

**EFFECT OF THE PREVAILING LENDING INTEREST RATES ON
THE DEFAULT RATE OF KENYAN DEPOSIT TAKING
MICROFINANCE BANKS**

BY:

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DECLARATION

This research project is my original work and it has not been presented and submitted to any in university or college for examination.

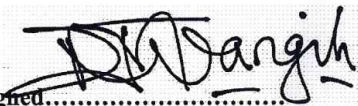
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I thank GOD for according the health and getting me this far. I also thank to my supervisor Professor Cyrus Mwangi Iraya for the invaluable guidance and support.

DEDICATION

This project has been dedicated to my parents for their continued support and encouragement

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LIST OF ABBREVIATIONS/ACRONYMS

- CBK** - Central Bank of Kenya
- MFIs** - Microfinance Institutions
- NPL** - Non-Performing Loans

ABSTRACT

In a short term, low interest rates minimize credit risk since refinancing costs are lowered and the net worth of borrowers is increased, which decreases credit risk of outstanding bank loans. Because of the number of outstanding loans being higher in comparison of that of new loans, the low interest rates therefore only make the portfolio less risky only in the short term. The objective of the study was to establish the effect of the lending interest rate on the default rate of Kenyan Micro-Finance Institutions. In addition it is focused on review of the growing empirical and theoretical studies which have endeavoured to examine the range of magnitude and effects of lending interest rates on the default rate of Micro-Finance Institutions. The target population was all the 13 licensed MFIs. Secondary sources of data were employed. Panel data was utilized, data was collected for several units of analysis over a varying time periods. The research employed inferential statistics, which included correlation analysis and panel multiple linear regression equation with the technique of estimation being Ordinary Least Squares (OLS) so as to establish the relationship of the lending interest rates and by extension the control variables, collateral and derivatives, and the default rates of MFIs. The study findings were that lending interest rates have a significant association and relationship with default rate. Lending interest rate has a significant negative relationship with default rate. The study made recommendations to policy makers like the National Treasury and CBK to regulate the interest rates in order to mitigate default rates. Recommendations were also made to MFIs, and by extension, other financial institutions, to utilize interest rates in order to mitigate default rates by customers. Further recommendations were that particular focus should be made on the lending interest rates in order to mitigate default rates.

CHAPTER ONE

INTRODUCTION

1.1 Background of the Study

Banks tend to adjust their lending obligations in times of low short-term interest rates a little bit low and grant new higher credit risk loans but reduce the correlated loan spreads. This implies that low interest rates increase the appetite of the bank for risks (Ongena & Peydró-Alcalde, 2007). Despite this escalation in risk-taking, in the short run, low interest rates reduce credit risk as they reduce the costs of refinancing and increase the net worth of the borrower thus lowering the outstanding bank loans' credit risks (Kashyap & Stein, 2000). Since the outstanding bank loans are more than new loans, low interest rates could make the loan portfolios of the bank less risky in the short-run. However, in the medium term, very low interest rates encourage risk-taking, that raises credit risk thus shaking the financial stability more so when the prevailing interest rates return to, or rise beyond average levels (Den Haan, Sumner, & Yamashiro, 2007).

The study was anchored on the loanable fund theory advocated by Wicksell (1898). The theory states that the demand for funds arises, not only for investment but also for hoarding wealth and regards interest as a function of saving and investment. Thus, the theory regards interest as a savings and investment function. This theory connects to the current study since they both focus on interest rates. The lending rate is influenced by the demand for credit, which is accentuated by investments and the only instance of default that can occur is if rate of return on the investment is lower than the lending rate the base lending rate (Woodford, 2003). The other theory that underpinned this study is the Fisher's theory of interest advocated by Fisher (1930). The Fisher's theory is relevant in explaining the effect of inflation risk premium as an element of interest rates on the financial performance of the

loan. Therefore, the real interest rate falls with increase in innovation unless if the increase in nominal rates and increase in inflation are concurrent. The lending interest rate is a nominal rate, its fluctuations could not entirely affect the default rate, and it could be the real lending interest rate that can affect the default rate.

Gashaw (2014) posited that repayment rates amongst Kenyan Micro-Finance Institutions (MFIs) have been a success factor implying that these companies have kept the default risks low. Credit borrowers from MFIs are able to pay commercial interest rates resulting to low default rates. MFIs in Kenya are less effective, charge higher interest rates and offer a shorter repayment period. Wealthy clients are not members of MFIs; clients seeking larger amount of loans are those planning to default exposing the firm to high credit risks. This can be explained by the fact that micro finance institutions lack the financial capacity to compete with commercial banks which provide huge amount of loans to their clients (Gashaw, 2014; Quayes, 2012; Okumu, 2007; Bayeh, 2012; Abate, Borzaga & Getnet, 2013).

1.1.1 Lending Interest Rates

Keynes (1936) refers to interest rate as the borrowing cost of capital over a specified time frame. Interest rate describes the cost of credit in a country. Interest rate is the annual price paid to a lender by a borrower for loan advances. It is the cost associated with current claims of resources relative to future consumption of the resources (Kwak, 2000). The lending rate can be termed as the price paid by a borrower for the use of money that he/she does not own and has to compensate the lender for delaying his consumption for lending purposes.

Lending interest rates constantly change due to government policies and inflation. The central bank of a nation also uses lending interest rates to track any fluctuations in currency. An

increase in lending rates is important in curbing inflationary pressure and stabilizing the exchange rate depreciation thus helping to prevent adverse economic downturns (Devereux & Yetman, 2002). Interest rate changes have a significant effect on the household's saving and consumption behaviours, firm's capital accumulation decision and portfolio allocation of foreign and domestic traders in financial markets. These variations also affect the plans and expectations of economic players regarding their future and their beliefs on the welfare and income redistribution and prospects of the country (Keynes, 1936). The costs of operating a business as well as costs of living is low when if the real interest rate are kept low. This boosts the economy since home and car loans become affordable. Therefore, households tend to borrow more and subsequently increase expenses. Interest rate influences the inflation rate and overall financial inflows in an economy. Successful and sustainable finance is underscored by positive interest rate and lending more than inflation rate (Buckler, 1999).

Interest rate is presented as a percentage of the total amount of funds issued as loans (Fisher, 1930). An interest charged for the use of money is computed as an annual percentage of the principal. Interest is computed as a percentage of money taken over a certain period, for instance, one year (Yetman & Devereux, 2002). The average lending rate of MFIs in Kenya is tracked by the Central Bank of Kenya (CBK) and documented monthly; this is going to be utilized in the current study.

1.1.2 Default Rate

The lending business is prone to the default risk, where either the total or partial amount of loan granted might not be paid back as stipulated in the loan agreement. The Basel Committee on Banking Supervision (1997) describes default risk as an investor's likelihood of incurring losses due to a borrower not making payments as promised. The committee

further defines default risk as it relates to banks, as the possibility that a counterparty or borrower could default on his or her commitments according to the terms agreed on. Generally, default risk, can otherwise be characterized as the chance that the actual return on an investment or credit advanced may vary from the expected return (Tsai & Huang, 1997). Also, Khalid (2012) refers to default risk as losses incurred as a result of the refusal or inability of borrowers to make full and timely payments of amounts owed, thus making the disbursed loan to be attributed as non-performing. According to Conford (2000), a Non-Performing Loan (NPL) is any credit advancement that interest and principal payments are in arrears for a period greater than three months, or more than three months' worth of interest has been refinanced, capitalized, or deferred by agreement, or payments are not yet three months overdue but are no longer anticipated. IMF further defines an NPL as one in which the maturity date has lapsed, though some of the amount lent is yet to be paid. Ahmad and Ariff (2007) states that NPLs are the proportion of loan values that remain unpaid for ninety days and more.

In effort of reducing the delinquency of loans, banks ought to take any possible action. There are therefore necessitating to always undertaken individual exposures reviews so as to monitor the quality of loans and minimize losses (Ahmad & Ariff, 2007). The liquidity of banks is hurt and adversely affects the banks earning due to loan becoming non performing. It also threatens the customer's deposit. Non-repayment of loans leads to the lack of ability to reuse funds to other borrowers (Conroy, 2003). According to Gorter and Bloem (2002), both the borrowers and the lenders feel the effect of the cost of delinquencies of loans. The costs to the lender comprise of loss in interest, legal fees, the opportunity cost of the principal amount and associated costs. In the part of the borrowers, the choice to default is a tradeoff amongst

the fines in lost reputation from default and the opportunity cost of neglecting the investments because of financing the present loan.

Loans being a major asset in the MFI's balance sheet, the success of a particular MFIs in credit risk management is largely demonstrated in the amount of NPLs to gross lending, which is referred to as the NPL ratio. A high ratio of NPLs to advances is a reflection of poor repayment of loans as a result of poor credit management practices. A low ratio is thus desirable as it indicates good loan repayment (Thygeson, 1995). Thus, the NPL ratio will be adapted as the indicator of loan default in this study.

1.1.3 Lending Interest Rates and Default Rates

Foote et al. (2009) observed that a moderate numbers of adjustable rate mortgages defaults mostly happen because of interest rates, which are high whereas the opposite is true for fixed rates mortgages. For adjustable rate mortgages, the required mortgage repayments increase when the interest rates are high and this tends to makes some people to fail to honour their repayments, mores son early if they had a small-accumulated savings. On the contrast, for the fixed rates mortgages, lower interest rates implied that the rental repayments will also be lowers in comparison to mortgage repayments which can trigger the intention to default.

