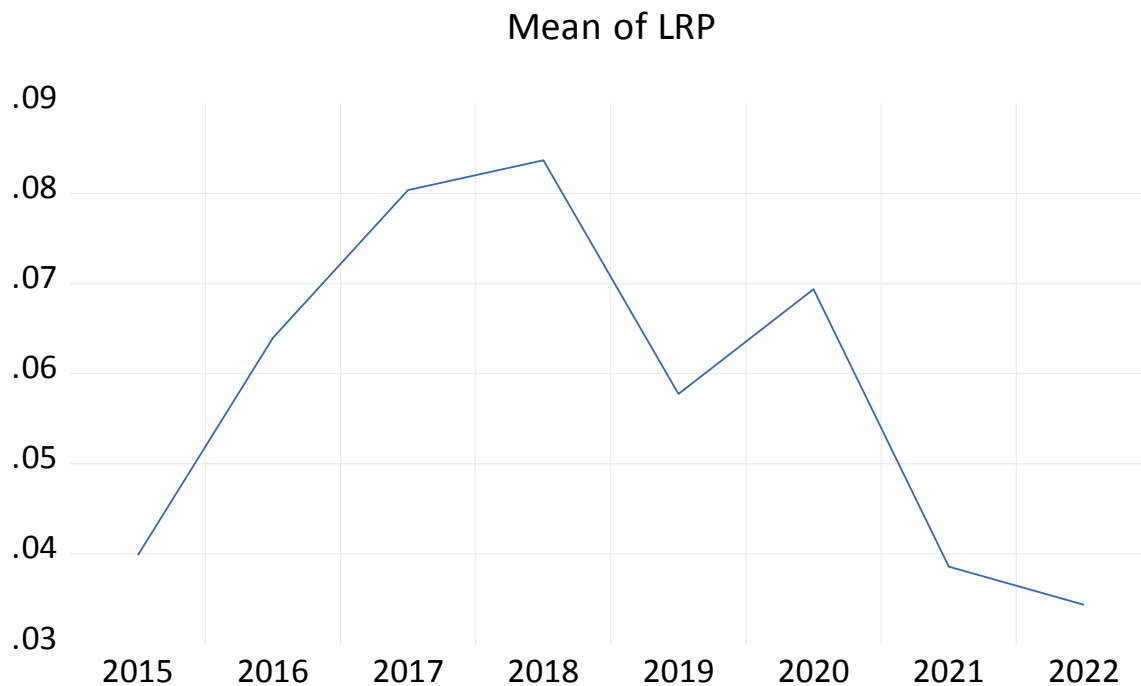


Figure 4.1: Trend for Loan Repayment

Source: Field Data, 2023

Figure 4.1 indicates that the mean loan repayment had a gradually increasing trend from 2015 to the year 2017 before experiencing a rising but gently decreasing trajectory to the year 2018. Incidentally, in the year 2018 when loan repayment performance ratio was at the peak for the study period, there was a corresponding adverse performance of the liquidity management ratio.. A high loan repayment ratio in 2018 may be interpreted to suggest that during the year, there was a slump in loan repayment which triggered a significant drop in the uptake of new loans, indicative of an adverse liquidity position experienced by MFBs at the time. This analysis serves to lend credence to the indication in the supervision report issued by the

regulator (CBK, 2018) that MFBs relied on deposits and leverage as major sources of financing their operations at the time.

There was a significant drop in the loan repayment ratio between 2018 and 2019, which was reversed in 2020 before dropping down further in 2021 and a little more in the period to 2022. This is consistent with the recorded drop in net loans issued by MFB from Ksh.46.7 billion in 2019 to Ksh.44.2 billion in the year 2020, suggesting concentration of efforts in recovery of outstanding loans (CBK, 2020).

4.3.2 Liquidity Management

The behaviour of liquidity management depicted across the period of the study was as presented in Figure 4.2.

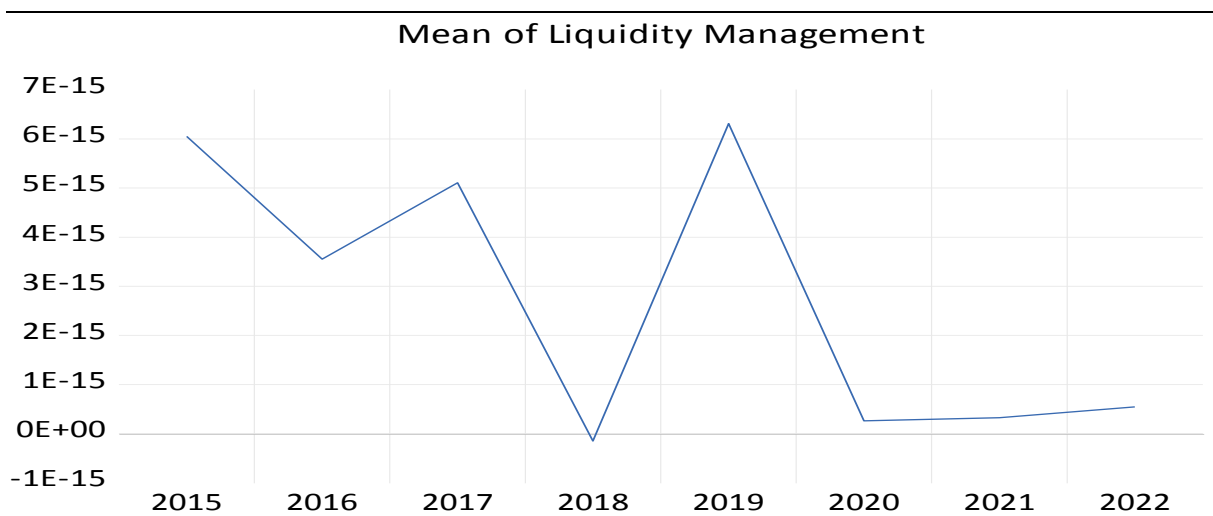


Figure 4.2: Trend of Liquidity Management

Source: Field Data, 2023

From the graphical presentation of the trend with respect to liquidity management, Figure 4.2 indicated that the variable, measured using the ratio of loans to deposits has been gently decreasing from the year 2015, slightly improved between mid 2016 and 2017 before sharply dropping to zero in 2018. This implies in year 2018, there MFBs were drained of liquidity such

that they experienced difficulties to meet their arising loaning obligations. The rapid decline could have been associated with low demand of loans by members of MFGs for investment. At the same time, the drop in liquidity management ratio could be interpreted to suggest that even though borrowers could have been seeking for loans, there were no funds in their reserves to meet the obligations, courtesy of the corresponding behaviour in loan repayment trend, discernible from Figure 4.1. This resonates with the regulators' analysis in their supervision report which highlighted reliance on borrowed funds and member deposits as having been the major sources of liquid assets to MFBs at the time (CBK, 2019). In the subsequent year, 2019, there was a sudden rise in disbursed loans, leading to high liquidity management ratio, before dropping to a nearly similar position in 2020 as experienced in 2018. Thereafter, an asymptotic-like low stagnant ratio is witnessed, evidence of the struggle by MFBs to regain cashflow stability to the end of the period covered in this study. Therefore, from the demonstrated patterns in Figures 4.1 and 4.2, it is safe to report as a finding of this study, that at the point when loan repayment performance is low and unfavourable, courtesy of increased non-performing loans, liquidity management is most adversely affected. This finding is consistent with past studies (Sangwan, Nayak and Samanta, 2020) who reported that liquid resources in MFBs are supported by attracted deposits and internally generated funds from recovered loans and further, as highlighted in Dzapasi (2020), confirms that liquidity management strongly influences the performance of financial institutions.

4.3.4 Credit Risk Management

Data relating to the trajectory of efforts employed by MFBs to mitigate the threat of the likelihood of non-repayment of disbursed loans, measured by the ratio of cash and cash equivalents to member deposits were graphically analyzed and the results were as shown in Figure 4.3.

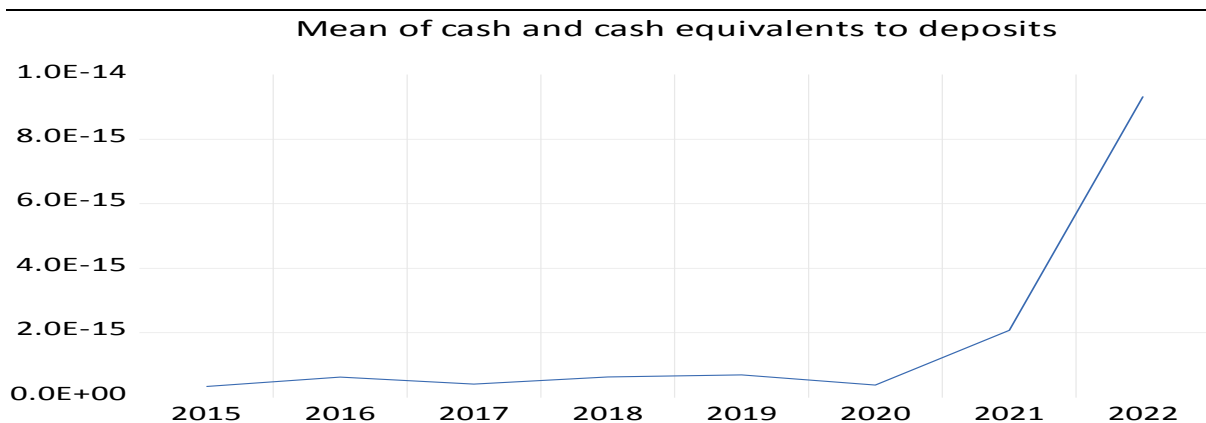


Figure 4.3: Trend of Credit Risk Management

Source: Field Data, 2023

It can be safely deduced from Figure 4.3 that the graph for the ratio of cash and cash equivalents to member deposits remained significantly low from the start of 2015 until the year 2020 when significant rise is noted from year 2020 before it picked up to assume a sharp rise from 2021 to 2022. The graph may be interpreted as suggesting that MFBs had not been employing adequate credit risk mitigation measures during the study period, until the year 2020 when the reality and need to monitor their loan books dawned on them. After adopting preventive measures to overcome losses associated with default, the period between 2021 to 2022 experienced a consistent rapid growth in the credit risk management ratio. Interestingly, while the efforts to revamp credit risk management were enhanced from year 2020, liquidity management remained at an all time low and remained as such until 2022 as per Figure 4.2.

4.3.5 Management Efficiency

The ratio of staff expenses and directors' emoluments to total assets, which was the metric for management efficiency was plotted graphically and provided the results as shown in Figure

4.4.

