

**INTEREST RATES AND NON PERFORMING LOANS OF COMMERCIAL
BANKS IN KENYA**

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DECLARATION

This is my own work and has not been previously submitted for an award.

Signature _____

Date _____

ERIC KINYOTI

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This work has been presented for assessment purposes with my consent as the Supervisor.

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DEDICATION

This work is particularly dedicated to my friend Irene and the entire family members Robert and Jane who were of great inspiration towards my education. I appreciate their material and spiritual support that they gave me as I carried out this study. May the God Almighty bless you richly.

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TABLE OF CONTENTS

DECLARATION..... ii

DEDICATION..... iii

ACKNOWLEDGEMENT iv

TABLE OF CONTENTSv

APPENDICES viii

LIST OF TABLES ix

LIST OF FIGURESx

OPERATIONAL DEFINITION OF TERMS..... xi

ABBREVIATIONS AND ACRONYMNS xii

ABSTRACT..... xiii

CHAPTER ONE1

INTRODUCTION.....1

1.1 Background of the Study 1

1.1.1 Interest Rates.....4

1.1.2 Non-performing loans6

1.1.3 Commercial Banks in Kenya8

1.2 Statement of the Problem.....9

1.3 Objectives of the study..... 11

1.3.1 General Objective 11

1.3.2 Specific Objectives 11

1.4 Study Hypothesis 12

1.5 Significance of the Study 12

1.7 Limitations of the Study..... 13

1.8 Organization of the study 14

CHAPTER TWO15

LITERATURE REVIEW15

2.1 Introduction..... 15

2.2 Theoretical Review 15

2.2.1 The Classical Theory of Interest Rate..... 15

2.2.2 Keynes Theory of Liquidity Reference.....	16
2.2.3 Information Asymmetry Theory	18
2.2.4 Adverse Selection Theory	19
2.3 Empirical Review.....	20
2.3.1 Credit Size and NPLs in Commercial Banks.....	20
2.3.2 Bank Lending Rates and NPLs in Commercial Banks	23
2.3.3 Interest on Deposits and NPLs in Commercial Banks.....	26
2.3.5 Central Bank Rates, Interest Rates, Non-Performing Loans	28
2.4 Summary of Research Gaps.....	30
2.5 Conceptual Framework.....	35
CHAPTER THREE	37
RESEARCH METHODOLOGY	37
3.1 Introduction.....	37
3.2 Research design	37
3.3 Target population	37
3.4 Sampling Design and Procedure.....	38
3.5 Data collection	38
3.6 Data analysis	38
3.6.1 Empirical Modelling	39
3.6.2 Diagnostic Tests.....	40
3.7 Operationalization and measurement of variable	42
3.8 Ethical consideration.....	43
CHAPTER FOUR.....	44
DATA ANALYSIS AND INTERPRETATION OF FINDINGS.....	44
4.1 Introduction.....	44
4.2 Descriptive statistics	44
4.3 Diagnostic Tests.....	45
4.3.1 Test for Normality.....	46
4.3.2 Heteroscedasticity Test	46
4.3.3 Multicollinearity Test.....	47
4.3.4 Autocorrelation Test	47

4.3.5 Linearity Test.....	48
4.3.6 Unit Root Test.....	51
4.4 Hausman Test.....	53
4.5 Regression Analysis.....	53
4.6 Moderation of Central Bank Rate.....	56
CHAPTER FIVE	58
SUMMARY OF FINDINGS, CONCLUSIONS AND RECOMMENDATIONS	58
5.1 Introduction.....	58
5.2 Summary of the Findings.....	58
5.2.1 Interest on Deposits and non-performing loans	58
5.2.2 Bank Lending Rates and Non-performing loans	58
5.2.3 Credit Size and NPLs.....	59
5.3.4 Central Bank Rate, Interest Rates and Non-performing loans.....	59
5.3 Conclusion	59
5.4 Recommendations.....	60
5.5 Areas for Further Research	61
REFERENCES.....	62
APPENDICES.....	68
Appendix 1: List of Commercial banks in Kenya	68
Appendix 2: Data Extraction Tool.....	70

APPENDICES

Appendix 1: List of Commercial banks in Kenya.....	67
Appendix 2: Data Extraction Tool	69

LIST OF TABLES

Figure 2.1: Conceptual Framework	35
Figure 4.1: Credit Size and NPL ratio	49
Figure 4.2: Bank Lending Rates and NPL ratio.....	50
Figure 4.3: Interest on money Deposited and NPL ratio	51

LIST OF FIGURES

Figure 2.1: Conceptual Framework	35
Figure 4.1: Credit Size and NPL ratio	49
Figure 4.2: Bank Lending Rates and NPL ratio.....	50
Figure 4.3: Interest on money Deposited and NPL ratio	51

OPERATIONAL DEFINITION OF TERMS

- Bank lending rates:** The amount of money paid by debtors to the banking institutions for use of borrowed money or borrowed asset.
- Central Bank Rate** Is the IR which is charged on loans by central bank and then goes to commercial bank.
- Commercial banks:** These are financial entities that have their primary function being accepting deposits and advancing of loans to borrowers at a certain interest rate and also making certain investments which are all aimed at making profit.
- Credit size:** This is the total amount of money that a financial institution like a bank has offered as loans as well as advances to the customers.
- Interest on deposits:** This refers to the money paid by the bank for using money deposited by clients in some form of savings account with the bank.
- Interest rate:** This is the amount charged, to borrower by the lender, expressed as percentage of principal, for loan facility provided. In this study, interest rate is explained in terms of bank lending rates and interest on deposits.
- Non-performing loans:** This refers to a loan where the borrower has defaulted and has not made scheduled payments of interest or principal for some time, mostly 90 days.
- Risk free rate:** This is a rate of return which has no risk attached to it meaning no financial loss up to certain duration of time.