Bernanke, Gertler, and Gilchrist (1996) suggested that interest rates that are low were revealed to minimize the credit risk in the in the short run because they minimize the cost of refinancing and improves the net worth of borrower, hence decreasing the outstanding loans credit risk. Since the volume of loans outstanding is greater that of new loans, the bank loans may become less risky in the short run if the interest rates are low. Taherizadeh (2001) pointed out that increment in base lending rate results to higher borrowing costs. This is due

to the fact the banks as well as other depository and lending institution transfer the cost to the borrower. The effect of increased base lending rate is therefore increased default among individual borrowers, SMEs, and even large corporations.

However, Ongena and Peydró-Alcalde (2007) opined that banks lighten up their standards lending and provide new loans with higher credit risk though minimize the related loan spreads when the short-term interest rates are low. This implies that interest rates that are low enhances the banks appetite for risk, thus lower lending rates lead to increased default rates. In the medium term, too low interest rates encourage the risk taking of banks, which lead to increment in credit risk, hence negatively influencing the financial stability, particularly if the interest rates afterwards increase average level (Ongena & Peydró-Alcalde, 2007).

Oduori (2012) in his study explored the extent to which interest fluctuations responded on the borrowing level. The study confirmed an existence of strong positive linear association between the loan defaults and the running lending rates. The loan defaults decrease with declining lending rates, as the borrowers have a less interest obligation to pay. Ndirangu (2004) also conducted a study on the association amongst interest rates and NPLs and found out there existed a positive association amongst NPLs and interest levels, whereby as the interest rates went up the NPLs also went up, however the relationship amongst the two variables was found to be weak.

Ngugi (2001) stated that in Kenya the banks were quick on increasing the lending rates though as the CBR went down the bank were reluctant in decreasing it as a result of reducing income from assets. They reacted by decreasing the deposit rate, in this way widening the

spread as they lending rate remained high. Thus, in this instance, the base lending rate had no impact on the rate of loan repayment.

1.1.4 Deposit Taking Microfinance Institutions in Kenya

Microfinance involves provision of small credits or loans, savings and other financial services to the poor or low-income clients. Micro-finance also imply small-scale financial facilities mainly loans and savings to small or micro enterprises (Robinson, 2001). In Kenya micro finance institutions are categorised as; Deposit Taking MFIs, Non Deposit-Taking institutions and Informal Money Lending institutions, for instance shylocks. Deposit Taking MFIs are licensed, mandated, and supervised by CBK (Microfinance Act, 2006 No.19 of 2006).

The CBK regulates Deposit Taking Microfinance Institutions through the Microfinance Act, Section 8(2) of The Microfinance (Deposit-Taking Microfinance Institutions) Regulations, 2008. This statute was incorporated in the year 2006, however the Micro Finance Act became active in the year 2008. Currently there are 13 Deposit Taking Microfinance Institutions in Kenya (CBK, 2016).

Gashaw (2014) posited that repayment rates amongst Kenyan Micro-Finance Institutions (MFIs) has been a success factor implying that these companies have kept the default risks low. Credit borrowers from MFIs have the capacity of paying commercial interest rates resulting to low default rates. MFIs in Kenya are less effective, charge higher interest rates and offer a shorter repayment period. Wealthy clients are not members of MFIs; clients seeking larger amount of loans are those planning to default exposing the firm to high credit risks. This can be explained by the fact that micro finance institutions lack the financial

capacity to compete with commercial banks which provide huge amount of loans to their clients (Gashaw, 2014; Quayes, 2012; Okumu, 2007; Bayeh, 2012; Abate, Borzaga & Getnet, 2013).

1.2 Research Problem

Interest rates are primarily the drivers of desirable financial performance by financial institutions. They establish the profit margin for each transaction amongst a financial institution and its clients. Though, most loan repayment defaults have been reported in MFIs. High interest rates has been cited as the chief reason for defaulting (Delfiner, Pailhe & Peron, 2006). When borrowers fail to honour credit repayment and default, losses are incurred by the MFIs. MFIs face operational crisis and lack funds to issue to potential borrowers when credit default rates are alarming. If the non-repayment persists for long, some debts will be treated as bad debts which could result in downsizing of staff, postponement of market expansion and subsequent collapse (Ditcher, 2003). The MFIs play a crucial part in improving financial services' accessibility particularly to the low-income earners. This means that the challenges faced by these institutions affect the society and economy at large (Pandey, 2010).

Higher default rate has been reported among MFIs compared to commercial banks with commercial banks reporting less than 5% default rate while MFIs are reporting between 10 % and 20%. (Kiraka et al., 2013). Gashaw (2014) posited that repayment rates amongst Kenyan Micro-Finance Institutions (MFIs) are part of their success stories, which ideally means that these firms have managed to suppress their interest rate levels. However, the default rate of MFIs is comparatively higher than ones of commercial banks. Thus, it is imperative to determine the factors that influence the default rate of MFIs.

Numerous studies have been undertaken both internationally and locally pertaining to the base lending rate and financial performance. Stiglitz and Weiss (1981) undertook an investigation on credit rationing in markets confined with information asymmetry. The study established that endeavour to charging interest rates that are high adversely impacts the loan quality because of adverse selection and incentive effects. It leads to increment in the general risk of the assets portfolio. Increase in interest rates decrease projects returns and lead to less risky projects becoming unprofitable and firms react by switching to riskier project as interest rates increases. This study engrossed on the impact of interest rates, not the base lending rate, on banks performance. This presents a conceptual gap. Enyioko (2012) looked at the Nigerian banking sector performance based on the lending interest rates. That study showed that there was a slight change in the performance of banks when interest rates changed. This study centered on the effect of lending rate on banks performance, not the default rate. This presents a conceptual gap. The global studies highlighted in the research were not conducted in the Kenyan context, thus presenting a contextual gap.

Locally, Mang'eli (2012) undertook an investigation on the impact of interest rates spreads on default rate. The study pointed out the performance of commercial banks is affected by interest rate spreads, as it leads to increment on the cost of borrowing furthermore regulation on interest rates largely impact the financial institutions performance as they decide on the spread of interest rates of banks and also aid in mitigating moral hazards coincidental to commercial banks performance. The study additionally established that methods of managing credit risk slightly influences the value of interest rate spread of banks since interest rates are benchmarked against the related NPLs and NPLs is related to cost of loans that are high. Adano (2013) examined the performance of loans in the commercial banks in Kenya and revealed that performance of loans is negatively associated with the gross loans granted and

lending rate loan performance was measured by loan default. The studies did not focus on the effect of the base lending rate on the default rate, thus presenting a conceptual gap.

Numerous researches done on lending rates set by commercial banks issuing loans have centred on its impact on financial performance (Stiglitz & Weiss, 1981; Enyioko, 2012). The studies previewed have also not been done in the MFIs context. Thus, the studies have not endeavoured to investigate the impact of the lending rate on loan repayment of MFIs. The foregoing underscore the need to undertake a study examining the extent to which interest rates charged by MFIs affect their loan performance. Thus, this study aims to address the research question, what is the influence of the base lending rate on loan repayment of loans in Kenyan MFIs?

1.3 Research Objective

The objective of this research was to establish the effect of the lending rate on the default rate of Kenyan MFIs.

1.4 Value of the Study

Loan quality is of great significance to banking stakeholders, government as the industry regulator, investors and scholars. To the researchers and academicians: the study will provide a useful basis that future research on credit management activities in the financial sector are done. Since the study will be one of the few done on relating the prevailing lending interest rates and the level of NPLs in MFIs, therefore, it will be useful for future research as it will add to the existing literature. Future studies will thus be founded upon the literature. The study findings will be used as referral by later scholars keen in research on credit risk administration and its effect on financial performance of MFIs. Thus, the research output will

be a source of invaluable literature among the study variables on theories and policies that inform them. The study methodology employing inferential statistics that entail correlation analysis and multiple linear regression will be useful to researchers who might be keen on analyzing complex association amongst the dependent and many independent variables.

To officials and policy creators, this study provides ground for controlling strategy outline to alleviate financial system from economic crises and to recommend and count those credit threats arising from loan quality. The regulator of Deposit Taking MFIs, the CBK, the government, and policy makers would gain valuable information on effects of the base lending rate on banking sector loan repayment. The study would be useful to the government in policymaking regarding financial regulation. Policy makers would as well learn the challenges and loopholes in their current regulatory framework and how it is affecting the operations of the banking sector. The study will inform as to whether fluctuations in the lending rates of MFIs results to high level of loan defaults. The CBK, and specifically the Monetary Policy Committee (MPC), will therefore make viable policies regarding setting the borrowing interest rate that will optimize loan repayment especially during the economic cycles; during economic booms and bust.

The study is important to the MFI sector shareholders, consultants, and MFIs administration, it will provide an overview into how the prevailing lending rates will affect the loan repayment rates. Performing loans imply increase in shareholders' wealth. On the other hand, NPLs reduce shareholders earnings through diminished financial performance of MFIs. It would therefore be of importance to banking sector in Kenya and stakeholders in understanding the effects of the base lending rate on loan performance, which has a bearing of shareholders' value, the MFI' maintaining a going concern, enhancing customer

confidence, and most importantly increase revenue. The management would have the ability to make informed decisions regarding management of loan quality.

CHAPTER TWO

LITERATURE REVIEW

2.1 Introduction

In this chapter, the literature on the research variables is reviewed. Additionally, the theories together with prior empirical evidence in the area of study are undertaken and finally the determinants of economic growth are discussed.

2.2 Theoretical Background

A theory is created to identify, elaborate, and comprehend certain phenomenon and in other instances, to challenge the present knowledge on this within the brackets of present bounding assumptions. A theory entails many concepts brought together and existing approaches used for a particular study (Saad & Siha, 2000). The theories included in this study are the loanable funds theory and Fischer's theory of interest.