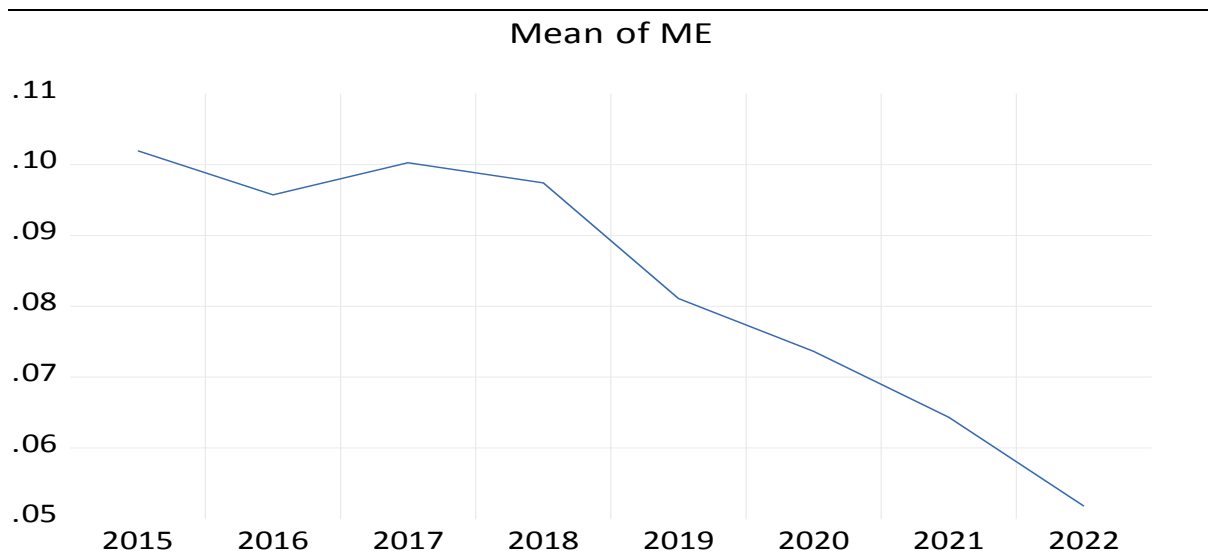


Figure 4.4: Trend of Management Efficiency

Source: Field Data, 2023

From Figure 4.4, the direction of the graph suggests the peak of the period when management efficiency was at its optimum is from the period of regulation of MFBs. There has been recorded a progressive slump in the management of recurrent expenditure with a sharp decline reflected from 2019 to the end of the study period. This implies that the control variable of fixed administrative expenses has been steadily declining over the study period.

4.4.1 Relationship between Liquidity Management and Loan Repayment

To test the first objective of this thesis, a null hypothesis, H_{01} , was formulated to the effect that there was no statistically significant relationship between liquidity management and loan repayment among microfinance banks (MFBs) in Kenya. Fixed effects simple regression analysis was conducted on the study variables in the basic model of the study, which incorporated the interaction of all the independent variables (liquidity management, MLDM; credit risk management, MCRK), the control variable, management efficiency, ME as measured against the dependent variable, loan repayment (LRP). The results were as presented in Table 4.2.

Table 4.2: Fixed Effect Regression-Basic Model

Variable	Coefficient	Std. Error	t-Statistic	Prob.
C	.025046	.009824	2.549565	.0127
ME	.401666	.112987	3.554967	.0006*
MLDM	.020110	.007460	2.695535	.0085*
MCRK	-.009874	.004353	-2.268152	.0260*
R-squared	0.826936			
Adjusted R-squared	0.797024			
S.E. of regression	0.049850			
F-statistic	27.64544			
Prob(F-statistic)	0.000000			
Durbin-Watson	1.726765			

Source: Field Data, 2023

** Represent significance at the 0.05 level*

Source: Field Data, 2023

Table 4.2 presents the regression results arising from testing the relationship between the study variables as contained in the primary model of the study, Model 3.1. It reveals that liquidity management and loan repayment have a weak but statistically significant positive relationship ($\beta = 0.020110$, $p = 0.0085$), suggesting, as liquidity management increases, it yields a corresponding 2.01% increase in loan repayment.

This finding suggests that whenever efforts to manage liquid assets of MFBs are engaged, there is recorded minimal corresponding change in the loan repayment trajectory. The results show that as MFBs strive to secure adequate liquid assets to meet their arising obligations, they project an image of sound financial strength from the perspective of the borrowers. This impression stimulates the desire by borrowers to remain trusted by the MFBs in anticipation of future application of higher value loans. By striving to maintain a good borrowing record, loan default becomes as disincentive, leading to deliberate measures by borrowers to meet their

arising obligations regularly. Since just but a section of all loanees would appreciate the value of maintaining good relations with MFBs for purposes of future mutual engagements, the increase in loan repayment could be traceable to the diligent minority, which explains the marginal increase in response.

These results are inconsistent with those in Khaled (2019) who reported an inverse relationship between liquidity and non-performing loans. At the same time, the results improved the justification in the reported findings of Chinweoda *et al* (2020) which indicated a weak but statistically significant relationship between liquidity management and performance of deposit banks. Unlike the findings in this study which were subjected to hypothesis testing, results in Chinweoda *et al* (2020), which was an *ex post facto* designed study, could have led to predicting a spurious relationship.

At the same time, the findings of this study provide a plausible justification of the findings in Shakatreh (2021) who reported a negative relationship between liquidity management ratios and firm profitability ($\beta = -.774$, $p = 0.000$). In this study, it has been shown that increase in liquidity management ratio implies availability of more liquid resources, which is manifested through increased issuance of loans. In the event that adequate loan appraisal mechanisms are not effectively implemented, there would be a noted increase in loan repayment on account of growing non-performing loans. Growth in non-performing loans results in suppressed interest income, hence low profitability. In this context therefore, it can be safely inferred that loan repayment precedes profitability among financial institutions.

With regard to the study context, the results indicate that whenever efforts to manage liquid assets of MFBs are increased, there is recorded minimal corresponding positive change in the

loan repayment trajectory. The results show that as microfinance banks strive to secure adequate liquid assets to meet their arising obligations, they project an image of sound financial strength from the perspective of the borrowers. This impression stimulates the desire by borrowers to remain trusted by the MFBs in anticipation of future application of higher value loans. By striving to maintain a good borrowing record, loan default becomes a disincentive, leading to deliberate measures by borrowers to meet their arising obligations regularly. Since just a section of all loanees will see the value of maintaining good relations with MFBs for purposes of future mutual engagements, the increase in loan repayment could be traceable to the minority, which explains the marginal increase in response.

At the same time, the results may be interpreted to mean that disbursement of more loans may include granting credit to borrowers who, along the repayment journey, may get distressed. This would lead to repayment but not at the rate that may be projected. It would be safe to infer from the findings therefore, that growth in the loan book leads to growth in non-performing loans. This could be on account of inclusion of onboarding debtors with doubtful credit history or whose anticipated income fail due to the exigencies of the business environment. Consistent with pronouncement of the anticipated income theory, the findings of this study concur with past studies which related firm revenue to the projected earnings of borrowers. The point of departure however, is that the results of this study suggest limited reliance should be accorded to disbursed loans because the weak positive growth, if extrapolated across longer periods, may result in depressed industry returns and possible liquidation of adversely affected MFBs.

The reported adjusted R-squared ($R^2 = 0.797024$, $p = 0.000$) indicates that liquidity management together with the combined variables of the study predict approximately 79.7024% of the changes in loan repayment among MFBs. The other variables not included in

the model account for the remaining 20.2976% of loan repayment performance of MFBs in Kenya. These results resonate with past empirical findings in Beck, Jakubik and PiloIU, (2015); Bassey *et al.*(2016); Khan and Kazi, (2016) and Dzapasi (2020) who reported a positive and significant relationship between liquidity management and loan repayment. Moreover, the current study results provide a more comprehensive outlook of the parameters since it used moderated multiple regression on panel data at firm level unlike Beck, Jakubik and Pilou (2015) which was at cross-country level, Bassey *et al.* (2016) a desk-top review while Dzapasi (2020) used mixed methodology with purposively sampled data.

However, the findings contradict those of other past studies (Muhammad *et al.* 2020; Ojiako *et al.*,2014; Sathyamoorthi *et al.*,2020; Shakatreh, 2021 and Salifu *et al.*, 2018) who reported a significant but negative relationship between liquidity management and loan repayment. However, the context of Sathyamoorthi *et al.*(2020) was in commercial banks whereas Salifu *et al.* (2018) was a case study among small and medium enterprises, as was Muhammad *et al.* 2020. Shakatreh (2021) focused much on profitability and analyzed data obtained from industrial firms, whose revenue source is predominantly derived from sale of manufactured products unlike the current study which was conducted among MFBs which rely on interest on loans as their primary source of income.

The findings of the primary relationship between liquidity management and loan repayment showed that, unlike other outcomes in related reviewed studies, there exists a weak relationship between liquidity management and loan repayment. This qualified the parameters to be tested for moderation, consistent with the recommendations in Baron and Kenny (1986).

Based on the findings, the null hypothesis, H_{01} , that there is no statistically significant relationship between liquidity management and loan repayment among microfinance banks (MFBs) in Kenya is rejected and the alternative accepted.

4.4.2 Relationship between Credit Risk Management and Loan Repayment

Objective two of the study sought to determine the relationship between credit risk management (MCRK) and loan repayment (LRP) among microfinance banks in Kenya. To realize this objective, a null hypothesis, H_{02} , that there is no statistically significant relationship between credit risk management and loan repayment among microfinance banks in Kenya, was formulated. Fixed effects regression results for the relationship between credit risk management and loan repayment, as per the basic model shown in Table 4.2.

The panel regression results reveal that there is a negative but statistically significant relationship between credit risk management and loan repayment ($\beta = -0.009874$, $p = 0.0260$). This implies that a unit increase in credit risk management ratio leads to a significant 0.98% decrease in loan repayment ratio. The decline is associated with the reduction in non-performing loans which is the numerator in the loan repayment ratio. The results show that as MCRK, measured by the ratio of total cash and cash equivalents divided by customer deposits, increase, the ratio of net non-performing loans to total assets decrease minimally but significantly. Since the basic model's adjusted R^2 was 0.797024 and $p = 0.0000$, as reported in Table 4.2, it can be deduced from the findings that credit risk management together with the combined variables in the primary model account for 79.7024% of the changes in loan repayment among MFBs in Kenya.

This outcome is consistent with the findings in Ademola and Adegoke (2021) who established that interest rate, as a measure of credit risk management, and loan repayment have an inverse but statistically significant relationship ($\beta = -.112$, $p=.012$). They also correspond with the outcome in Khan, Siddique and Sarwar (2020) whose findings showed that credit risk management was positively correlated with non-performing loans ($\beta = -.0804$, $p=.0000$). However, the findings in this study deviate from those in Ademola and Adegoke (2021) with respect to conceptualization, measure and methodological orientation. Whereas this study perceived credit risk management as a firm-specific loss mitigation parameter, measured using a financial ratio metric, Ademola and Adegoke (2021) analyzed interest rates which is a macroeconomic element of credit risk. Additionally, like Khan, Siddique and Sarwar (2020) and Orichom and Omeke (2020), Ademola and Adegoke (2021) reported findings were derived from purposively sampled data which is not only subjective given its unrepresentative nature but also incapable of generating results that can be reliably generalized. This study's findings provide a more robust outlook of credit risk management since it provides a firm-specific analysis of the interaction between credit-risk management and loan repayment.

On the other hand, findings in this study contradict those in Orichom and Omeke (2020) who reported a positive and statistically significant relationship between credit risk management and financial performance ($\beta = 0.529$, $p = 0.01$). The divergence in the reported results could be informed by the deliberate focus of this study to analyze the constructs at the foundational level of interaction, rather than from the global outlook. Financial management attributes of an entity stretch to cover various company attributes which may not adequately bring out the primary output of the interplay amongst selected variables. By focusing on loan repayment, the findings of this study are more targeted at deriving the foundational theoretical basis which can be used to justify the explanation of the outcome as reported in Orichom and Omeke (2020).

From a methodological perspective, even though this study obtained similar findings as those reported by Khan, Siddique and Sarwar (2020), who found out that credit risk management, surrogated as operating efficiency had an inverse and statistically significant relationship with NPLs ($\beta = -.0804$, $p = .000$), the latter used both random and fixed effect models in analysis. Fixed effect model studies are based on the assumption that all studies in the meta-analysis share a common (true) effect size. On the contrary, the random-effects model allows that the true effect size may vary from study to study (Borenstein, Hedges, Higgins and Rothstein, 2010). These make the dual findings in Khan, Siddique and Sarwar (2020) conflicting. This study only adopted the fixed effect model which was scientifically selected from the range of options available to analyze secondary data on credit risk management and loan repayment.