ABBREVIATIONS AND ACRONYMS

APR:	Annual Percentage Rate
BLR:	Bank Lending Rates,
CBA:	Commercial Bank of Africa
CBK:	Central Bank of Kenya
CBR:	Central Bank Rate
CS:	Credit Size
IR:	Interest Rate
LM:	Langrage Multiplier
NIC:	National Industrial Bank
NPAs:	Non-Performing Assets
NPLs:	Non-Performing Loans
OLS:	Ordinary Least Squares
SASRA:	Sacco Societies Regulatory Authority
UR:	unit root
VAR:	Vector Auto Regression
VECM:	Vector Error Correction Model
VIF:	Variance inflation factor

ABSTRACT

In the last ten years (2010 to 2019), NPLs in Kenyan commercial banks has been rising. Between the year 2011 and 2018, NPLs increased from 4.4 per cent and 12.7 per cent. High interest rates contribute to NPLs as they influence the borrowers' capacities to service the loans. However, despite the decrease in interest rates, after introduction of interest rate capping in 2016 non-performing loans have still been increasing. It was therefore essential to examine influence of interest rates on NPLs in Kenyan commercial banks. Therefore, general study objective was to assess the association between IR and Kenyan commercial banks' NPLs. Specific objectives were to examine influence of credit size, bank lending rates and interest on deposit on NPLs. The study sought to evaluate moderating effect of CBR on association between interest rate and NPLs. The study was guided by classical theory of interest rate, Keynes theory of liquidity preference, information asymmetry theory as well as adverse selection theory. An explanatory research approach was adopted. Group of interest comprised all 39 commercial banks operating in Kenya that were currently operational. Since the sample size was small (39) a bank census was carried out and duration between 2016 and 2020 was covered in this study. The study deployed secondary data, which was acquired from Kenyan commercial banks' financial statements and from CBK supervision reports. Moreover, the study made use of a data extraction tool to collect secondary data. In analysis of data, the researcher used inferential and also descriptive statistics and all statistical analysis was carried out with the support of STATA version 14. Descriptive statistics comprised of frequency distributions, percentages, mean, variances as well as standard deviation. On the other hand, inferential statistics were carried out using regression analysis, which was fixed effect based on the results from Hausman test. Diagnostic tests that were done include normality test, heteroscedasticity test, autocorrelation test, linear test, Hausman test, multicollinearity test, and the UR test. The study found that IOD measured in terms of Interest on Money Deposited has significant and inverse effect on the NPLs (Ratio of gross NPLs to gross loans) of Kenyan commercial banks. The research discovered that BLR measured in terms of Commercial banks weighted average rates, has a significant and positive effect on NPLs of Kenyan commercial banks. In addition, CS measured using amount of loans and advances has insignificant negative effect on NPLs. Additionally, CBR has no moderating influence on the link between IR and NPLs in Kenyan commercial banks. The study therefore recommends that the commercial banks in Kenya ought to lower the interest rate charged on deposits since increasing rate of interest lowers demand for loans and also leads to loan default by the borrowers. In addition, the commercial banks' management in Kenya should develop proper strategies to increase the lending interest rates such as increasing the spread between federal funds rate and the rate that customers are charged by the bank in order to increase the loans' profitability. Moreover, the management of commercial banks should put proper measures to lower the credit size since huge loans size leads to high possibility of defaulters. Moreover, lowering the credit size increases the number of loan borrowers which consequently increases the profitability.

CHAPTER ONE

INTRODUCTION

1.1 Background of the Study

In an economy, financial organizations bridge the gap or link the borrowers with depositors. This implies that those wishing to save the incomes for interest rate are free to save while those wishing to take loans and pay back with interest rate are free to have it (Tumwine & Kamukama, 2018). In the Kenyan economy, the financial sector is dominated by banking institutions. The primary role of these institutions is to take savings from people who want to use their money in future and provide loans to people who need it. The act of lending money to people started a long way back in the times of industrial revolution whereby the need for high amount of capital for project facilitation and successful completion triggered the pace of commercial activities (Etale & Ayunku, 2016). Among the key services offered by the banking institutions to their customers is lending. This can be done on long-term basis, short or even on medium term basis. Albentosa and Beyaert (2014) argue that the most key primary role that is highly valued or that the banking sector cannot survive with is lending.