2.2.1 Loanable Funds Theory

This theory was proposed by Wicksell (1898) and stipulates that the supply and demand of loanable funds are the ones that determine the interest rates. The theory applies a partial equilibrium technique where all the variables, which could affect the loanable funds supply, are held constant apart from interest rate alone. Better said, this theory makes the assumption that interest rates are independent of all other macroeconomic factors. Ohlin (1937) further extended this theory by stating that the gross amount of available credit within an economy may be more than the private saving since the bank systems is able to generate more credit out of thin air. Therefore, market interest rate or equilibrium is also affected by the ability to create or destroy credit and fiat money in addition of being influence by the tendencies of saving and investing

The key essentials of this theory have been recognized by the mainstream monetary theory; however, there seems to be few critiques. Woodford (2003) critiqued the theory, starting and pointed out that Wicksell's theory establishes the theoretical basis of the mechanism which is used by western countries central banks in the recent years which is seeking after price stability objective via a monetary policy rules founded on planning of interest rate. The wicksellian distinction is used by central banks in affirming that monetary policy only influences the short-term interest rates but the real factors are the ones that affect the interest rates in the long run. Keynes, (1973^a) aimed on re- elaborating the Keynesian monetary theory by concentrating on the credit market as opposed to the money market. Keynes (1973^b) kept on disputing the proposal that ex-ante investment are funded by ex-ante saving and that the decisions to save are dependent on the level of income that as a result relies upon investment decision, therefore saving cannot be the financing source for investment in as much as it is the consequence of the investment process.

This theory connects to the current study since they both focus on interest rates. While the theory regards interest as a savings and investment function. Thus, the lending rate is influenced by the demand for credit, which is accentuated by investments. Thus, the only instance of default that can occur is if the rate of return on the investment is lower than the lending rate the base lending rate (Woodford, 2003).

2.2.2 Fischer's Theory of Interest

This theory is an economic theory that was advocated by Fischer (1930), which related the nominal interest rate to the rate of inflation and the "real" interest rate. It stated that the real interest rate is the interest rate after adjusting for inflation and it is therefore the interest rate that lenders are willing to loan out their funds. It furthers contends that the real interest rate is

equivalent with the nominal interest rates less the inflation rate expected. Consequently, as the inflation rates goes high, the real interest falls, except if the nominal rates rise with the same rate as inflation.

Keynes (1936) was the first person to critics the Fisher's theory of interest and it was further restated and advanced by Harrod (1971) and Davidson (1974, 1986). The criticism rested on three points. The first one is that the money-rates should be compared but not the actual rates since the prior are the only observable and the position of liquidity is important and capital gain/loss ought to be incorporated in the calculation of yield rate. The second one is that capital assets are normally not an appropriate substitute of monetary assets to reinstate value although monetary assets have high sustainability and amongst financial assets and the liquid non-financial assets. The final point was that the two formers reasons, that the explanation by Fisher's on the determinant of interest rate on funds is not valid. Interest rates changes do not mirror the opportunity cost changes triggered by inflation in the future or current consumption arbitrage, they shows the changes in unpredictability, which can influence the stock equilibrium amongst illiquid and liquid assets.

This theory associate to the current study since they both focus on interest rates. The Fisher's theory is relevant in explaining the effect of inflation risk premium as an element of interest rates on financial performance of the loan. The lending interest rate is a nominal rate, its fluctuations could not entirely affect the default rate, and it could be the real lending interest rate that can affect the default rate.

2.3 Determinants of the Default Rate

This section will elaborate on the various determinants of loan repayment. These are: prevailing lending interest rates and credit risk management practices that include; obtaining collaterals, and employing derivatives.

2.3.1 Lending Interest Rates

Keynes (1936) refers to interest rate as the borrowing cost of capital over a specified time frame. Interest rate describes the cost of credit in a country. Interest rate is the annual price paid to a lender by a borrower for loan advances. It is the cost associated with current claims of resources relative to future consumption of the resources (Kwak, 2000). The lending rate can be termed as the price paid by a borrower for the use of money that he/she does not own and has to compensate the lender for delaying his consumption for lending purposes.

As the cost of credit increases, it impairs the capacity of a borrower to pay back his or her loan. If a borrower's disposable income remains constant and interest rates rise, then the default risk of the borrower increases. A period experiencing relatively higher interest rates will have higher default rates than a period experiencing relatively lower interest rates. The lower interest rates enhance borrowers' net returns and boost their incentive to perform (Mimmel et al., 2012).

2.3.3 Collateral

Collateral is described as an asset transferred to the lender as security for a loan. Depending on the purpose of the loan, collateral might take the form of real estate or other forms of assets. Collateral accords some protection and guarantee to the lender since the lender can seize the collateral and sell to recover his money in case the borrower defaults (Bester, 1994).

Bester (1985) and Thakor and Besanko (1987) anchoring the ex-ante screening framework by Stiglitz and Weiss (1981) defined collateral as factor that allows a bank to address the problem of adverse selection that is common in debt financing due to asymmetric information. In a model with low and high-risk projects, there exists a separating equilibrium. Low-risk borrowers opt for contracts that demand high collateral. On the other hand, high-risk borrowers prefer loans with no collateral. Therefore, the signalling models argues that there exists a negative correlation between loan risk and collateral. The signalling model comes into play at the pre-contractual stage. The information asymmetry issue is resolved in principle upon the conclusion of the project and the collateral's economic function in a multi-period. Bester (1994) developed a debt renegotiation negotiation model which proposes positive correlation between collateralization and default risk. In this framework, a creditor cannot differentiate amongst strategic default, which is the borrower is willingly defaulting, and default attributed to bad state realization of the globe. The model concludes that collateral will minimize the incentive of the debtors for strategic default.

2.3.3 Derivatives

A derivative refers to a financial asset which enables parties to manage their risk exposure. It constitutes privately owned, negotiable bilateral contracts between two parties in a debtor or credit relationship. It enables the creditor to transfer the debtor's default risks to a third party (Partnoy & Skeel, 2006).

There are four main reasons why derivatives are utilized. First, they are used to reduce the risk exposure, also referred to as hedging. Through hedging, cash flows from a previous market commitment are offset using the derivative (Sundaram, 2011). Secondly, derivative are used to profit from the expected market movements. Speculation increase exposure to risk

therefore the potential loss or gain is escalated relative to the prior investment. Thirdly, the use of derivatives translates to lower transaction costs, which include trading costs and commission costs. Sill (1997) opines that the success of the derivatives market pegs on the fact that it increases the efficiency of financial markets. The use of derivatives keeps the borrowing and lending costs lower resulting to lower transaction costs. According to Merton (1990), large companies will incur lower transaction costs in the securities market as a result of prevailing large trade volume. Finally, the use of derivatives through regulatory restrictions and asset management activities maximise the ROA. Financial institutions usually utilize derivatives for hedging purposes.

DeMarzo (2005) opines that the introduction of credit derivatives enabled diversification into new credit market segments that did not exist previously. Securitization has increased the risk exposure in other sectors or other nations, which was not possible in the as a result of market imperfections. Franke and Krahen (2005) opined that Credit Default Obligation (CDO) transactions eliminate moral hazard and adverse selection problems by a significant “first loss position” of the originator. However, financial institutions utilize derivatives for hedging purposed only to a limited extent. Minton, Stulz, and Williamson (2008) conducted a study on US banks established that credit derivatives are mainly used for dealer endeavours and only less than 2% of the loans used as credit derivatives.

2.4 Empirical Literature

In the global scene, Taherizadeh (2001) conducted a study in 22 countries on the association between economic growth and interest rate. A negative association amongst interest rate and economic growth is exhibited in the findings with the association between the two variables being unilateral causal. The study further noted that micro-economic policies resulting to an

escalation in the base lending rate leads to borrowing cost being high. This is because the cost is transferred to the borrower by commercial banks, lending institution, and other depository institutions. This could have an effect of increased default among individual borrowers, SMEs, and even large corporations.

Khemraj and Pasha (2009) did a survey of NPLs determinants in the banking industry in Guyanese banking where they used panel dataset and a fixed effect model. The study findings exhibited that volume reduction of NPLs is the same with desirable economic performance, the GDP, and the volume of NPLs are inversely related.

Vogiazas and Nikolaidou (2011) undertook a study in the banking sector of Romania during the banking crisis to examine the determinants of NPLs. The study utilized monthly series ranging from Dec 2001 and Nov 2010, covering both the booming seasons and the 2007-2009 financial crisis. The paper also introduced variables that proxy the Greek crisis, given the existence of many Greek banks in Romania. The findings displayed that; the main factors influencing the credit risk of the country in the banking sector were, the rates of inflation and unemployment, expenditure on construction and investment, M2 and the external debt to GDP ratio in Romania.

Nakayiza (2013) did a study on loan portfolio performance in commercial banks pertaining to the impact of interest rates. The research conducted a case study of Centenary Bank in Entebbe. The study utilized questionnaires on 73 Centenary Bank respondents supplemented by review of secondary sources. The findings displayed that the bank duly follows procedures and regulations in credit administration, although there was still a considerable default on loan repayment by clients causing an increase in the bank's bad debts. The findings further

revealed that there is insignificant impact of the interest rates on loan repayment behaviours. However, descriptive statistics displayed that fair interest rates favoured customers' willingness to repay the loans.

Locally, Kwabai and Wandera (2013) aimed on relating the economic condition of Kenya to NPLs by outlining the origin of Kenyan NPLs to the external environment where the commercial banks transact. The CBK in the year 1992 when the country conducted multiparty elections that it had not properly prepared for was supposedly forced to print money for funding election. According to the author, this led to a drastic rise in interest rates since the government later begun initiatives to reduce the excessive liquidity. During the period that saw astronomical decrease in default rates, treasury bills rates likewise increased to up to 76% in 1993 from 23% in early 1992.