From the credit risk theory standpoint, high loan repayment is an indicator of comprehensive mechanisms in the loan management department. By inference, efforts to mitigate against loss due to default are expected to yield favourable loan repayment and thus improve repayment. In the short-run, it would be safe to conclude that total assets are bound not to change significantly and therefore growth or reduction in the loan repayment ratio would be triggered by changes in non-performing loans. At the same time, both total cash and cash equivalents alongside deposits are bound to improve in the short run, leading to increase in the credit risk management ratio as conceptualized in this study. When stringent measures are taken to overcome default, the ratio would experience growth with the corresponding influence leading to reduction in non-performing loans. This outcome is consistent with the priori expectation that measures to improve the credit risk management component of loan issuance would serve to filter borrowers by isolating defaulters and hence reducing the loan repayment ratio.

The Durbin-Watson (D-W) is a test statistic used in regression analysis to detect the likelihood of the presence of autocorrelation among the residuals (Benchimol, 2020). The D-W statistic normally ranges from 0 to 4. Results of D-W near 2 reflects non-autocorrelation, values tending towards 0 indicates positive autocorrelation while those tending towards 4 connotes negative autocorrelation. Conventionally, the limit bounds have been set between 1.5 and 2.5 to demonstrate absence of serial correlation. The null hypothesis with respect to interpreting D-W statistic is that the residuals are not correlated. From the results indicated in Table 4.2, D-W statistic was 1.726765 which is within the indicated threshold.

From the study results, it can be inferred that whenever measures are employed to mitigate potential loss due to default, the outcome yields suppressed non-performing loans. This position is consistent with the pronouncement of the credit risk theory which advocates for measures to interrogate loanees as mitigation mechanisms to control for future default. The theory presupposes that due to inevitable information asymmetry subsisting between borrowers and lenders, deliberate steps must be taken by financial institutions to extract as much critical details as possible from the borrowers so as to provide a balanced understanding of the established credit integrity of loanees. From this finding, it can be deduced that taking preventive measures to arrest potential default works in favour of loan repayment performance of MFBs, as non-performing loans are seen to be reduced with enhanced loaning restrictions.

To explain this output, it can be deduced that strict measures in the credit issuance framework of MFBs serves to clean the loan book of potential defaulters. When loan applicants for loan products are exposed to stringent qualification benchmarks, this information is processed amongst potential borrowers, leading to compliance in honouring loan obligations and hence reduced non-performing loans. Besides, strict enforcement for recovery of defaulted loans

leads to accumulation of liquid assets besides enhancing the credit image of MFBs amongst its trading partners. It can therefore be safe to infer from the findings that tight credit control mechanisms help in cleaning the loan book of borrowers with tainted credit history and serves to strengthen the liquidity base of MFBs.

On account of the credibility of the tests shown, therefore, the null hypothesis, H_{02} , for the second objective to the effect that there is no statistically significant relationship between credit risk management and loan repayment among microfinance banks in Kenya, failed to be accepted and the alternative hypothesis failed to be rejected.

4.4.3 Relationship between Operating Leverage and Loan Repayment

Objective three of the study sought to determine the relationship between operating leverage and loan repayment among microfinance banks in Kenya. Consistent with best practice, the direct primary relationship between the moderator, operating leverage (MLG) and the dependent variable, loan repayment (LRP) was tested. The results were as presented in Table 4.4.

Table 4.4: Relationship between Operating Leverage and Loan Repayment

Variable	Coefficient	Std. Error	t-Statistic	Prob.
C	0.022934	0.010054	2.281049	0.0252
ME	0.427020	0.115558	3.695292	0.0004
MLDM	0.019448	0.007702	2.524971	0.0135*
MCRK	-0.010308	0.004590	-2.245629	0.0275*
MLG	-0.004192	0.036977	-0.113361	0.9100
R-squared	0.819059			
Adjusted R-squared	0.785133			
S.E. of regression	0.049667			
F-statistic	24.14227			
Prob (F-statistic)	0.000000			
Durbin-Watson Stat	1.693142			

* Represent significance at the 0.05 level.

Source: Field Data, 2023

Table 4.4 reveals that there is an insignificant negative relationship between operating leverage and loan repayment ($\beta = -0.004192$, $p = 0.9100$). This implies that one unit increase in operating leverage leads to an insignificant 0.419% decrease in loan repayment. Since low loan repayment signifies high default, this finding lends credence to the argument in literature that low leverage ratio results in high loan default (Choudhary and Jain, 2021). As pronounced in Carte and Russell (2003), the moderator variable may or may not have an effect on the dependent variable, but serves to provide the platform against which distinction between the direct and interaction effects are logically explained.

One possible explanation as to why the direct relationship between operating leverage and loan repayment performance is negative is that using borrowed funds for lending places demand on the MFBs to exercise extra caution through enhanced vigilance from appraisal through to loan repayment monitoring. Resources are committed more to reinforce strict recovery measures, including appointment of loan collection agents for aggressive default management mechanisms, comprehensive loan appraisal and stringent management of the loan accounts. This requires investment in professional human resource capacity, credit management software

and incentive recovery programmes tied to targets all designed to inspire staff dedication towards achieving desired optimum loan repayment. Since the anticipated income theory presupposes loanees' business earnings to offset loan obligations, establishment of a comprehensive recovery mechanism serves to facilitate recovery consistent with this theory.

However, the insignificance of the relationship between leverage and loan repayment could be due to the likelihood that debt recovery initiatives cannot guarantee one hundred percent repayment of disbursed loans. Much as loans would be aggressively pursued for repayment, a sizeable proportion of debtors are bound to remain in default for a cocktail of reasons, ranging from premeditated non-compliance, cashflow difficulties, poor business management on the part of the borrowers, misplaced investments or changes in the trading environment leading to struggling business ventures. From the anticipated income theory standpoint, it can be safely deduced from the findings of this study that any form of frustration on the part of borrowers directly extends to manifest in low recoveries. With expenses incurred to put up strict recovery measures, coupled with repayment of loans advanced and interest payments thereon, collected money is offset against costs incurred and hence explaining the insignificance in the relationship.

From the moral hazard perspective, the results indicate that information asymmetry still exist between loanees and MFBs. It can be deduced from the findings that even in the most comprehensive of loan appraisal and recovery mechanisms employed to ensure loan repayment, critical details touching on repayment assurance could remain undisclosed by loanees. Such non-disclosure makes it unlikely for MFBs to secure confidence in stringent recovery as a lone strategy to collect disbursed loans. If this scenario prevails under circumstances where borrowings are used to supplement loanable funds, recovery from well-

intentioned loanees could account for improved loan repayment. However, in the long run, the repayment gains would be reversed by the effects of the realities of the undisclosed information, leading to insignificance in the relationship between leverage and loan repayment.

Looking at the results from the standpoint of the MFBs, borrowings are shown to introduce a new perspective to the moral hazard theory. The inverse relationship between leverage and loan repayment suggests that when MFBs cut down on borrowings, there occurs a spike in non-performing loans. This finding suggests that in the event of inadequate internally generated funds, and whenever MFBs fail to outsource for liquidity through short term loans, borrowers exploit their weak position by defaulting on loans. Besides, it can be inferred from the findings that whenever funds are not available to closely monitor borrowers, their affinity towards default substantially grows. On the flipside, it can be interpreted that when MFBs use borrowed funds for loaning, they re-direct the collections towards repaying their creditors to avoid a scenario of upsetting their relationship for future business considerations. It can therefore be safely concluded that MFBs act in good faith towards protecting their integrity with creditors through overriding the moral hazard threat by honouring their loan obligations. However, avoiding secondary default comes at the expense of their own growth since funds recovered end up being used to offset outstanding obligations, hence the negative relationship.

With regard to the hypothesis adopted for this objective, it was proposed that there was no significant relationship between operating leverage and loan repayment among microfinance banks in Kenya. The results from Table 4.4 ($\beta = -0.004192$, $p = 0.9100$) indicate that the relationship between operating leverage and loan repayment is negative and insignificant. Additionally, one half of the coefficient, working out as -0.002096 , is less than the reported standard error of estimate at 0.036977 , which suggests further that the coefficient of the

relationship between operating leverage and loan repayment is insignificant. It therefore follows that the null hypothesis failed to be rejected and the alternative hypothesis failed to be accepted.

4.4.4 Moderating effect of Operating Leverage on the Relationship between Liquidity Management and Loan Repayment

Objective four of the study sought to evaluate the moderating effect of operating leverage on the relationship between liquidity management and loan repayment among microfinance banks in Kenya. A null hypothesis to the effect that operating leverage has no moderating effect on the relationship between liquidity management and loan repayment among microfinance banks in Kenya was formulated to realize this objective. To test this hypothesis, the researcher adopted the step-wise hierarchical procedure as recommended by Baron and Kenny (1986). The first step involved analysing the direct relationship between liquidity management and loan repayment. Liquidity management was measured by the ratio of net loans to customer deposits while loan repayment was measured by the ratio of net non-performing loans to total assets. To establish the statistical significance of the hypothesized relationships, multiple linear regression was conducted at 95% confidence level ($\alpha = 0.05$). Fixed effect model was used to test the primary relationship between the independent and dependent variables. The summary of the relationship between liquidity management and loan repayment from the primary model 3.1 was as shown in Table 4.5.

Table 4.5: Primary relationship between liquidity management and loan repayment in Model 3.1

Model	β	Std Error	t-statistic	Prob. Sig.	R²	Adj.R²
3.1	0.020110	0.007460	2.695535	0.0085*	0.826936	0.797024

*Represents significance at the 0.05 level

Source: Field Data, 2023

Table 4.5 indicates that without the cross product, the relationship between liquidity management and the dependent variable, loan repayment is positive and significant ($\beta = 0.020110$, $p = 0.0085$) with an adjusted R^2 of 0.797024. This indicates that the primary model depicting the relationship between the liquidity management and loan repayment, but without the moderator, explains 79.7024% changes in loan repayment, leaving about 20.2976% to be explained by other factors not included in the study.

The findings reflect a weak but significant relationship between liquidity management and loan repayment of 2.01%. With respect to testing significance using the comparison between the coefficient and the standard error, the results show that one half of the coefficient, worked out as 0.010055 is higher than the standard error of 0.007460. This confirms that the coefficient is significant.

According to the anticipated income theory of liquidity, term loans are designed to be liquidated by the borrowers' earnings. The theory presumes that in both prosperous and hard economic times, a well-managed, well-established entity whose past earnings' transactional records can be well vouched for, is comfortably placed to offset its loan obligations. It is also theoretically hypothesized that financial institutions would naturally provide safeguards to protect their liquid assets from exposure, indicating that in the event issued loans are not retired, lending entities would remain in operation uninterrupted. The findings of the primary relationship between liquidity management and loan repayment indicate that increase in the liquidity management ratio leads to a corresponding increase in loan repayment ratio. This implies that when more loans are issued, the rate of non-performing loans increase relative to total assets. This trend points to the likelihood that the drive to grow the loan book through issuing more loans is not compensated by the borrowers' regular repayment. Instead, it triggers

sustained default. Supposing MFBs rely exclusively on internally generated funds out of the collections from the projected anticipated business income, there is a likelihood of them being starved of liquid resources. To this end therefore, this finding conflicts the assumption of the anticipated income theory which presumes borrowers would prioritize loan repayment from their business ventures' returns.

The upshot of this disconnect introduces the application of the moral hazard theory to explain the shift in repayment commitment on the part of loanees. The weak but significant positive relationship of 2.01% between liquidity management and loan repayment reveals that there is a 2.01% chance that the moment loans issuance is sustained, borrowers relax their commitment to repayment either because they are not aggressively followed up with repayment pressure or they presume a state of excess liquidity which then inspires them to ride on weaknesses in the recovery framework of MFBs. Looked at from the MFBs' lenses, it can be safe to interpret the results as suggesting that the moral hazard assumptions of withdrawn impetus to contractual obligations is experienced in the credit departments. The results imply that MFBs' staff responsible for pursuing borrowers demonstrate lethargic tendencies whenever there is a sustained growth trajectory in loan issuance, with the reigning perception being that the firms are doing well. Better still, the moral hazard attribution of lack of due care can be traced to MFBs' staff responsible with loan appraisal. Since they are not directly liable for the pecuniary loss on the MFBs occasioned by defaults, the positive relationship between liquidity management and growth in non-performing loans may be attributed to negligence which results in shortcomings within the loan appraisal filtering mechanisms. The gaps in the appraisal process have the ability to compromise the qualification standards, resulting in the approval of loans to borrowers whose repayment discipline exposes MFBs to defaults.

At the second step, the operating leverage was introduced into the relationship and the outcome was as depicted in Table 4.6

Table 4.6: Inclusion of operating leverage as an independent variable in model 3.2

Model	β	Std Error	t-statistic	Prob. Sig.	R ²	Change in R ²	Adj.R ²
3.1	0.020110	0.007460	2.695535	0.0085*	0.826936	0.826936	0.797024
3.2	0.019448	0.007702	2.524971	0.0135*	0.819059	-0.007877	0.785133

*Represents significance at the 0.05 level

Source: Field Data, 2023

Table 4.6 indicates that the relationship between liquidity management and loan repayment remains positive and statistically significant ($\beta = 0.019448$, $p = 0.0135$), even at the inclusion of the moderator, operating leverage. It is also revealed that the introduction of operating leverage in the model has the effect of reducing both the relationship level, from 0.020110 to 0.019448 and R² from 0.826936 to 0.819059 ($\Delta R^2 = -0.007877$).

The results show that the introduction of operating leverage in the model, stimulates a reduction in the relationship level subsisting between liquidity management and loan repayment. This means, by onboarding borrowings into the model, the growth in the net loans to customer deposits ratio maintains a statistically significant positive relationship but at a reduced rate. The implication of this result is that by boosting the liquidity level of MFBs through acquisition of short-term loans, the liquidity management – loan repayment level marginally reduces but maintains a positive direction. This means that, even upon receiving borrowings, MFBs still experience rise in non-performing loans, though at a reduced rate. This outcome is consistent with past findings in Soltane (2013) which reported a positive and significant relationship between operating leverage and loan repayment performance ($\beta = 0.491$, $p=0.01$). However, this study differs from Soltane (2013) which used a mix used both primary and secondary data

and that it focused on commercial banks whose financial reporting model is done quarterly and therefore yielding more observations.

From the anticipated income theory standpoint, the results portray the likelihood that due to care that is exercised by MFBs by disbursing loans from funds obtained from external sources, measures are employed to ensure meticulous follow ups on borrowers designed to discourage default. This is from the focal point of MFBs. However, most interestingly, MFBs are also customers to the firms that disbursed the loans to them. It can be deduced from the finding that MFBs are diligent borrowers that are reliable in the way they implement use of borrowed funds. This serves to create strong partnership bonds between them and their corporate lenders.

The second perspective in interpreting this finding is aligned to the moral hazard theory. The results disclose a new perspective to the moral hazard theory which, conventionally, factors the information asymmetry against lenders. According to the output of this study, borrowed money introduces fiscal discipline which then enhances austerity measures in the management of financial resources. Because of external funds, financial institutions reinforce the filtering criteria at the point of loans' appraisal such that only borrowers with outstanding credit qualities qualify to receive loans. Because loanable funds are generally available, all qualified borrowers are advanced with loan products which are then closely monitored, thus stimulating improved repayment.

This finding introduces a novel limb of argument to the development of the moral hazard theory in favour of third-party lenders. MFBs in this context are secondary lenders, since they employ borrowed resources in their traditional lending business. Unlike the general view of the theory where borrowers do not exercise due care given that their level of exposure is not adverse, it

can be inferred from this finding that on the contrary, leverage stimulates fiscal discipline for the benefit of the primary lender. To the primary lenders, that is the sources from which MFBs obtain funds, the anticipated income theory can aptly explain their comfortable position in this context, albeit theoretically.

With regard to the insignificant level of the relationship, the results suggest that investing in loaning using third party borrowings acts as a disincentive to the MFBs. This is because the funds against which their loanees are pursued are essentially to be recovered for the ultimate beneficiary, the primary lenders. This makes the improved repayment trend shown not of significant, thus buttressing the findings in literature that advocate for use of internally generated funds than borrowings. Additionally, the negative growth change in R-squared (-0.007877) testifies in support of the uncomfortable position that MFBs are placed owing to use of borrowings for subsequent loaning.

The third level of testing moderation involved the introduction of the interaction term of liquidity management and the moderator into the model to determine its influence on the relationship between liquidity management and loan repayment. The results of the cross-product effect is as shown in Table 4.7.

Table 4.7: Moderating Effect of Operating Leverage on the Relationship between Liquidity Management and Loan Repayment

Variable	Coefficient	Std. Error	t-Statistic	Prob.
C	0.024708	0.010157	2.432654	0.0172
ME	0.403994	0.117488	3.438615	0.0009
MLDM	0.012794	0.007237	1.767851	0.0809
MCRK	-0.007944	0.004504	-1.763651	0.0817
MLG	0.059638	0.034868	1.710408	0.0911
MLDM*MLG	-0.099417	0.038148	-2.606118	0.0109
R-squared	0.832757			
Adjusted R-squared	0.798886			
S.E. of regression	0.048928			
F-statistic	24.58549			
Prob(F-statistic)	0.000000			
Durbin-Watson Stat	1.759349			

The Regression results of Model 3.3 from Table 4.7 gave rise to the following equation;
 $LRP=0.024708+0.012794MLDM-0.007944MCRK+0.403994ME+0.059638MLG-0.099417MLDM * MLG$

In order to reflect the observed changes as shown in the respective models involved in the moderation testing process, the outcomes from each of the three models were summarized and the results presented in Table 4.8 for purposes of assessing the moderation effect.

Table 4.8: Moderating effect of Operating Leverage on the Relationship between Liquidity Management and Loan Repayment

Model	β	Std Error	t-statistic	Prob. Sig.	R ²	Change in R ²	Adj.R ²
3.1	0.020110	0.007460	2.695535	0.0085*	0.826936	0.826936	0.797024
3.2	0.019448	0.007702	2.524971	0.0135*	0.819059	-0.007877	0.785133
3.3	-	-	-	-	0.832757	0.013698	0.798886
	0.099417	0.038148	2.606118	0.0109*			

*Represents significance at the 0.05 level

Source: Field Data, 2023

Table 4.8 shows that the coefficient of the product term, MLDM*MLG, ($\beta = -0.099417$, p-value=0.0109). This means that a unit increase in liquidity management together with an

increase in the operating leverage leads to a decrease of 0.099417 in the loan repayment rate of the MFBs in Kenya. In addition, the effect is significant as the p-value is less than the 0.05 level of significance. In addition, the R^2 of the interaction term, Model 3.3, is 0.832757, implying that the model with the product term of liquidity management and operating leverage explains approximately 83.27% changes in loan repayment among MFBs in Kenya. This is a significant increase from Model 3.1 ($0.832757 - 0.826936 = \Delta R^2$ of 0.00582, approximately 0.58%) and from Model 3.2 ($0.832757 - 0.819059 = \Delta R^2$ of 0.013698, approximately 1.3698%).

Therefore, it can be deduced from Table 4.8 that when the interaction term between liquidity management and operating leverage is introduced to the model, there is a significant increase in R^2 by 0.013698 (1.3698%). According to Kenny (2018), moderation is taken to be of small, medium or large effect when its size is 0.5%, 1% and 2.5%. From the hierarchical perspective of analysis, this study reported an effect size of the interaction as 1.36% indicating a medium effect moderation of operating leverage on the relationship between liquidity management and loan repayment among MFBs in Kenya.

While confirming that majority of studies reporting significant interaction effects post small effect sizes, Dawson (2014) posits that R^2 is not an ideal metric for independently measuring the interaction effect brought about by the moderator. This argument is buttressed in the subsequent works by Memon *et al.*, (2018) and Hair *et al.*, (2022) who reiterate that computation of effect size, f^2 , clearly indicates the value of contribution of the interaction term in explaining the changes in the endogenous construct. This procedure serves to eliminate the exogenous construct from the final model since inevitably, there is a shared variance between the independent variable, moderator and the interaction term when observed collectively. Put differently, the interplay between the exogenous construct and the moderator

and how they jointly influence the endogenous construct obscures the specific contribution attributable to the interaction term. To cure this conundrum, the exogenous construct must be eliminated by employing the following formula;

$$f^2 = \frac{R^2_2 - R^2_1}{1 - R^2_2}$$

Where: f^2 = ratio of variance explained by the interaction term

R^2_1 = variance explained by the model excluding the interaction term

R^2_2 = variance explained by the model including the interaction term

Using values extracted from Table 4.9, R^2_1 is 0.826936 while R^2_2 is 0.832757.

Substituting the values in the formula above, the interaction term works out as below;

$$\begin{aligned} f^2 &= \frac{0.832757 - 0.826936}{1 - 0.832757} \\ &= 0.03481 \end{aligned}$$

There is no consensus in literature over the appropriate metric to distinguish between small, medium and large interaction effects. Cohen (1988) proposes 2%, 15% and 35% to represent small, medium and large interaction effects respectively which unfavourably compares with those reported in Kenny (2018), which, according to Hair *et al.*, (2022) are more realistic standards, than even Aguinis *et al.*, (2005) proposal of an average 0.009 benchmark. In this study, interpretation adopted the standards as recommended by Kenny (2018). It is therefore observed from the computed value of f^2 that the effect size of 3.481% indicates a large effect moderation between liquidity management and loan repayment as influenced by operating leverage.

Consequently, it is safe to infer from the findings that operating leverage significantly alters the direction of the relationship between liquidity management and loan repayment among MFBs. Additionally, the moderator weakens the relationship between liquidity management

and loan repayment such that, *ceteris paribus*, the inclusion of the interaction term leads to shift of the regression coefficient from positive (0.020110) to the negative regime (-0.099417). The actual effect size introduced by the inclusion of the interaction term was computed as 0.03481, which by the benchmarks set by Kenny (2018), is large.

The weakening of the relationship between liquidity management and loan repayment implies that when MFBs adopt the use of borrowings for onward lending, operationally, they attain a more comfortable position because of the renewed capacity to meet arising customer obligations but this does not translate into firm growth. This finding corroborates those in Omondi (2020) which indicated a negative but significant relationship between operating leverage and financial performance ($\beta = -0.032$; $p = 0.000$). However, in Omondi (2020) operating leverage was an exogenous variable and not a moderator. The results from the main effect conformed to those in Chinweoda *et al.*, (2020) who reported a weak but positive relationship ($\beta = 0.184$; $p = 0.048$) between liquidity management and performance of deposit money banks, the Nigerian equivalent of MFBs. Also, Soltane, (2013) reported a comparative outcome ($\beta = 0.491$, $p=0.01$) though the study was designed to cover conventional commercial banks.

Theoretically, the results meet the prediction of the priori expectation of this study since according to the anticipated income theory, when loans are issued by MFBs, it was expected that borrowers would prioritize their repayment using funds flowing from their investments. Increase in net loans over customer deposits which has the effect of increasing the liquidity management ratio would trigger simultaneous reduction in the non-performing loans component of the loan repayment ratio which then reduces it to favourable status. Better still, when short term externally sourced funds are injected in the loaning scheme, it was expected that MFBs reserves would be enhanced. In response, many qualified borrowers would turn up

for loans following mechanisms employed by MFBs to eliminate idle funds with a view to exploit the investment boom, in response to funds availability.