Collins and Wanjau (2011) conducted a study on regulatory guidelines effect on loan performance of Kenyan commercial banks. The study discovered that regulations and policies of interest rates are important in mitigating interest rates, loan defaulters and moral hazards. Additionally, the study uncovered that the CBK uses varying CBR rate and interest rates ceiling as was of regulating the interest rates which the banks charge. However, the study established that these regulations are yet to be enforced since commercial banks continue to charge interest rates that are high, an average of 11.5% in comparison to the average CBR of 8.5%.

Tireito (2012) conducted an investigation of the association amongst NPLs and interest rate in Kenyan commercial bank. The study analyzed financial statements for five years for the five-year period of 2007 to 2011 for the 43 licensed commercial banks. The analysis utilized

correlation and linear regression analyses. There lacked significant association amongst interest rate and NPLs as exhibited by the findings.

Ongweso (2005) did a study on the association amongst interest rates and NPLs amongst Kenyan commercial banks. The study covered a time period of 2000 to 2004. The results displayed average interest rates trend, which was declining, from 12.00% in 2000 to 2.96% in 2004. This indicated that over the period there was an improvement in macro-economic variables. In addition, the NPLs for all commercial banks declined in the timeframe being studied. However, the study established that between the level of interest and NPLs there is a positive but insignificant relationship, where an increment in rate of interest resulted to higher NPLs levels.

Kamunge (2013) did an investigation on the impact of interest rate spread on the NPLs level of Kenyan Commercial banks. All the 43 licensed commercial banks were the survey population and secondary data was employed. The findings showcased that spread of interest rate in explaining level of NPLs was statistically significant; an increment of interest rates spread with a unit led to a positive change in NPLs level.

2.5 Conceptual Framework

Rocco and Plakhotnik (2009) stipulate that a conceptual framework lays the foundation for research objectives and questions by grounding a study in the right knowledge constructs. The independent variables in this study were determinants of loan repayment, which include; the lending interest rate, collaterals, and derivatives. The loan repayments by MFIs customers will be the dependent variable.

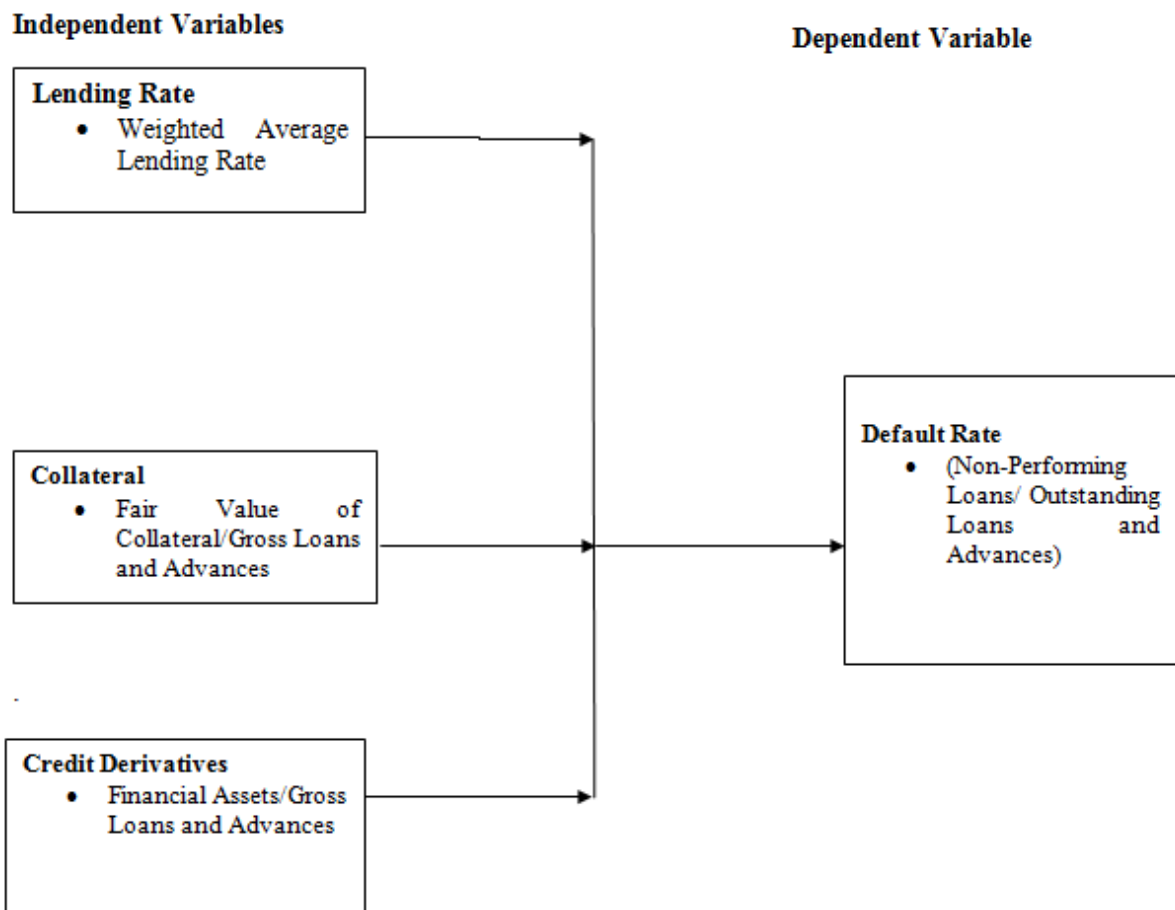


Figure 2.1: Conceptual Model

2.6 Summary of the Literature Review

There were various knowledge gaps emanating from the studies reviewed. First, all the studies reviewed did not analyse the lending rates and the control variable constituting collateral, and credit derivatives. Therefore, this presents a conceptual gap. Generally, some of the literature reviewed highlighted that there is an insignificant association amongst interest rates and loan repayment (Nakayiza, 2013; Kwambai & Wandera, 2013; Tireito, 2012); Ongweso, 2005). However, the studies did not analyse the effect of the lending rate on loan repayment of MFIs, thus presenting a conceptual gap.

The study by Taherizadeh (2001) focused on the association amongst interest rate and economic growth. The study by Khemraj and Pasha (2009) established that GDP and the volume of NPLs are negatively associated. Additionally, the study done by Vogiazas and Nikolaidou (2011) found that; expenditure on construction and investment, the rates of inflation and unemployment, external debt to GDP, and M2 were the main influencing factors of the country's credit risk in the banking sector. Finally, Kamunge (2013) conducted a study on the interest rate spread effects on the level of NPLs of Kenyan commercial banks. The cited studies did not provide findings on the effect of lending rates on loan repayment thus presenting a conceptual gap. The global studies reviewed were conducted on single (Khemraj & Pasha, 2009; Nakayiza, 2013) or multiple countries (Taherizadeh, 2001; Vogiazas & Nikolaidou, 2011) outside the Kenyan context. Therefore, this presents a contextual gap.

The study by Vogiazas and Nikolaidou (2011) utilized monthly series ranging from December 2001 to November 2010, the current study will use quarterly series as the period of analysis. The paper also introduced variables that proxy the Greek crisis thus converting it into a comparative study. The study done by Khemraj and Pasha (2009) applied a panel dataset and a fixed effect model. Additionally, the study conducted by Nakayiza (2013) utilized primary data, the current study will use secondary data. The current study will utilize a longitudinal data set and an Ordinary Least Squares (OLS) model. The present study will not be a comparative study. Finally, studies done by Kwambai and Wandera (2013) and Collins and Wanjau (2011) entailed review of past literature to draw conclusions. The current study will involve quantitative data analysis that will include correlation and multiple linear regression to draw the conclusions. Thus, a methodological gap in the studies reviewed in this section is inherent.

CHAPTER THREE

RESEARCH METHODOLOGY

3.1 Introduction

In this chapter, the research methodology which was employed is laid out. This chapter focused on the research design, subjected study area, targeted population of the study, the actual sample size and its sampling technique, data collection instruments and its data source, data analysis and presentation.

3.2 Research Design

The study applied a causal research design since it sought to determine the cause and effect relationship between variables. Thus, this design was utilized because it addressed the aim of research in examining the association amongst variables of the research. The study was a formal study because it employed relevant theories and literature to guide it. It was also an ex post facto study because the variables were not manipulated but simply measured. It was a field setting with the unit of analysis being the country. This design took into account aspects like method of analysis, the variables used in the research, and data gathering methods.

3.3 Target Population

A populace is a set of things or entities with shared observable characteristics (Mugenda & Mugenda, 2013). All the 13 licensed microfinance banks in Kenya, whose list is provided in Appendix I, formed the population in this study. The study is a census because the entire population will be examined.

3.4 Data Collection

The research utilized secondary data. In particular, the investigator relied on data provided by CBK and the published financial statements of the individual licensed MFIs, which contained the data required for the study. The study utilized panel data, data was gathered annually for a period of five years, from 2015 to 2019. Data on gross non-performing loans, weighted average lending rates, gross loans advances, net charge-offs, and loan loss provisions, was collected for the period.

3.5 Data Analysis

Data collected was organized, tabulated and simplified so as to make it easier to analyze, interpret and understand. Because panel data was employed for the study, STATA version 13 was the statistical analysis program utilized for the study because it is able to perform panel linear regression. Correlation analysis was used to show whether and how strongly changes in the lending interest rate is related to the default rate while regression analysis was employed to determine the association amongst the lending rate and the default rate. The quantitative reports obtained from the investigation were presented using tabulations.