Additionally, it was theoretically perceived that to enforce the anticipated income theory projections, MFBs would adopt aggressive debt-collection practices. This could be through hiring competent staff in relevant recovery departments, close monitoring of the loan accounts, offsetting loans against demand deposits and even prosecution of defaulters in courts of law as a collection alternative. To place the results in proper context, the results were theoretically analyzed to compare the state before and after introduction of the moderator.

First, before the introduction of leverage, increase in loans issued would strain customer deposits, leaving little resources for MFBs to pursue default cases. Whenever borrowers are not under pressure to repay their loans, they lack incentive to honour their obligations making them slide into default and hence the growth in non-performing loans. Failure to give loan repayment preference contravenes the postulations of the anticipated income theory as it directly leads to financial distress within the firm. It can therefore be theoretically concluded that adverse outcomes of the anticipated income theory are experienced when internally generated funds are low with borrowers taking advantage to exploit MFBs when in their state of vulnerability.

Conversely, the results could be interpreted to imply that when net loans issued are low, the management focus is turned to strict loan administration to maximize collections. With limited revenue streams, every effort is engaged to streamline the loaning processes to eliminate bad borrowers from being advanced loans as a measure to overcome non-performing loans. When pressed to honour repayment obligations, borrowers prioritize their loan obligations leading to high repayment rates and hence low loan repayment ratio. It can therefore be inferred from the results that the extreme case of defaults can be reversed when MFBs apply stringent

mechanisms to enforce reliance on borrowers income consistent with the postulations of the anticipated income theory of liquidity. This analysis brings out the perspective of the significant but weak positive relationship between liquidity management and loan repayment before the inclusion of the moderator.

Secondly, the inverse relationship shown by the shift in the regression coefficient from $\beta = 0.020110$ to $\beta = -0.099417$ at the inclusion of the moderator can imply different perspectives in the context of the anticipated income theory of liquidity and the moral hazard theory. The significant inverse relationship with an R^2 of 83.28% indicates that the model has a strong predictive power of the changes in the dependent variable, loan repayment. The findings agree with those in Zafrizal *et al.*, (2021) where borrowings moderated the relationship between liquidity risk and management efficiency of commercial banks from $\beta = -0.297$, $p = 0.000$ to $\beta = 0.0880$, $p = 0.000$. The analysis of the inverse relationship can be viewed from the favourable and adverse standpoints.

On a positive note, the introduction of additional funds through short-term leverage boosts the financial capacity of MFBs making them comfortably meet their loan disbursement obligations. With the availability of liquid resources, the high number of loans issued is matched with strict loan administration. From the perspective of the anticipated income theory, borrowers are placed in a constrained position to honour their repayment obligations. This explains increased values in net loans that result in increased liquidity management ratio at a time when non-performing loans experience a reduction translating in the corresponding drop in the loan repayment ratio.

The downside of the introduction of borrowed funds can be viewed from the angle of the pressure that these resources exert on MFBs. While obtaining loans substantially offloads the operational burden from their shoulders, MFBs take on the integral responsibility of honouring

their commitment to their financiers and hence onboard the moral hazard phenomenon in attempting to interpret the ensuing relationship. The inverse significant relationship suggests that at the point when all borrowed funds have been disbursed and the MFBs are strained of liquid resources, an upsurge in non-performing loans can be experienced owing to information asymmetry between them and the loanees. Unavailability of adequate funds to mount close follow up to enforce the anticipated income theory postulations would trigger defaults beyond MFBs control. Since substantial recovered resources may be directed towards prioritizing settlement of operational expenses and repaying borrowings at a premium, a new layer of default would serve to depress the liquidity position of MFBs. Without repayment compulsion, more loanees slide into default due to absence of moral pressure to cushion the credibility image of the MFBs.

The upshot of this analysis confirms that the findings in this study lend credence to the hypothesis that loan repayment is a critical ingredient preceding financial performance analysis. The findings here confirm the outcome in Ojiako *et al.*, (2014) that borrowed loans and loan repayment are inversely related ($\beta = -0.25$, $p = 0.01$) and that similarly, low value loans and loan repayment as reported by Salifu *et al.*, (2018) are inversely related ($\beta = -0.875$; $p = 0.000$)

On the strength of this finding, the null hypothesis that operating leverage has no moderating effect on the relationship between liquidity management and loan repayment of MFBs in Kenya failed to be accepted and the alternative hypothesis failed to be rejected.

4.4.5 Moderating effect of Operating Leverage on the Relationship Between Credit Risk Management and Loan Repayment among Microfinance Banks in Kenya

Objective five of the study sought to evaluate the moderating effect of operating leverage on the relationship between credit risk management and loan repayment among microfinance

banks in Kenya. A null hypothesis to the effect that operating leverage has no moderating effect on the relationship between credit risk management and loan repayment among microfinance banks in Kenya was formulated to realize this objective. The hierarchical procedure of establishing step-wise changes in study variables was adopted to test the effect of the interactions among the study variables. The first step involved analysing the direct relationship between credit risk management and loan repayment. Credit risk management was measured by the ratio of total cash and cash equivalents divided by customer deposits while loan repayment was measured by the ratio of net non-performing loans to total assets. The results were as shown in Table 4.9.

Table 4.9: Primary Relationship between Credit Risk Management and Loan Repayment in Model 3.1

Model	β	Std Error	t-statistic	Prob. Sig.	R ²	Adj.R ²
3.1	-0.009874	0.004353	-2.268152	0.0260*	0.826936	0.797024

*Represents significance at the 0.05 level

Source: Field Data, 2023

Table 4.9 reveals the relationship between credit risk management and loan repayment before the introduction of the moderator as an independent variable is negative but significant ($\beta = -0.009874$, $p = 0.0260$). This implies that with a unit increase in credit risk management, there is a significant drop in the loan repayment. With an R² of 0.826936, the model is a good predictor of the dependent variable, loan repayment as 82.69% of changes in loan repayment is accounted for by credit management among other variables in the study.

At the second moderation level, the operating leverage was introduced into the relationship and the outcome was as reflected in Table 4.10.

Table 4.10: Inclusion of Operating Leverage as an Independent Variable in Model 3.2

Model	β	Std Error	t-statistic	Prob. Sig.	R ²	Change in R ²	Adj.R ²
1	-		-		0.826936	0.826936	0.797024
	0.009874	0.004353	2.268152	0.0260*			
2	-		-		0.819059	-0.007877	0.785133
	0.010308	0.004590	2.245629	0.0275*			

*Represents significance at the 0.05 level

Source: Field Data, 2023

Table 4.10 indicates that with the introduction of operating leverage in the model as an independent variable, the relationship between credit risk management and loan repayment remains negative but significant ($\beta = -0.010308$, $p = 0.0275$). The model also indicates a lower R² of 0.819059, which reflects a reduction of -0.007877. This outcome suggests that with the introduction of operating leverage, credit risk management yields a reduction in the rate at which loans of MFBs in Kenya are repaid. On the flipside, the results imply that when credit risk management measures are relaxed, there is a marked increase in non-performing loans.

The third level involved the introduction of the interaction term of credit risk management and the moderator into the model to determine its influence on the relationship between liquidity management and loan repayment. The results of the product-term effect were obtained from the interaction of the variables in Model 3.4. The results were as shown in Table 4.11.

Table 4.11: Moderating Effect of Operating Leverage on the Relationship between Credit Risk Management and Loan Repayment

Variable	Coefficient	Std. Error	t-Statistic	Prob.
C	0.025063	0.010459	2.396160	0.0189*
ME	0.413572	0.118210	0.498627	0.0008*
MLDM	0.018352	0.007859	2.335076	0.0221*
MCRK	-0.007834	0.005374	-1.457813	0.1489
MLG	-0.011264	0.037372	-0.301393	0.7639
MCRK *MLG	0.026144	0.033397	0.782839	0.4361
R-squared	0.815979			
Adjusted R-squared	0.778709			
S.E. of regression	0.049960			
F-statistic	21.89366			
Prob(F-statistic)	0.000000			
Durbin-Watson Stat	1.710536			

** Represent significance at the 0.05 level.*

Source: Field Data, 2023

The regression results of model 3.7.2.4 yields the following: $LRP = 0.025063 + 0.018352 MLDM - 0.007834 MCRK + 0.413572 ME - 0.011264 MLG + 0.026144 MCRK * MLG$

Table 4.11 shows that with the introduction of the product term of MCRK*MLG, the coefficient of the relationship becomes positive but insignificant ($\beta = 0.026144$, $p = 0.4361$). The R^2 changes from 0.819059 to 0.815979, which is a reduction of 0.00308. This indicates that with the cross-product, there is a marked reduction in the explanatory power of the model.

The relative changes observed in the respective models used in the hierarchical analysis of the relationship between the study variables relating to the fifth objective are depicted in Table 4.12

Table 4.12: Moderating Effect of Operating Leverage on the Relationship between Credit Risk Management and Loan Repayment

Model	β	Std Error	t-statistic	Prob. Sig.	R ²	Change in R ²	Adj.R ²
3.1	-		-		0.826936	0.826936	0.797024
	0.009874	0.004353	2.268152	0.0260*			
3.2	-		-		0.819059	-0.007877	0.785133
	0.010308	0.004590	2.245629	0.0275*			
3.4	0.026144	0.033397	0.782839	0.4361	0.815979	-0.00308	0.778709

*Represents significance at the 0.05 level

Source: Field Data, 2023

Table 4.12 shows that the negative but significant relationship observed between credit risk management and loan repayment at the introduction of operating leverage as an independent variable ($\beta = -0.010308$, $p = 0.0275$) shifts to the positive domain, though insignificantly, when the product term is introduced in the model ($\beta = 0.026144$, $p = 0.4361$). With regard to the R-squared metric, the observed reduction by 0.00308 indicates that the product-term reduces the explanatory power of the model.

The results in Table 4.12 suggest that introduction of borrowings in the equation works at the disadvantage of the financial institutions. This can substantially be accounted for in the context of the credit risk theory. As the measures to tighten the grip on default are engaged, taking up borrowed resources introduces another layer of cost to the MFBs since they are under obligation to pay off interest on borrowings. By engaging in strict lending and aggressive recovery mechanisms, MFBs become unsuitable lenders in the eyes of borrowers and this introduces borrowing apathy. With excess liquidity sourced at a premium and frustrated borrowers reacting to unbearable restrictions imposed to guard against potential default, funds accumulate with limited borrowers calling in for advances. On the other hand, strict enforcement to achieve collections, reinforced by profiling defaulters gives rise to growth in non-performing loans and thus leads to growth in loan repayment ratio.

With respect to the change in beta at the introduction of the interaction term in the model, the reverse relationship between credit risk management and loan repayment to positive regime could be accounted for by the availability of excess liquidity which triggers high loan disbursements. The loans disbursed to the vetted applicants, even if high in value, leaves the MFBs with adequate resources in their reserves. But because of strict lending terms designed to overcome default, borrowed funds together with recovered loans contribute to growth in cash and cash and equivalents which grows the credit management ration substantially, but not significantly enough to cause a corresponding change in the R-squared. The sustained drop in R-squared value can be accounted for by the effects of unsuccessful default recovery measures in the face of changing trading environment that breeds sustained inability to honour loan obligations.

The null hypothesis of this objective was that operating leverage has no moderating effect on the relationship between credit risk on loan repayment among microfinance banks in Kenya. From the reported findings, change in R^2 maintains a steady reduction at the introduction of operating leverage in the primary model and also at the inclusion of the product term. Though the coefficient of the model with the product term changed to depict a positive relationship, it was insignificant. The upshot of this findings indicate that operating leverage has no moderating effect on the relationship between credit risk management and loan repayment. It is safe to conclude, therefore, that the null hypothesis failed to be rejected and the alternative hypothesis failed to be accepted.

4.4.6 Relationship between Management Efficiency and Loan Repayment

The study included the ratio of staff expenses and directors' emoluments to total assets as a control variable of the microfinance banks' level of management efficiency. The results of the

regression with the product terms between management efficiency among other regressors and the dependent variable, loan repayment are as shown in Table 4.13.