The study adopted a confidence interval of 95%. The results were set to be statistically significant at the 0.05 level, which indicated that the significance value should be less than 0.05. A statistical inference technique was applied in deriving conclusions associated to the model accuracy in predicting the loan volumes. The model significance was tested using the significance values at 95% confidence. The meaning of the association amongst every predictor variable to the response variable was determined by the significance values. T-test was likewise undertaken in establishing the significance of individual co-efficient while F-test was similarly undertaken to determine the overall model significance.

3.5.1 Diagnostic Tests

For the validity of regression analysis, a number of assumptions are done in conducting linear regression models. These are; no multi-collinearity, observations are sampled randomly, conditional mean ought to be zero, linear regression model is “linear in parameters”, spherical errors: there is homoscedasticity and no auto-correlation, and the optional assumption: error terms ought to be distributed normally. According to the Gauss-Markov Theorem, the first 5 assumptions of the linear regression model, the regression OLS estimators, are the Best Linear Unbiased Estimators (Grewal *et al.*, 2004).

The aforementioned assumptions are of great importance since when any of them is violated would mean the regression estimates will be incorrect and unreliable. Particularly, a violation would bring about incorrect signs of the regression estimates or the difference of the estimates would not be reliable, resulting to confidence intervals that are either too narrow or very wide (Gall *et al.*, 2006).

The diagnostic tests are conducted so as to guarantee that the assumptions are met to attain the Best Linear Unbiased Estimators. Regression diagnostics assess the model assumptions and probe if there are interpretations with a great, unwarranted effect on the examination or not. Diagnostic examinations on normality, linearity, multicollinearity, and autocorrelation were done on the collected data to establish its suitability in the formulation of linear regression model. Normality was tested by the Shapiro Wilk test, which is suitable for testing distributions of Gaussian nature which have specific mean and variance. Linearity indicates a direct proportionate association amongst dependent and independent variable such that variation in independent variable is followed by a correspondent variation in dependent

variable (Gall et al., 2006). Linearity was tested by determining homoscedasticity, which was determined by the Breusch-Pagan Cook-Weisberg Test for Homoscedacity.

Tests for multicollinearity of data was carried out using variance inflation factors (VIF) to determine whether the predictor variables considered in the research are significantly correlated with each other. According to Grewal *et al.* (2004) the main sources of multicollinearity are small sample sizes, low explained variable and low measure reliability in the independent variables. Auto-correlation test was carried out through the Durbin-Watson Statistic.

Additionally, to avoid spurious regression results unit root test was carried out on the panel data. The aim of conducting unit root test is for finding out if the macroeconomic variables under study are integrated of order on (1,1) or not before estimation procedure can be proceeded into. Unit root test was conducted through the Levin-Lin-Chu test. The study also did a Hausman specification test so as to establish if the variables influence over time. The null hypothesis presumes a random variable influence. The ultimate hypothesis is that the variables regard a fixed effect. The Null hypothesis is rejected if the p value is below 0.05 and accepted if the null hypothesis is more than 0.05

3.5.2 The Model of Analysis

The objectives of the research were attained through use of a multiple linear regression analysis, which tested whether predictor variables have any effect on operational efficiency. The statistical tests were conducted at 95% significance level meaning that the study allowed for an error of up to 5%. The model is illustrated as shown;

$$Y = \alpha + \beta_1 X_1 + \beta_2 X_2 + \beta_3 X_3 + \beta_4 X_4 + \epsilon$$

Where:

Y_t = Default Rate indicated by the Non-Performing Loans Ratio

α = Constant

$\beta_1 - \beta_4$ = Beta coefficients

X_1 = Lending Interest Rates

X_2 = Collateral

X_3 = Derivates

ϵ = error term

Table 3.1: Operationalization of the Study Variables

Variable	Measurement
Default Rate	Will be denoted by the NPL ratio; (Non-Performing Loans/ Outstanding Loans and Advances) (Thygerson, 1995).
Lending Rate	Will be denoted by the lending rates (Interest Income/Loans and Advances)
Collateral	(Fair Value of Collateral/Total Loans and Advances)
Derivatives	(Financial Assets/Total Loans and Advances) (Minton, Stulz & Williamson, 2008)

3.5.3 Tests of Significance

The study adopted a confidence interval of 95%. The results were set to be statistically significant at the 0.05 level, which indicates that the significance value should be less than 0.05. A statistical inference technique was applied in deriving conclusions associated to the model accuracy in predicting the market capitalization. The model significance was tested using the significance values at 95% confidence. The meaning of the association amongst

every predictor variable plus response variable was also be determined by the significance values, which illustrates how much standard error indicated that the sample deviates from the tested value.

CHAPTER FOUR

DATA ANALYSIS, RESULTS, AND FINDINGS

4.1 Introduction

This chapter focuses on the study data analysis, data elucidation and the clarifications on the research outcomes. The section is further portioned to quadruple subsections. This portion entails the inferential test, diagnostic tests, and the ultimate interpretation of the outcomes with cognitive arguments concerning the outcomes. Conclusively, this study chapter focuses on the study analysis, and interpretations and presentations.

4.2 Diagnostic Tests

Precursor diagnostic tests were conducted with relation to the linear regression analysis test. The normality tests, multicollinearity tests, homoscedasticity tests and autocorrelation tests are some of the diagnostics tests carried out. Normality test was implemented the guide of the Shapiro-Wilk test while the homoscedacity test was executed on Breusch-Pagan Cook-Weisberg analysis for a resultive Homoscedasticity. The analysis on Multicollinearity of data was geared on using Variance Inflation Factors (VIF). Autocorrelation examination n the variables of the study was completed via Durbin-Watson statistic. The Unit root experiment was performed with the help of the Levin-Lin-Chu test. Additionally, the Hausman test was accomplished on the variables with the aim of determining the relation of fixed and variable effects on the panel regression.

4.2.1 Normality Test

Table 4.1 following highlights the normality tests of the all variables in this study.

Table 4.1: Shapiro-Wilk Test for Normality

Variable	Obs	W	V	z	Prob>z
DefaultRate	65	0.11521	51.291	8.526	0.00000
LendingRate	65	0.88280	6.794	4.149	0.00002
Cololateral	65	0.41831	33.720	7.618	0.00000
Derivatives	65	0.41831	33.720	7.618	0.00000

In the test, the null hypothesis holds that the data has a normal distribution. The level of significance adopted in the study is 5%. Since the significance values in tests for all the variables are less than α (0.05), the null hypothesis is rejected. Hence, the data series of the variables are not normally distributed.

4.2.2 Homoscedacity Test

The homoscedacity tests for all the predictor variables used in the study are enlisted in Table 4.2.

Table 4.2: Breusch-Pagan/Cook-Weisberg Test for Homoscedacity

Breusch-Pagan / Cook-Weisberg test for heteroskedasticity

Ho: Constant variance

Variables: fitted values of DefaultRate

chi2(1) = 154.65

Prob > chi2 = 0.0000

The null hypothesis is that there is homoscedacity. The level of significance adopted in the study is 5%. Since the significance value is below α (0.05), the null hypothesis is rejected. Hence, the data series of all the predictor variables are heteroscedastic.

4.2.3 Test for Multicollinearity

Results on Test for Multicollinearity of data carried out using Variance Inflation Factors (VIF) are displayed in Table 4.3.

Table 4.3: VIF Multicollinearity Statistics

Variable	VIF	1/VIF
Cololateral	1.17	0.852196
LendingRate	1.17	0.852196
Mean VIF	1.17	

The common rule in statistics is that the VIF values should be less than 10 and greater than 1. The findings indicate that the individual and mean VIF values fall below 10 and are greater than 1. Hence, there is no presence of multicollinearity amongst them. Derivatives however had multicollinearity and thus was omitted from the findings.

4.2.4 Tests for Autocorrelation

The result on the autocorrelation test carried out using the Durbin-Watson Statistic. The findings showcased that Durbin-Watson d-statistic (3, 65) = 2.129811. The Durbin-Watson statistic ranges from point 0 and point 4. If there exist no correlation between variables, a value of 2 is shown. If the values fall under point 0 up to a point less than 2, this is an indication of an autocorrelation and on the contrast a negative autocorrelation exist if the value falls under point more than 2 up to 4. As a common rule in statistics, value falling under the range 1.5 to 2.5 is considered relatively normal whereas values that fall out of the range raise a concern (Shenoy & Sharma, 2015). Field (2009) however, opines that values

above 3 and less than 1 are a sure reason for concern. Therefore, the data used in this panel is not serially autocorrelated since it meets this threshold.

4.2.5 Unit Root Test

The results for the unit root test done for the data series default rate is displayed in Table 4.4 below.

Table 4.4: Unit Root Test for Default Rate

```

Levin-Lin-Chu unit-root test for DefaultRate
-----
Ho: Panels contain unit roots           Number of panels =    13
Ha: Panels are stationary               Number of periods =     5

AR parameter: Common                   Asymptotics: root(N)/T -> 0
Panel means: Not included
Time trend: Not included                Cross-sectional means removed

ADF regressions: 1 lag
LR variance: Bartlett kernel, 5.00 lags average (chosen by LLC)
-----

```

	Statistic	p-value
Unadjusted t	0.5821	0.7198
Adjusted t*	0.3640	0.6421

The null hypothesis is that the default rate variable has a unit root and the alternate hypothesis is that the variable is stationery. Since the significance value (p=0.7198, 0.6421) is greater than the critical value (α) at the 5% confidence level, then the null hypothesis is not rejected. Thus, there is presence of unit root in the panel data series.

The results for the unit root test done for the data series lending rate is exhibited in Table 4.5.

Table 4.5: Unit Root Test for Lending Rate

Levin-Lin-Chu unit-root test for LendingRate

Ho: Panels contain unit roots	Number of panels =	13
Ha: Panels are stationary	Number of periods =	5
AR parameter: Common	Asymptotics: root(N)/T -> 0	
Panel means: Not included		
Time trend: Not included	Cross-sectional means removed	

ADF regressions: 1 lag
LR variance: Bartlett kernel, 5.00 lags average (chosen by LLC)

	Statistic	p-value
Unadjusted t	-0.9362	0.1746
Adjusted t*	-0.9100	0.1814

The null hypothesis is that the lending rate has a unit root and the alternate hypothesis is that the variable is stationary. Since the significance value ($p=0.1746, 0.1814$) is greater than the critical value (α) at the 5% confidence level, then the null hypothesis is not rejected. Thus, there is presence of unit root in the panel data series.

The results for the unit root test conducted for the data series collateral are displayed in Table 4.6. The null hypothesis is that the collateral variable has a unit root and the alternate hypothesis is that the variable is stationary. Since the significance value ($p=0.7281, 0.7138$) is greater than the critical value (α) at the 5% confidence level, then the null hypothesis is not rejected. Thus, there is presence of unit root in the panel data series.

Table 4.6: Unit Root Test for Collateral

Levin-Lin-Chu unit-root test for Cololateral

Ho: Panels contain unit roots	Number of panels =	13
Ha: Panels are stationary	Number of periods =	5
AR parameter: Common	Asymptotics: root (N) / T ->	0
Panel means: Not included		
Time trend: Not included	Cross-sectional means removed	

ADF regressions: 1 lag
LR variance: Bartlett kernel, 5.00 lags average (chosen by LLC)

	Statistic	p-value
Unadjusted t	0.6072	0.7281
Adjusted t*	0.5644	0.7138

The results for the unit root test done for the data series derivatives are displayed in Table 47.

Table 4.7: Unit Root Test for Derivatives

Levin-Lin-Chu unit-root test for Derivatives

Ho: Panels contain unit roots	Number of panels =	13
Ha: Panels are stationary	Number of periods =	5
AR parameter: Common	Asymptotics: root (N) / T ->	0
Panel means: Not included		
Time trend: Not included	Cross-sectional means removed	

ADF regressions: 1 lag
LR variance: Bartlett kernel, 5.00 lags average (chosen by LLC)

	Statistic	p-value
Unadjusted t	0.6072	0.7281
Adjusted t*	0.5644	0.7138

The null hypothesis is that the derivatives variable has a unit root and the alternate hypothesis is that the variable is stationery. Since the significance value ($p=0.7281, 0.7138$) is greater than the critical value (α) at the 5% confidence level, then the null hypothesis is not rejected. Thus, there is presence of unit root in the panel data series.

4.2.6 Test for Random and Fixed Effects

The Hausman test was executed with an aim of realising the effects of the fixed influence overtime or otherwise may have an implication of random or varying influence over time. Before the Hausman test was conducted, the variables had to be transformed because they did not meet the conditions of normality, homoscedacity, and stationarity. Thus, a logarithmic function was introduced to all the variables to transform them. Since you cannot transform a negative value with a logarithmic function, negative values were considered as missing values. The outcomes on the Hausman test are exhibited in Table 4.8.

Table 4.8: Hausman Test of Specification

```
. hausman re fe
```

	Coefficients		(b-B) Difference	sqrt(diag(V_b-V_B)) S.E.
	(b) re	(B) fe		
LendingRate	-27.82396	-35.41443	7.590466	.
Cololateral	1.116421	-.1695961	1.286017	.

b = consistent under Ho and Ha; obtained from xtreg
 B = inconsistent under Ha, efficient under Ho; obtained from xtreg

Test: Ho: difference in coefficients not systematic

```
chi2(2) = (b-B)'[(V_b-V_B)^(-1)](b-B)
        = -2.40 chi2<0 ==> model fitted on these
data fails to meet the asymptotic
assumptions of the Hausman test;
see suest for a generalized test
```

The null hypothesis will assume that variables have a random effect and alternative hypothesis will be that the variables have a fixed effect. The Null hypothesis is rejected if the p value is below 0.05 and accepted if the null hypothesis is more than 0.05. When the Hausman chi-square test statistic is negative, the alternate hypothesis is adopted because asymptotically, the p value is equal to 1. Thus, the variables have a fixed effect and a fixed effect panel model shall be utilized.

4.3 Inferential Statistics

Inferential statistics was spear headed for establishing the variables relation, direction and strength of the association linking the response variables and the predictor variable. The section entailed the inferential statistics like the panel multiple linear regression and correlation analysis.

4.3.1 Correlation Analysis

Correlation investigations ascertain any existence of any correlation amongst two variables. The correlation ranges from strong negative correlation to a perfect positive correlation. The study used Pearson Correlation. This study employed a Confidence Interval of 95% and a two tail test. The correlation test was done to ascertain the association between lending rate and the control variables entailing collateral and derivatives, with the default rate.

Table 4.9: Correlation Analysis

	DefaultRate	LendingRate	Collateral	Derivatives
DefaultRate	1.0000			
LendingRate	-0.3060*	1.0000		
Collateral	-0.0233	0.3845*	1.0000	
Derivatives	-0.0233	0.3845*	1.0000*	1.0000

Table 4.9 displays that only lending rate is significantly correlated at the 5% significance level to the default rate, they have a negative significant association. Collateral and derivatives do not have a significant association with the default rate at the 5% significance level.

4.3.2 Multiple Linear Regression

The fixed effects panel regression model assessed the effect of the lending rate, collateral, and derivatives on the default rate. The regression analysis was established at the 5% significance level. The significance critical value exhibited from the Analysis of Variance and Model Coefficients were compared with the values obtained in the analysis. The outcomes are displayed in Table 4.10.

Table 4.10: Panel Multiple Linear Regression

```

Fixed-effects (within) regression      Number of obs   =      65
Group variable: A                    Number of groups =      13

R-sq:  within = 0.0968                Obs per group:  min =      5
      between = 0.1429                  avg   =      5.0
      overall = 0.0914                  max   =      5

corr(u_i, Xb) = -0.3359                F(2, 50)        =      2.68
                                          Prob > F         =      0.0784
  
```

DefaultRate	Coef.	Std. Err.	t	P> t	[95% Conf. Interval]
LendingRate	-35.41443	15.31414	-2.31	0.025	-66.17379 -4.65507
Cololateral	-.1695961	1.556897	-0.11	0.914	-3.296715 2.957523
Derivatives	0	(omitted)			
_cons	7.504348	3.050207	2.46	0.017	1.377827 13.63087
sigma_u	2.1716312				
sigma_e	4.6290256				
rho	.18038583	(fraction of variance due to u_i)			

```

F test that all u_i=0:      F(12, 50) =      0.90      Prob > F = 0.5491
  
```

The overall R^2 reveals the variations of the response variables originating from the changes in predictor variables. The overall R^2 value is 0.0914, an indication that 9.14% of the variation in the default rate are caused by lending rate, collateral, and derivatives. Those factors which are not included in the model justify for 90.86% of the variations in the default rate.

The null hypothesis is that lending rate, collateral, and derivatives do not significantly influence the default rate. The significance value derived in the study ($\text{Prob}>F=0.0784$) is greater than critical value of 0.05. Therefore, the null hypothesis is not rejected. Thus, lending rate, collateral, and derivatives do not in unison influence the default rate. Thus, they cannot be utilized to significantly predict the default rate.

The null hypothesis was that there was no significant association amongst lending rate, collateral, and derivatives in isolation and the default rate. The study findings exhibited that lending rate has a significant relationship with the default rate. This is because its significance value ($p>(t) = 0.025$) is less than the critical significance value (α) of 0.05. Thus, the null hypothesis is rejected. Therefore, it has a significant influence on the default rate. It has a significant negative impact on the default rate. Collateral however does not have a significant effect on the default rate. This is because its significance value ($p>(t) = 0.914$) is more than the critical significance value (α) of 0.05. The variable derivatives exhibited multi-collinearity and was consequently dropped from the study analysis.

4.4 Interpretation and Discussion of Findings

The study endeavoured to establish the effect of the lending rate on the default rate of Kenyan MFIs. The study also aimed on establishing effect of collaterals and derivatives on the default rate of Kenyan MFIs. However, the control variable; derivatives, exhibited multi-collinearity and was consequently dropped from the study analysis. Additionally, the variables had to be transformed because they did not meet the conditions of normality, homoscedacity, and stationarity. A logarithmic function was thus introduced to all the study variables.

The study findings established that lending interest rate is significantly correlated at the 5% significance level to the default rate. However, collateral and derivatives were not significantly correlated at the 5% significance level to the default rate. Additionally, the study findings revealed that the lending interest significantly impacts on the default rate. The two variables have a significant negative relationship.

The study findings are in tandem to the study findings by Oduori (2012) whose study examined the degree to that borrowing react to interest changes and established existence of a strong positive linear association amongst lending rates and loan defaults and that the loan defaults decrease with declining lending rates, as the borrowers have a less interest obligation to pay. The study is also congruent to the study by Ndirangu (2004) that was conducted on the association amongst interest rates and NPLs and established a positive association amongst NPLs and interest levels, whereby as the interest rates went up the NPLs also went up.