Table 4.13: Regression of the Relationship between Management Efficiency and Loan Repayment

	Model 3.3				Model 3.4			
	Coefficient	Std. Error	t-Statistic	Prob.	Coefficient	Std. Error	t-Statistic	Prob.
ME	0.403994	0.117488	3.438615	0.0009*	0.413572	0.118210	3.498627	0.0008*

* *Represent significance at the 0.05 level*

Source: Field Data, 2023

The findings in Table 4.13 show that the management efficiency (ME) ratio has a positive coefficient of 0.403994 with a p-value=0.0009 in the model where the product term between liquidity management and operating leverage interacts with the study variables. Similarly, the interaction of the control variable with the study variables in the model where credit risk management interacts with operating leverage, the results yielded a positive and significant coefficient ($\beta = 0.413572$, $p = 0.0008$). These results indicate that management efficiency has a positive and significant effect on the loan repayment since its p-value is less than the 0.05 level of significance. Compared to the results in Table 4.2 where the coefficient of management efficiency was 0.427020 at a significant p-value of 0.0004. This indicates that the control variable, ME, maintains its relationship with the study variables at 42.7% before the product terms and at between 40.3% and 41.3% with the consideration of the product terms. This portends a stable relationship with the variables as it oscillates within a range of 2.4%.

4.4.7 Summary Statistics of the Regression Model

Table 4.14 presents the summary statistics of the interaction regression models.

Table 4.14: Summary Statistics of the Moderated Regression Model

	Model 3.3	Model 3.4
R-Squared	0.832757	0.815979
Adjusted R-Squared	0.798886	0.778709
F-statistic	24.58549	21.89366
Prob (F-statistic)	0.000000	0.000000
Durbin-Watson stat	1.759349	1.710536

Source: Field Data, 2023

From the statistics, R-Squared is 0.832757 for Model 3.3 and 0.815979 for Model 3.4. This means the independent variables jointly explain over 80% of the variations in loan repayments for MFBs in Kenya. In addition, the results show that the Adjusted R-Squared is 0.798886 for Model 3.3 and 0.778709 for Model 3.4, a clear indication that the independent variables collectively, are good explanatory variables of the loan repayments for MFBs in Kenya. Moreover, the probability of the F-statistic (0.000000) was less than the 0.05 level of significance in both models. Hence, the null hypothesis of F-statistic (the overall test of significance) that R-Squared is equal to zero was rejected. Further the D.W. statistic was over 1.7 in both models implying that serial correlation was not a problem in the analysis.

CHAPTER FIVE

SUMMARY OF FINDINGS, CONCLUSIONS AND RECOMMENDATIONS

5.1 Introduction

The overall objective of this study was to analyze the effect of operating leverage on the relationship between liquidity management, credit risk and loan repayment among microfinance banks in Kenya.

The researcher used multiple regression to analyze secondary data which was collected in order to answer the objectives of the study. Hierarchical moderation analysis was undertaken to specifically answer the fourth and fifth objectives. The summary of the findings per objective were as follows;

In objective one, the study sought to establish the relationship between liquidity management and loan repayment among microfinance banks in Kenya. The results indicated that there exists a weak but statistically significant positive relationship between liquidity management and loan repayment in Kenyan microfinance banks. Besides laying a background that justified moderation testing for the fourth objective, this finding implied that increase in liquidity management yields minimal corresponding change in loan repayment.

The second objective intended to determine the relationship between credit risk management and loan repayment among microfinance banks in Kenya. The findings reported the existence of a significant inverse relationship between credit risk management and loan repayment performance. This suggests that enhancing mitigation of loss measures against loan default leads to the reduction of non-performing loans and hence reduction in the loan repayment ratio.

Objective three of this study purposed to determine the relationship between operating leverage and loan repayment among microfinance banks in Kenya. The results posted an inverse and insignificant relationship between operating leverage and loan repayment. By implication, the finding shows that introduction of increase in borrowings insignificantly cause the reduction of non-performing loans which ultimately leads to a decrease in the loan repayment ratio.

The fourth objective was designed to evaluate the moderating effect of operating leverage on the relationship between liquidity management and loan repayment among microfinance banks in Kenya. The outcome of the analysis indicates that operating leverage fully moderates the relationship between liquidity management and loan repayment by strengthening the relationship. This implies that use of borrowings deepen the reversal of the primary relationship between liquidity management and loan repayment by improving the interaction, in positive terms, from the perspective of MFBs.

The last objective of the study was framed to evaluate the moderating effect of operating leverage on the relationship between credit risk management and loan repayment among microfinance banks in Kenya. The results indicate that operating leverage does not moderate the relationship.

Finally, the study also employed the ratio of staff expenses and directors' emoluments to total assets as a control variable of the banks' level of management efficiency. The summary findings indicate that the effect of management efficiency is negative though significant.

5.2 Conclusions on the Study Findings

The primary relationship of liquidity management and loan repayment is positive, though weak but statistically significant. By introducing the moderator, operating leverage, the relationship becomes inverse and insignificant. However, by exposing the entire relationship to the interaction term, there is noticed a further inverse relationship that shifts to a significant level. Drawing from the reported findings, we now know that short-term borrowings moderate by enhancing the reversal of the relationship between liquidity management and loan repayment performance.

It is a novel finding of this study that the direction of the relationship between liquidity management and loan repayment is undesirable until leverage is introduced to tilt the outcome. The change in direction does not only happen by introducing leverage, but the same is favourably reinforced when the interaction term is embedded in the relationship. This therefore implies that operating leverage fully moderates the primary relationship between liquidity management and loan repayment.

This study contributes to the theory by buttressing past findings which suggest that adverse outcomes of the anticipated income theory are experienced whenever internally generated funds are low among MFBs, at which point, borrowers adversely exploit their state of financial vulnerability. Additionally, it is reported that by inference, the study findings met the priori expectation that with substantial follow up and pressure by MFBs, borrowers feel obligated to repay their loans from the proceeds of their business engagements. On the flipside, it can safely be inferred as well, that a secondary level of moral hazard outcomes is discernible when borrowings taken for the purpose of onward lending are incapable of being serviced by MFBs on account of adverse loan repayment performance.

5.3 Recommendations

The study recommendations were made consistent with the findings of every study objective. The first objective reported a weak positive growth in NPLs on account of growing net loans which suggested that MFBs should be more vigilant on growing loan books as it may simultaneously stimulate growth in NPLs which, if unchecked, has the potential long-run effect of pushing affected firms into possible insolvency.

From the findings on the second objective of the study, it is recommended that MFBs should adopt stringent loan appraisal measures in their credit departments in order to minimize information asymmetry as a corrective mechanism to mitigate against growth in NPLs.

With regard to the outcome established in objective three of the study, it is recommended that MFBs should balance their borrowing financial obligations so they do not offset short-term liquidity commitments at the expense of long term financial goals.

The fourth objective disclosed that operating leverage fully moderates the relationship between liquidity management and loan repayment among MFB. Consistent with this finding, it is recommended that MFBs should prioritize to closely apply constant follow-up on borrowers to get them honour loan repayment obligations. Besides, they should cautiously improve their liquidity position by supplementing internally generated funds with borrowings in cases of liquidity pressure to meet arising obligations.

With respect to the findings in objective five, the unexpected insignificant findings associated with credit risk management should be subjected to further empirical investigation in future studies using higher number of observations.

5.4 Limitation of the Research

The outcome of this study may not be applicable to microfinance institutions that are unregulated and other financial intermediaries that target the unbanked poor. Hence, while the study findings can offer important insights to other financial institutions, such conclusions should be approached with care given the dynamics associated with different financial intermediaries. Moreover, the study relied on secondary data from the financial statements of the MFBs in Kenya and Central Bank of Kenya. Whereas the source of data is reliable for research, quantitative data may not isolate other intervening attributes with the potential to influence the environment in which the study variables interact.

5.5 Suggestions for Further Research

In order to improve on this empirical study, the researcher suggests that further investigations be done on the topic using both primary and secondary data from microfinance banks so as to accommodate in the analysis experiences relating to the study parameters that are unique to every institution. Additionally, future research work should be focused on investigating the conflicting findings in credit risk management, since they are mechanisms employed to streamline the loaning programmes.

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APPENDICES

APPENDIX I: LETTER OF INTRODUCTION



MASENO UNIVERSITY
SCHOOL OF GRADUATE STUDIES

Office of the Dean

Our Ref: PHD/BE/00053/2020

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Tel:(057)351 22/351008/351011
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Email: sgs@maseno.ac.ke

Date: 23rd March, 2023

TO WHOM IT MAY CONCERN

**RE: PROPOSAL APPROVAL FOR NADEBU PHILBERT CALEB—
PHD/BE/00053/2020**

The above named is registered in the Doctor of Philosophy in Finance programme in the School of Business and Economics, Maseno University. This is to confirm that his research proposal titled “Effect of operating leverage on the relationship between liquidity management, credit risk and loan repayment among microfinance banks, Kenya” has been approved for conduct of research subject to obtaining all other permissions/clearances that may be required beforehand.



Dr. Patrick Onyango

ASSOCIATE DEAN, SCHOOL OF GRADUATE STUDIES

Maseno University

ISO 9001:2008 Certified



APPENDIX II: LETTER OF ETHICAL APPROVAL



MASENO UNIVERSITY SCIENTIFIC AND ETHICS REVIEW COMMITTEE

Tel: +254 057 351 622 Ext: 3050
Fax: +254 057 351 221

Private Bag – 40105, Maseno, Kenya
Email: muerc-secretariate@maseno.ac.ke

REF: MSU/DRPI/MUSERC/01225/23

Date: 10th July, 2023

TO: Nadebu, Philbert Caleb
PHD/BE/00053/2020
Department of Accounting and Finance
School of Business and Economics
Maseno University
P. O. Box, Private Bag, Maseno, Kenya

Dear Sir,

RE: Effect of Operating Leverage on the Relationship between Liquidity Management, Credit Risk and Loan Repayment among Microfinance Banks, Kenya


This is to inform you that Maseno University Scientific and Ethics Review Committee (MUSERC) has reviewed and approved your above research proposal. Your application approval number is MUSERC/01225/23. The approval period is 10th July, 2023 – 9th July, 2024.

This approval is subject to compliance with the following requirements;

- i. Only approved documents including (informed consents, study instruments, MTA) will be used.
- ii. All changes including (amendments, deviations, and violations) are submitted for review and approval by Maseno University Scientific and Ethics Review Committee (MUSERC).
- iii. Death and life threatening problems and serious adverse events or unexpected adverse events whether related or unrelated to the study must be reported to Maseno University Scientific and Ethics Review Committee (MUSERC) within 24 hours of notification.
- iv. Any changes, anticipated or otherwise that may increase the risks or affected safety or welfare of study participants and others or affect the integrity of the research must be reported to Maseno University Scientific and Ethics Review Committee (MUSERC) within 24 hours.
- v. Clearance for export of biological specimens must be obtained from relevant institutions.
- vi. ~~Submission of a request for renewal of approval at least 60 days prior to expiry of the approval period. Attach a comprehensive progress report to support the renewal.~~
- vii. Submission of an executive summary report within 90 days upon completion of the study to Maseno University Scientific and Ethics Review Committee (MUSERC).

Prior to commencing your study, you will be expected to obtain a research license from National Commission for Science, Technology and Innovation (NACOSTI) <https://oris.nacosti.go.ke> and also obtain other clearances needed.