Additionally, the study findings are similar to the assertion by Memmel et al. (2012) which stipulated that the as the cost of credit increases, it impairs the capacity of a borrower to pay back his or her loan. If a borrower's disposable income remains constant and interest rates rise, then the default risk of the borrower increases. A period experiencing relatively higher interest rates will have higher default rates than a period experiencing relatively lower interest rates. The lower interest rates enhance borrowers' net returns and boost their incentive to perform.

However, the study findings disagrees with those of findings by Ngugi (2001) done on the association amongst interest rates and default rates in Kenyan commercial banks which established the lending rates had no impact on the rate of loan repayment. The study findings

are also not similar to Bester's (1994) findings that developed a model of debt renegotiation which forecasts a positive association amongst collateralization and default risk. The creditor in this model is unable to differentiate between a strategic default that is borrower cheating and default as a result of poor state of the business environment. The study findings are not congruent to a study by Sundaram (2011) which established that derivatives are applied to minimize the risk exposure, similarly known as hedging. By hedging, the cash flows from derivative are applied in offsetting or preventing cash flows from previous market commitment.

The study findings are not in tandem to the study conducted by Tireito (2012) on the association amongst interest rates and non-performing loans in commercial banks in Kenya which established that there was no significant association amongst interest rate and non-performing loans in commercial banks in Kenya. Finally, the study findings are not congruent to study findings by the study conducted by Ongweso (2005) on the relationship between interest rates and NPLs among Kenyan commercial banks, which established a positive but insignificant association amongst the level of interest, and non-performing loans, where rise in interest rates resulted to growth in NPLs.

CHAPTER FIVE

SUMMARY, DISCUSSIONS, CONCLUSIONS, AND RECOMMENDATIONS

5.1 Introduction

This section shows the study findings summary, offered conclusions, and recommendations on the effect of the lending interest rates on the default rate of Kenyan Micro-Finance Institutions. Additionally, the research limitations and further research suggestions are also outlined.

5.2 Summary of Findings

The study endeavoured to establish the effect of the lending rate on the default rate of Kenyan MFIs. The study also sought to establish effect of collaterals and derivatives on the default rate of Kenyan MFIs. The study undertook analysis using correlation and regression analyses. The correlation analysis employed in the study established that lending interest rate is significantly correlated at the 5% significance level to the default rate. However, collateral and derivatives were not significantly correlated at the 5% significance level to the default rate. The panel multiple linear regression analysis revealed that the lending rates, collateral, and derivatives in unison do not have a significant effect on the lending rate and thus the model cannot be utilized in predicting the default rate. Additional study finding from the panel multiple linear regression analysis was the lending interest significantly impacts on the default rate and the two variables have a significant negative relationship. However, collateral does not have a significant relationship with the default rate.

5.3 Conclusion

In this section, the conclusion of the study is given; the conclusions were affiliated to the study objective, that was to determine effect of the lending rate on the default rate of Kenyan MFIs. The study concluded that the lending interest rate has a significant negative relationship with the default rate.

The study conclusion is in tandem with the conclusion by Den Haan, Sumner, and Yamashiro (2007) since the outstanding bank loans are more than new loans, low interest rates could make the loan portfolios of the bank less risky in the short-run. However, in the medium term, very low interest rates encourage risk-taking that increases credit risk thus shaking the financial stability more so when the prevailing interest rates return to or increase beyond average levels.

The study conclusion is also congruent to the conclusion by Foote et al. (2009) that a moderate numbers of adjustable rate mortgages defaults mostly happen because of interest rates, which are high whereas the opposite is true for fixed rates mortgages. For adjustable rate mortgages, the required mortgage repayments increase when the interest rates are high and this tends to makes some people to fail to honour their repayments, mores son early if they had a small-accumulated savings. On the contrast, for the fixed rates mortgages, lower interest rates implied that the rental repayments will also be lowers in comparison to mortgage repayments which can trigger the intention to default.

The study conclusion is parallel to the conclusion by Bernanke, Gertler, and Gilchrist (1996) that interest rates that are low were revealed to minimize the credit risk in the in the short run because they minimize the cost of refinancing and improves the net worth of borrower, hence

decreasing the outstanding loans credit risk. Since the volume of loans outstanding is more than that of new loans, the bank loans may become less risky in the short run if the interest rates are low. The study conclusion is also in tandem with the conclusion by Taherizadeh (2001) that increment in base lending rate results to higher borrowing costs. This is due to the fact that the banks as well as other depository and lending institutions transfer the cost to the borrower. The effect of increased base lending rate is therefore increased default among individual borrowers, SMEs, and even large corporates.

However, the study conclusion is not similar to that of Ongena and Peydró-Alcalde (2007) that banks relax their standards lending and provide new loans with higher credit risk though minimize the related loan spreads when the short-term interest rates are low. This implies that interest rates that are low enhance the banks' appetite for risk, thus lower lending rates lead to increased default rates. In the medium term, too low interest rates encourage the risk-taking of banks, which leads to an increment in credit risk, hence negatively influencing the financial stability, particularly if the interest rates afterwards increase to the average level (Ongena & Peydró-Alcalde, 2007).

5.4 Recommendations

The study findings will aid in further researches to be conducted on the field of interest rates and their impact on the default rate. Later scholars keen in research on interest rates and their impact on the default rate will use the study findings as a referral. Policy recommendations are made to the National Treasury and CBK since it has been established that the lending interest rate has a significant effect on the default rate of Micro-Finance Institutions, the policy makers should try to regulate the interest rates of the Micro-Finance Institutions, and by extension other financial institutions, so as to mitigate the default rates. The recommendation

will guide government regulators in making policies and practices to boost the financial system and mitigate the default rates.

The finding of the study that lending interest rate has a significant effect on the default rate of Micro-Finance Institutions will help MFIs practitioners, and by extension other financial institutions practitioners, and consultants utilize the interest rates to mitigate the financial institutions' default rates. The additionally finding that collateralization does not significantly impact on the default rates calls for the recommendation that the MFI practitioners should mainly focus the lending interest rates in order to mitigate the default rates.

5.5 Recommendations for Further Study

Exploring the influence the lending interest rates on MFIs default rates is of great importance the policy makers in the National Treasury and CBK, practitioners in the banking sector, and consultants. Although the present study was conceded on the MFIs context of which the same study could have been carried out in other similar financial institutions with an aim to ascertaining whether the study findings would hold. The study was only carried out in the Kenyan context, and gives room for further studies can be conducted out of Kenyan context. The study could have also been carried out in the African or global jurisdictions to ascertain whether the study findings would hold.

The study only considered lending interest rates, collaterals, and derivatives, as influencing the default rates. A study can be conducted to ascertain it there is other factors that influence default rates. Progressive subsequent studies ought to be carried out to establish the evidence of factors that might be moderating the affiliation of the default rates and the lending interest rates. In this study Secondary data was used, further study should use primary sources of data

like in-depth questionnaires and structured interviews to be administered to all the stock market participants. These can then support or condemn the current study findings. Multiple linear regression and correlation analysis were implemented in the research, future studies may adopt use of other techniques like factor analysis, discriminant analysis, cluster analysis and granger causality.

5.6 Limitations of the Study

The study was conducted only in the Kenyan Micro-Finance Institutions' context. due to time and cost constraints, which does not give clear indication of findings if other financial institutions were also incorporated in the study. More uncertainties would occur if similar studies were replicated in different financial institutions and countries. Although the research engaged secondary sources of data by utilizing questionnaires, there were some major challenges like some of the data being not readily available; especially data on collateral and derivatives, and it took great lengths and costs to obtain it. Some data were not utilized in their raw form, for instance the default rate and the management efficiency ratio, and further calculations and manipulations of the data were required. Impending delays were experienced due to data processing and further editing before the compilation by the researcher.

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APPENDICES

Appendix 1: List of Deposit Taking Microfinance Institutions June 2020

DIRECTORY OF LICENCED MICROFINANCE BANKS	
1.	<p>Caritas Microfinance Bank Limited Chief Executive Officer: Mr. George Mugwe Maina Postal Address: P. O. Box 15352 - 00100, Nairobi Telephone: +254 - 020 - 5151500 E-mail: info@caritas-mfb.co.ke Website: www.caritas-mfb.co.ke Physical Address: Cardinal Maurice Otunga Plaza, Ground Floor, Kaunda Street, Nairobi. Date Licenced: 2nd June 2015 Branches: 1</p>
2.	<p>Century Microfinance Bank Limited Chief Executive Officer: Mr. Reuben Mwangi Postal Address: P. O. Box 38319 - 00623, Nairobi Telephone: +254 - 020 - 2664282, 0722 - 168721, 0756 - 305132 E-mail: info@century.co.ke Website: www.century.co.ke Physical Address: K.K. Plaza, 1st Floor, New Pumwani Road - Gikomba, Nairobi Date Licenced: 17th September 2012 Branches: 2</p>
3.	<p>Choice Microfinance Bank Limited Chief Executive Officer: Ms. Lydia Maina Postal Address: P. O. Box 18263 - 00100, Nairobi Telephone: +254 - 020 3882206 / 207, 0736 - 662218, 0724 - 308000 E-mail: info@choicemfb.com Website: www.choicemfb.com Physical Address: Siron Place, Ongata Rongai, Magadi Road, Nairobi Date Licenced: 13th May 2015 Branches: 1</p>
4.	<p>Daraja Microfinance Bank Limited Ag. Chief Executive Officer: Mr. Githuku Mwangi Postal Address: P.O. Box 100854 - 00101, Nairobi Telephone: +254 - 020 - 3879995 / 0733 - 988888, 0707 – 444888, 0718 - 444888 E-mail: daraja@darajabank.co.ke Website: www.darajabank.co.ke Physical Address: Karandini Road, off Naivasha Road, Nairobi Date Licenced: 12th January 2015 Branches: 1</p>

DIRECTORY OF LICENCED MICROFINANCE BANKS	
5.	<p>Faulu Microfinance Bank Limited Managing Director: Mr. Charles Kimani Njuguna Postal Address: P. O. Box 60240 - 00200, Nairobi Telephone: +254 - 020 - 3877290/3/7; 3872183/4; 3867503, 0711 - 074074, 0708 - 111000 Fax: +254-20-3867504, 3874875 E-mail: info@faulkenya.com; customercare@faulkenya.com; contact@faulkenya.com Website: www.faulkenya.com Physical Address: Faulu Kenya House, Ngong Lane, Off Ngong Road Date Licenced: 21st May 2009 Branches: 39</p>
6.	<p>Kenya Women Microfinance Bank Limited Managing Director: Mr. James Mwangi Githaiga Postal Address: P. O. Box 4179-00506, Nairobi Telephone: +254 - 020 - 3067000, 2470272-5/2715334-5, 0729920920, 0732633332, 0703 - 067000 E-mail: info@kwftdm.com Website: www.kwftdm.com Physical Address: Akira House, Kiambere Road, Upper Hill, Nairobi Date Licenced: 31st March 2010 Branches: 31</p>
7.	<p>Rafiki Microfinance Bank Limited Managing Director: Mr. Ken Obimbo Postal Address: P. O. Box 12755 - 00400, Nairobi Telephone: +254-020-2166401/0730 170 000/500 E-mail: info@rafiki.co.ke Website: www.rafiki.co.ke Physical Address: Rafiki House, Biashara Street, Nairobi Date Licenced: 14th June 2011 Branches: 17</p>
8.	<p>Remu Microfinance Bank Limited Ag. Chief Executive Officer: Ms. Nancy Waweru Postal Address: P. O. Box 20833 - 00100, Nairobi Telephone: +254 - 020 - 2214483/2215384/ 2215387/8/9, 2631070, 2215380, 2215384/5/7/8/9, 0733-554555 E-mail: info@remultd.co.ke Website: www.remultd.co.ke Physical Address: Finance House, 14th Floor, Loita Street, Nairobi Date Licenced: 31st December 2010 Branches: 3</p>

DIRECTORY OF LICENCED MICROFINANCE BANKS	
9.	<p>SMEP Microfinance Bank Limited Chief Executive Officer: Mr. Symon Kamore Postal Address: P. O. Box 64063 - 00620, Nairobi Telephone: +254 - 020 - 3572799/2055761, 2673327/8, 0711606900 E-mail: info@smep.co.ke Website: www.smep.co.ke Physical Address: SMEP Building - Kirichwa Road, Off Argwings Kodhek Road, Nairobi Date Licenced: 14th December 2010 Branches: 7</p>
10.	<p>Sumac Microfinance Bank Limited Chief Executive Officer: Mr. John Kamau Njihia Postal Address: P. O. Box 11687 - 00100, Nairobi Telephone: +254 - 020 - 2212587, 2210440, 2249047, 0738637245, 0725223499 Fax: 20 2210430 E-mail: infor@sumacmicrofinancebank.co.ke Website: www.sumacmicrofinancebank.co.ke Physical Address: Consolidated Bank House, 2nd Floor, Koinange Street, Nairobi Date Licenced: 29th October 2012 Branches: 4</p>
11.	<p>U & I Microfinance Bank Limited Chief Executive Officer: Mr. Simon Mwangi Ngigi Postal Address: 15825 - 00100, Nairobi Telephone: +254 - 020 - 2367288, 0713 - 112791 E-mail: info@uni-microfinance.co.ke Website: www.uni-microfinance.co.ke Physical Address: Asili Complex, 1st Floor, River Road, Nairobi Date Licenced: 8th April 2013 Branches: 2</p>
12.	<p>Uwezo Microfinance Bank Ltd Ag. Chief Executive Officer: Mr. Edward Mwithali Postal Address: 1654 - 00100, Nairobi Telephone: 2212919, 0703591302 E-mail: info@uwezodtm.com Website: www.uwezodtm.com Physical Address: Rehani House, 11th Floor, Koinange Street, Nairobi Date Licenced: 8th November 2010 Branches: 2</p>
DIRECTORY OF LICENCED MICROFINANCE BANKS	

13.	Maisha Microfinance Bank Limited Chief Executive Officer: Mr. Ireneus Gichana Postal Address: P.O. Box 49316 -00100 GPO Nairobi Telephone: 0792 002 300/020 2220648 E-mail: info@maishbank.com Website: www.maishabank.com Physical Address: 2 nd Floor, Chester House-Commercial Wing, Koinange Street, Nairobi Date Licenced: 21 st May 2016 Branches: 1
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Source: Central Bank of Kenya Website (2020)

Appendix II: Data Collection Form

	Year					
Data	2014	2015	2016	2017	2018	2019
Non-Performing Loans						
Outstanding Loans and Advances						
NPL Ratio						
Weighted Average Lending Rates						
NPL Ratio						
Pre-Tax Income						
Loan Loss Provision						
Net Charge-Offs						
Loan Loss Provision						
Standard Risk Costs						
Write-Off Ratio						

Appendix III: Research Data

	Microfinance	Year	Default Rate	Lending Rate	Collateral	Derivatives
1	Caritas Microfinance Bank Limited	2015	0.142587	0.194519	0.329082	0.164541
		2016	0.156601	0.219381	0.305617	0.152809
		2017	0.182902	0.187899	0.311914	0.155957
		2018	0.198897	0.179953	0.36876	0.18438
		2019	0.149015	0.172804	0.307526	0.153763
2	Century Microfinance Bank Limited	2015	0.232486	0.16551	0.327822	0.163911
		2016	0.260567	0.206558	0.323284	0.161642
		2017	0.281607	0.15062	0.315589	0.157794
		2018	0.338338	0.159981	0.320453	0.160227
		2019	0.413896	0.183092	0.216528	0.108264
3	Choice Microfinance Bank Limited	2015	0.075441	0.267516	3.923388	1.961694
		2016	0.084557	0.263389	0.610697	0.305349
		2017	0.05864	0.247482	0.645823	0.322912
		2018	0.088242	0.281511	0.693215	0.346607

		2019	0.082817	0.293666	0.654717	0.327358
4	Daraja Microfinance Bank Limited	2015	0.04199	0.173382	0.368042	0.184021
		2016	0.05212	0.166881	0.357252	0.178626
		2017	0.055575	0.161352	0.360566	0.180283
		2018	0.061028	0.16386	0.327669	0.163834
		2019	0.056016	0.159183	0.333374	0.166687
5	Faulu Microfinance Bank Limited	2015	0.020248	0.209587	0.845976	0.422988
		2016	0.013942	0.229779	0.914711	0.457356
		2017	0.020719	0.251205	0.879409	0.439705
		2018	0.071348	0.314538	0.878401	0.439201
		2019	0.093559	0.458003	0.968402	0.484201
6	Kenya Women Microfinance Bank Limited	2015	0.058022	0.270416	0.566494	0.283247
		2016	0.019204	0.266475	0.527304	0.263652
		2017	0.036807	0.173482	0.511001	0.2555
		2018	0.016216	0.241827	0.552726	0.276363
		2019	0.025674	0.23784	0.54302	0.27151

7	Rafiki Microfinance Bank Limited	2015	0.105893	0.219098	0.358472	0.179236
		2016	0.074548	0.186968	0.36899	0.184495
		2017	0.083097	0.170817	0.346328	0.173164
		2018	0.079748	0.141242	0.314616	0.157308
		2019	0.05533	0.212272	0.187767	0.093884
8	Remu Microfinance Bank Limited	2015	0.117572	0.18248	0.158055	0.079028
		2016	0.152744	0.159677	0.101794	0.050897
		2017	0.153299	0.166254	0.056086	0.028043
		2018	0.256803	0.16507	0.270482	0.135241
		2019	0.063832	0.171914	0.310272	0.155136
9	SMEP Microfinance Bank Limited	2015	0.072183	0.199318	0.456951	0.228475
		2016	0.075357	0.158098	0.295447	0.147724
		2017	0.072421	0.140664	0.290138	0.145069
		2018	0.087024	0.141338	0.299157	0.149579
		2019	0.034188	0.176396	0.251608	0.125804
10	Sumac Microfinance Bank Limited	2015	0.038997	0.162461	0.455361	0.22768

		2016	0.061985	0.140491	0.453654	0.226827
		2017	0.100865	0.175318	0.323554	0.161777
		2018	0.097942	0.16362	0.301065	0.150532
		2019	0.260113	0.200401	0.501668	0.250834
11	U & I Microfinance Bank Limited	2015	0.209829	0.159496	0.471031	0.235516
		2016	0.298073	0.171224	0.464559	0.232279
		2017	0.369459	0.168606	0.629344	0.314672
		2018	0.024078	0.145457	0.292672	0.146336
		2019	0.032489	0.181494	0.370087	0.185044
12	Uwezo Microfinance Bank Ltd	2015	0.066567	0.176634	0.380226	0.190113
		2016	0.062905	0.182668	0.422152	0.211076
		2017	0.068335	0.165007	0.418273	0.209136
		2018	38.55386	0.045289	0.401011	0.200506
		2019	0.003733	0.083927	0.598047	0.299024
13	Maisha Microfinance Bank Limited	2015	0.00951	0.083912	0.29712	0.14856
		2016	0.062172	0.141605	0.499147	0.249574

		2017	0.162821	0.105043	0.388848	0.194424
		2018	0.376961	0.224996	0.319786	0.159893
		2019	0.17352	0.207989	0.331823	0.165912