Yours sincerely



Prof. Philip O. Owuor, PhD, FAAS, FKNAS
Chairman, MUSERC



MASENO UNIVERSITY IS ISO 9001 CERTIFIED




APPENDIX III RESEARCH LICENSE



REPUBLIC OF KENYA

NATIONAL COMMISSION FOR SCIENCE, TECHNOLOGY & INNOVATION


Ref No: **953211**



NATIONAL COMMISSION FOR SCIENCE, TECHNOLOGY & INNOVATION

Date of Issue: **30/June/2023**


RESEARCH LICENSE



This is to Certify that Mr. PHILBERT CALEB NADEBU of Maseno University, has been licensed to conduct research as per the provision of the Science, Technology and Innovation Act, 2013 (Rev.2014) in Nairobi on the topic: EFFECT OF OPERATING LEVERAGE ON THE RELATIONSHIP BETWEEN LIQUIDITY MANAGEMENT, CREDIT RISK AND LOAN REPAYMENT AMONG MICROFINANCE BANKS, KENYA for the period ending ; 30/June/2024.

License No: **NACOSTI/P/23/27217**


Applicant Identification Number: **953211**



Director General

NATIONAL COMMISSION FOR SCIENCE, TECHNOLOGY & INNOVATION

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See overleaf for conditions

APPENDIX IV: LIST OF MICRO FINANCE BANKS IN KENYA

Name of the Microfinance Bank	Code
1. CARITAS MICROFINANCE BANK LTD	MFB1
2. BRANCH MICROFINANCE BANK LTD	MFB2
3. CHOICE MICROFINANCE BANK LTD	MFB3
4. DARAJA MICROFINANCE BANK LTD	MFB4
5. FAULU MICROFINANCE BANK LTD	MFB5
6. KENYA WOMEN MICROFINANCE BANK PLC	MFB6
7. RAFIKI MICROFINANCE BANK LTD	MFB7
8. LOLC MICROFINANCE BANK PLC	MFB8
9. SMEP MICROFINANCE BANK LTD	MFB9
10. SUMAC MICROFINANCE BANK LTD	MFB10
11. U&I MICROFINANCE BANK LTD	MFB11
12. SALAAM MICROFINANCE BANK LTD	MFB12

APPENDIX V: MAP OF STUDY AREA



APPENDIX VI: RAW DATA

MFB	YEAR	Net Loans	Total Assets	Deposit	Bor- rowings	Net NPLs	LN/DEP	MnLnD	MLDM	BR/TATs	MnBrT	MLG	LRP	Staff Costs	Directors Emol- uments	SAL	ME	Cash & Bank Balances	Short- term Deposits	Govt Sec- urities	TCL	CRK	M1CRK	MCRK
MFB 1	2015	11	186	85	0	0	0.129411765	1.55976128	-1.430349515	0	0.111009804	-0.111009804	0	24	1	25	0.134408602	2	128	0	130	1.529411765	0.706625827	0.622785958
MFB 1	2016	141	574	287	0	0	0.491289199	1.517009228	-1.025710029	0	0.162429761	-0.162429761	0	37	4	51	0.071428571	7	343	0	350	1.219512195	0.507506374	0.712005821
MFB 1	2017	351	879	565	20	17	0.621238938	1.30458333	-0.66344992	0.022753129	0.135548193	-0.112795064	0.039440159	53	2	55	0.062571304	8	418	0	426	0.753982301	0.529094329	0.224887972
MFB 1	2018	751	1244	934	26	25	0.804068522	1.65606673	-0.851998208	0.020900322	0.146690477	-0.125790155	0.020096463	82	8	90	0.072347267	28	326	6	360	0.385438972	0.517669446	-0.132230473
MFB 1	2019	758	1712	1353	79	77	0.560236511	1.131258513	-0.571022001	0.046144886	0.0865059	-0.040916104	0.044976636	86	6	92	0.053738318	26	703	15	744	0.549889135	0.490134848	0.059754288
MFB 1	2020	1411	2284	978	0	43	1.442740286	1.191226869	-0.251513418	0	0.136854897	-0.136854897	0.03882662	88	5	93	0.040718039	24	643	15	682	0.697341513	0.464523328	0.232818186
MFB 1	2021	1952	2951	2504	0	65	0.779552716	0.700122465	0.079430251	0	0.145263561	-0.145263561	0.022026432	99	5	104	0.035242291	31	643	124	798	0.318690096	1.732913105	-1.414233009
MFB 1	2022	2154	3353	2854	0	112	0.754730203	0.785722627	-0.030992424	0	0.114050506	-0.114050506	0.033402923	119	9	128	0.038174769	169	374	425	968	0.339173609	1.347719366	-1.008546276
MFB 2	2015	79	197	105	22	1	0.752380952	1.55976128	-0.807380327	0.111675127	0.111009804	0.000685323	0.005076142	31	2	33	0.10751209	3	28	0	31	0.295238095	0.706625827	-0.411387731
MFB 2	2016	107	225	141	19	12	0.758865248	1.517009228	-0.758143979	0.084444444	0.162429761	-0.077985116	0.053333333	34	2	36	0.16	3	12	0	15	0.106882899	0.507506374	-0.401133995
MFB 2	2017	103	288	222	18	17	0.463693964	1.30458333	-0.840619366	0.0625	0.135548193	-0.073048193	0.05902778	32	1	33	0.145813333	2	78	0	80	0.36036036	0.529094329	-0.16073968
MFB 2	2018	195	431	341	1	13	0.571847507	1.65606673	-1.084219223	0.002320186	0.146690477	-0.144370291	0.030162413	36	2	38	0.088167053	19	136	0	155	0.454545455	0.517669446	-0.063123991
MFB 2	2019	187	348	256	19	27	0.73046875	1.131258513	-0.400789763	0.054597701	0.0865059	-0.031908199	0.077862037	31	3	34	0.097701149	1	52	0	53	0.20703125	0.490134848	-1.008546276
MFB 2	2020	114	296	270	9	18	0.422222222	1.191226869	-0.769004647	0.030405405	0.136854897	-0.106449491	0.060810811	26	4	30	0.101353353	2	65	0	67	0.248148148	0.464523328	-0.216975179
MFB 2	2021	113	402	388	0	28	0.291237113	0.700122465	-0.408885352	0	0.145263561	-0.145263561	0.069651741	28	3	31	0.077114428	2	163	0	165	0.425257732	1.732913105	-1.307655273
MFB 2	2022	342	872	339	0	-135	1.008849558	0.785722627	0.22312693	0	0.114050506	-0.114050506	0.154816314	42	1	43	0.049311927	3	427	0	430	1.268448578	1.347719366	-0.079282788
MFB 3	2015	19	77	17	0	0	1.117647059	1.55976128	-0.442114221	0	0.111009804	-0.111009804	0	19	1	20	0.25974026	1	13	0	14	0.823529412	0.706625827	0.116903585
MFB 3	2016	35	122	66	5	3	0.53030303	1.517009228	-0.966706197	0.040983607	0.162429761	-0.121446154	0.034590164	19	3	22	0.08127869	18	10	0	28	0.424242424	0.517669446	-0.302739412
MFB 3	2017	31	136	81	10	0	0.382716049	1.30458333	-0.92186728	0.073529412	0.135548193	-0.062018781	0	27	3	30	0.320588235	1	18	0	19	0.234567901	0.529094329	-0.294526428
MFB 3	2018	22	98	108	12	0	0.203709704	1.65606673	-1.452363027	0.12244898	0.146690477	-0.024241497	0	27	3	30	0.308122449	15	0	0	15	0.138888889	0.517669446	-0.378780557
MFB 3	2019	11	79	83	19	1	0.13253012	1.131258513	-0.998728392	0.240506329	0.0865059	-0.134000429	0.012638228	14	0	14	0.17721519	0	21	0	21	0.253012048	0.490134848	-0.237122799
MFB 3	2020	6	54	98	5	-3	0.06122449	1.191226869	-1.13002379	0.092529593	0.136854897	-0.044262304	-0.055555556	9	0	9	0.166666667	0	6	0	6	0.06122449	0.464523328	-0.403298838
MFB 3	2021	7	45	115	5	-4	0.060869565	0.700122465	-0.6392519	0.111111111	0.145263561	-0.03415245	-0.088888889	9	0	9	0.071212121	0	6	0	6	0.052173913	1.732913105	-1.008546276
MFB 3	2022	4	142	32	0	-9	0.125	0.785722627	-0.66072367	0	0.114050506	-0.114050506	-0.06380282	8	0	8	0.056338028	1	89	0	90	2.8125	1.347719366	-1.464780634
MFB 4	2015	36	83	34	0	0	2.571428571	1.55976128	-1.011667292	0	0.111009804	-0.111009804	0	15	1	16	0.192771084	1	5	0	6	0.428571429	0.706625827	-0.278054398
MFB 4	2016	51	180	85	0	0	0.6	1.517009228	-0.917009228	0	0.162429761	-0.162429761	0	22	3	25	0.138888889	33	27	0	60	0.705882353	0.507506374	0.198375979
MFB 4	2017	53	168	95	0	-5	0.557894737	1.30458333	-0.746685933	0	0.135548193	-0.135548193	-0.029781903	30	3	33	0.196428571	4	19	0	23	0.242105263	0.529094329	-0.260989066
MFB 4	2018	42	172	121	5	0	0.347107438	1.65606673	-1.30895929	0.029069767	0.146690477	-0.117820709	0	24	1	25	0.134548837	26	0	0	26	0.214876033	0.517669446	-0.302739412
MFB 4	2019	10	133	107	0	-13	0.093457944	1.131258513	-1.037800569	0	0.0865059	-0.0865059	-0.097744361	15	1	16	0.120500752	1	8	0	9	0.08411215	0.490134848	-0.406022698
MFB 4	2020	2	124	97	0	-2	0.020618557	1.191226869	-1.170608132	0	0.136854897	-0.136854897	-0.016129032	11	1	12	0.096774194	0	7	0	7	0.072164948	0.464523328	-0.392358379
MFB 4	2021	1	120	103	0	-22	0.009708738	0.700122465	-0.690413727	0	0.145263561	-0.145263561	-0.103333333	6	1	7	0.058333333	0	4	0	4	0.098834951	1.732913105	-1.094078154
MFB 4	2022	0	235	108	0	0	0	0.785722627	-0.785722627	0	0.114050506	-0.114050506	0	4	0	4	0.037021277	4	0	0	4	0.097037037	1.347719366	-1.310682329
MFB 5	2015	16584	25324	16690	2671	254	0.993648892	1.55976128	-0.566112388	0.105473069	0.111009804	-0.005536735	0.010030011	1048	12	1060	0.041857526	276	4756	721	5733	0.344697424	0.706625827	-0.361828403
MFB 5	2016	17955	27369	17371	4387	1025	1.03361925	1.517009228	-0.483389977	0.16202984	0.162429761	-0.002138921	0.037451131	1038	18	1056	0.03858799	298	3622	1750	5670	0.326406079	0.507506374	-0.181100295
MFB 5	2017	16958	25925	16450	3572	2257	1.030881459	1.30458333	-0.273701871	0.141046397	0.135548193	0.005498204	0.089212422	1032	15	1047	0.041342547	297	3890	2500	4687	0.284924012	0.529094329	-0.244170317
MFB 5	2018	16935	27225	17941	4431	57	0.943927317	1.65606673	-0.712139413	0.162754821	0.146690477	0.016064144	0.002096964	958	13	971	0.035665748	349	3670	1880	5899	0.328799955	0.517669446	-0.18866949
MFB 5	2019	19777	29682	20092	4366	-163	0.984322118	1.131258513	-0.146936395	0.147092514	0.0865059	0.060586614	-0.005491544	909	14	923	0.031098287	408	2582	3469	6459	0.321471232	0.490134848	-0.168663615
MFB 5	2020	17561	29279	22931	2017	358	0.765819197	1.191226869	-0.425407672	0.068888965	0.136854897	-0.067965932	0.012227194	903	12	915	0.031251067	339	3099	4294	7732	0.337185469	0.464523328	-0.127337858
MFB 5	2021	15378	27780	21524	692	-77	0.714458279	0.700122465	-0.014335834	0.024910007	0.145263561	-0.120353554	-0.002771778	999	15	1014	0.03600108	388	2651	4997	8036	0.373350678	1.732913105	-1.895964227
MFB 5	2022	12975	22704	16250	1265	212	0.798461538	0.785722627	0.012738911	0.055717054	0.114050506	-0.05833452	0.009337562	978	16	994	0.043780832	353	1357	4149	5859	0.360553846	1.347719366	-0.98713552
MFB 6	2015	22094	31861	17806	8206	1745	1.240817702	1.55976128	-0.318943578	0.25755626	0.111009804	0.146546456	0.054769154	269	91	360	0.01129908	914	5334	0	6248	0.350892957	0.706625827	-0.355732669
MFB 6	2016	22189	32153	17156	9074	3150	1.293366752	1.517009228	-0.223642475	0.282213168	0.162429761	-0.197833408	0.097969083	2776	93	2869	0.089229621	957	5331	19	6307	0.367626488	0.507506374	-0.139879888
MFB 6	2017	19374	28931	16324	6774	3269	1.18684146	1.30458333	-0.117741869	0.234143306	0.135548193	0.098595114	0.111299283	2759	109	2868	0.099132419	1260	4421	0	5681	0.348015192	0.529094329	-0.181079136
MFB 6	2018	19997	29582	16139	8088	3453																		

MFB 7	2021	3484	5889	3336	676	1460	1.044364508	0.700122465	0.344242043	0.114790287	0.145263561	-0.030473274	0.247918651	354	7	361	0.06130073	65	1130	612	1807	0.541666667	1.732913105	-1.191246439
MFB 7	2022	3473	5346	3324	525	1474	1.044825511	0.785722627	0.259102884	0.098204265	0.114050506	-0.015846242	0.275720165	383	6	389	0.072746684	60	874	380	1314	0.395306859	1.347719366	-0.952412507
MFB 8	2015	257	397	158	40	44	1.626582278	1.55976128	0.066820999	0.100755668	0.111009804	-0.010254137	0.110831234	41	0	41	0.103274559	7	80	0	87	0.550632911	0.706625827	-0.155992915
MFB 8	2016	244	351	106	67	46	2.301886792	1.517009228	0.784677565	0.190883191	0.162429761	0.02845343	0.131054131	34	2	36	0.102564103	5	58	0	63	0.59439623	0.507506374	0.086833249
MFB 8	2017	218	354	124	52	43	1.758064516	1.30458333	0.453481186	0.146892655	0.135548193	0.011344462	0.121468927	40	1	41	0.115819209	5	63	0	68	0.548387097	0.529094329	0.018292768
MFB 8	2018	231	433	123	139	48	1.87804878	1.65606673	0.22198205	0.321016166	0.146690477	0.174325689	0.110854503	37	1	38	0.087759815	44	62	0	106	0.861788618	0.517669446	0.344119172
MFB 8	2019	158	406	99	133	51	1.595959596	1.131258513	0.464701083	0.327586207	0.0865059	0.241080307	0.125615764	36	2	38	0.093596059	30	92	0	122	1.232323232	0.490134848	0.742188385
MFB 8	2020	98	307	74	110	33	1.324324324	1.191226869	0.133097456	0.358306189	0.136854897	0.221451292	0.107491857	25	0	25	0.081433225	4	85	0	89	1.202702703	0.464523328	0.738179375
MFB 8	2021	62	289	80	126	41	0.775	0.700122465	0.074877535	0.435986159	0.145263561	0.290722596	0.141868512	22	0	22	0.076124567	24	62	0	86	1.075	1.732913105	-0.657913105
MFB 8	2022	168	451	140	32	41	1.2	0.785722627	0.414277373	0.070953437	0.114050506	-0.04309707	0.090909091	39	0	39	0.086474501	3	129	0	132	0.942857143	1.347719366	-0.404862222
MFB 9	2015	1728	2592	1287	576	36	1.342657343	1.55976128	-0.217103937	0.222222222	0.111009804	0.111112418	0.013888889	27	10	237	0.091435185	161	191	0	352	0.273504274	0.706625827	-0.433121553
MFB 9	2016	1677	2659	1451	624	158	1.155754652	1.517009228	-0.361254576	0.23464769	0.162429761	0.072244929	0.059420835	246	11	257	0.096652877	50	418	0	468	0.322536182	0.507506374	-0.184970192
MFB 9	2017	1677	2734	1607	579	91	1.043559428	1.30458333	-0.261023902	0.211777615	0.135548193	0.076229422	0.033284565	258	12	270	0.098756401	24	426	0	450	0.280024891	0.529094329	-0.249069438
MFB 9	2018	1647	2942	1896	487	32	0.866870886	1.65606673	-0.787395844	0.165533651	0.146690477	0.018843174	0.010876954	234	11	245	0.093276883	32	627	0	659	0.34757384	0.517669446	-0.170095606
MFB 9	2019	1682	3314	2143	481	-13	0.784881008	1.131258513	-0.34637505	0.145141823	0.0865059	0.058635923	-0.003922752	229	10	239	0.072118286	35	723	0	758	0.353709753	0.490134848	-0.136425095
MFB 9	2020	1761	3446	2398	401	3	0.734361968	1.191226869	-0.4568649	0.116368602	0.136854897	-0.020488095	0.000870575	241	7	248	0.071967499	41	642	0	683	0.284820684	0.464523328	-0.179702644
MFB 9	2021	1500	3382	2366	423	-10	0.633981403	0.700122465	-0.066141062	0.125073921	0.145263561	-0.02018964	-0.00295683	200	7	207	0.061206387	46	843	0	889	0.375739645	1.732913105	-1.35717346
MFB 9	2022	1412	3219	2240	461	-62	0.630357143	0.785722627	-0.155365485	0.143212178	0.114050506	0.029161671	-0.01926064	208	7	215	0.066790929	30	761	11	802	0.358025714	1.347719366	-0.989683652
MFB 10	2015	433	608	135	144	56	3.207407407	1.55976128	1.647464128	0.236842105	0.111009804	0.125832301	0.092105263	16	5	21	0.034539474	4	55	0	59	0.437037037	0.706625827	-0.26958879
MFB 10	2016	538	362	233	227	7	2.309012876	1.517009228	0.792003648	0.627071823	0.162429761	0.464642063	0.019337017	27	4	31	0.085635359	5	61	0	66	0.283261803	0.507506374	-0.224244571
MFB 10	2017	623	1137	413	395	26	1.508474576	1.30458333	0.203891247	0.347405453	0.135548193	0.21185726	0.022867194	31	4	35	0.030782762	7	227	0	234	0.566589556	0.529094329	0.037491628
MFB 10	2018	919	1530	500	625	290	1.838	1.65606673	0.181939327	0.408496732	0.146690477	0.261806255	0.189542484	41	13	54	0.035294118	280	0	0	280	0.56	0.517669446	0.042330554
MFB 10	2019	1199	2013	631	800	122	1.900158479	1.131258513	0.768899966	0.397416791	0.0865059	0.310910891	0.060606061	47	11	58	0.028812717	14	441	0	455	0.721077655	0.490134848	0.230942807
MFB 10	2020	1314	2310	978	728	330	1.343558282	1.191226869	0.152331413	0.315151515	0.136854897	0.178296618	0.142857143	59	12	71	0.030735931	15	568	0	583	0.596114519	0.464523328	0.131591192
MFB 10	2021	1348	3037	1266	1144	359	1.064770932	0.700122465	0.364648467	0.376687521	0.145263561	0.23142396	0.118208759	65	15	80	0.028341785	14	1114	0	1128	0.890995261	1.732913105	-0.841917845
MFB 10	2022	1540	3678	1577	1460	405	0.97653773	0.785722627	0.190815102	0.396954867	0.114050506	0.28280436	0.110114192	77	14	91	0.024741707	92	1399	0	1491	0.945466075	1.347719366	-0.402253291
MFB 11	2015	142	184	59	18	5	2.406779661	1.55976128	0.847018381	0.097826087	0.111009804	-0.013183717	0.027173913	9	1	10	0.054347826	1	27	0	28	0.474576271	0.706625827	-0.232049555
MFB 11	2016	271	351	209	19	7	1.296650718	1.517009228	-0.22035851	0.054131054	0.162429761	-0.108128706	0.01994302	13	2	15	0.042735043	8	47	0	55	0.263157895	0.507506374	-0.244348479
MFB 11	2017	325	406	200	39	22	1.625	1.30458333	0.32041667	0.096059113	0.135548193	-0.03948908	0.054187192	20	2	22	0.054187192	17	24	0	41	0.205	0.529094329	-0.324094329
MFB 11	2018	443	534	285	72	38	1.554385965	1.65606673	-0.101680765	0.134831461	0.146690477	-0.011859016	0.071161049	21	3	24	0.04494382	59	0	0	59	0.207017544	0.517669446	-0.310651902
MFB 11	2019	601.72	686.4	356	155	19	1.890224719	1.131258513	0.558966206	0.225815851	0.0865059	0.139309951	0.027680653	26	5	31	0.04516317	7.18	52.17	0	59.35	0.166713483	0.490134848	-0.323421364
MFB 11	2020	700	805	368	236	15	1.902173913	1.191226869	0.710947044	0.293167702	0.136854897	0.156312805	0.01863354	22	6	28	0.034782609	8	72	0	80	0.217391304	0.464523328	-0.247132023
MFB 11	2021	872	1006	401	357	6	2.174563591	0.700122465	1.474441126	0.354870775	0.145263561	0.209607215	0.005964215	28	7	35	0.034791252	5	102	0	107	0.266832918	1.732913105	-1.466080188
MFB 11	2022	1077	1480	528	644	-6	2.039772727	0.785722627	1.2540501	0.435135135	0.114050506	0.321084629	-0.004054054	35	9	44	0.029272973	5	347	0	352	0.666666667	1.347719366	-0.681052699
MFB 12	2015	97	226	42	0	27	2.30952381	1.55976128	0.74976253	0	0.111009804	-0.111009804	0.119469027	18	0	18	0.079646018	8	89	0	97	2.30952381	0.706625827	1.602897983
MFB 12	2016	151	214	29	0	50	5.206896552	1.517009228	3.689887324	0	0.162429761	-0.162429761	0.2384486	17	1	18	0.08411215	7	7	0	14	0.482758621	0.507506374	-0.024747753
MFB 12	2017	126	212	29	0	79	4.344827586	1.30458333	3.040244257	0	0.135548193	-0.135548193	0.372641509	24	1	25	0.117924526	7	38	0	45	1.551724138	0.529094329	1.022629809
MFB 12	2018	135	225	16	0	76	8.4375	1.65606673	6.78143327	0	0.146690477	-0.146690477	0.337777778	26	0	26	0.115555556	26	0	0	26	1.625	0.517669446	1.107330554
MFB 12	2019	68	168	25	-155	34	2.72	1.131258513	1.588741487	-0.922619048	0.0865059	-1.009174948	0.202380952	15	2	17	0.101190476	2	22	0	24	0.96	0.490134848	0.469865152
MFB 12	2020	39	134	10	0	30	3.9	1.191226869	2.708773131	0	0.136854897	-0.136854897	0.223880597	10	1	11	0.082089552	1	11	0	12	1.2	0.464523328	0.735476672
MFB 12	2021	0	433	20	0	0	0	0.700122465	-0.700122465	0	0.145263561	-0.145263561	0	9	7	16	0.036951501	0	322	0	322	16.1	1.732913105	14.36708689
MFB 12	2022	0	405	23	0	0	0	0.785722627	-0.785722627	0	0.114050506	-0.114050506	0	24	4	28	0.069135802	4	174	0	178	7.739130435	1.347719366	6.391411069