The general perception of the banking institutions is that the sector uses customer's savings to provide loans to capable persons or even to invest the money in other assets that are expected to give interest in future (Wells, 2013). This implies that among the key objectives of the banking institutions is to make maximum returns for their shareholders. This goal is attained through widening the spread of the interest rate which is gotten by increasing the lending rates as much as possible and on the other hand lowering the deposit rate as much as possible (Hakan & Gulumser, 2014). This is attainable due to the fact that most nations enable their banking institutions to set their own lending rates up to a certain regulated rate by the central bank of that particular country. Nevertheless, it should be clearly understood that the act of setting the rates of deposits as well as the rates of lending is a key mechanism for transmission of monetary policy (Sheefeni, 2016). Among the assets of the banking institutions, loans are included; this is because they are expected to bring return in the near future or after a certain period of time (Siddiqui, Malik & Shah, 2012). Nevertheless, in

most cases this is not the case. This is because, some of the advanced loans fail to give the expected interest rate and end up being termed as the non-performing loans (NPLs).

Increasing rates of interest might negatively influence financial institutions since most of the borrowers are unable to service their loans due to the high amount of interest attached to the borrowed amount. This discourages most of the borrowers and businesses from going for loans hence stagnating expansion since it increases or even doubles the price as well as the cost of production of the business and on the other hand, it lowers the expenditure of the customer (Sheefeni, 2016). Nonperforming bank loan is the loan that is late for payment for more than three months (90 days) or even a loan that is not anticipated to be paid in full in future. After 2008 financial crisis, rate of NPLs has been increasing in a high rate. Out of the top twenty countries with the highest number of NPL ratio in the year 2017, two of those countries were from Europe and central Asia. These included Afghanistan and Vanuatu. Sub-Saharan Africa is dominated by economies of all income levels (The World Bank, 2017).

In Europe, there was an increase in the rate of NPLs from 4% in 2008 to about 55% in 2017 in Ukraine (The World Bank, 2017). This impact was also felt in some high income economies in Europe. The rate of NPLs in San Marino increased from 7% from the year 2009 to 49% in the year 2017. In addition, this increase was also recorded in Cyprus where the rate of NPLs increased from 4% to 46% over the same duration of time. In USA, Wood and Skinner (2018) revealed that the ratio of NPLs to total loans rose from 2.9% in 2007 to 12.9% in 2012, before falling to 10.8 percent in 2015. Depressed economic situation during the crisis, as well as the difficulties with macroeconomic management, increased uncertainty in the economy and increased risk aversion among business sectors and household. As a result, banking system was subjected to a significant slowdown from 2009 to 2013 in loan demand.

Sebastian (2018) argues that most of the countries in Europe are splitting down the gross NPLs into loan loss and net NPLs. He argues that the increased rate of NPLs is due to high rates of interest on lending in case the loan reserve fails to cover it sufficiently (Ghosh, 2018). Despite the fact that increased stock of NPLs comprises increased costs of funding,

there is a single minor role played by the latter variable which relates to the stock of NPLs with the pass-through of the interest rate. Siddiqui, Malik and Shah (2012) reveal that in Pakistan, non-performing loans is influenced insignificantly by the vitality of the market lending rates. Viswanadham and Nahid (2015) revealed that of late, banks operating in Jordan have increased their provision for bad and doubtful debt significantly in both monetary terms and as a percentage of NPLs. In 2007, ratio of NPLs to total loans was 6%; in 2008, it was 6.5 percent; and in 2009, it was 7%.

McNulty et al. (2016) suggests that regulating NPAs is critical for individual bank's success and the economy's financial environment. Commercial banks are usually exposed to borrowers' default due to the nature of their business. Proper credit risk evaluation and the establishment of sufficient provisions for doubtful as well as bad debts can help to mitigate the bank's risk. Nonetheless, when nonperforming assets (NPAs) level is extremely high, provisions are insufficient (Waweru 2019). Banking crises are frequently linked with a massive assemblage of NPAs, which can account for sizable portion of the insolvent banks' total assets and money lending institutions.

Africa is one of the continents with highest level of NPLs. Equatorial Guinea, Chad, Central African Republic and Ghana all had NPL ratios of over 15 per cent in 2017, which is more than four times the global median. The country with the highest value in Africa is Equatorial Guinea, with a value of 36.68 and the country with the lowest value is Malawi, with a value of 2.83. Sheefeni (2016) indicates that IR has positive as well as statistical significant influence on non-performing loans in Ghana, but inflation had positive but not statistical significant influence on NPLs in Ghana. Etale and Ayunku (2016) indicate that high level of NPLs in Nigeria was reducing the performance of banks in the long run, which was attributed to high and the ever increasing interest rates.

According to Ogundipe, Abolade and Adebayo (2020) the interest rate influences loan repayment significantly. This denotes that enhancing IR will almost certainly result in an increase or decrease in credit quality. Interest rate spread has positive as well as statistical significant impact on NPLs in Namibia according to Sheefeni (2016). As a result of positive influence of IR spread, rise in margins interest has the capability to increase probability of

client default. In South Africa, Shayanewako and Tsegaye (2018) discovered that the real exchange rate is a significant factor that influences banking system efficiency positively, while non-performing loans impede banking system efficiency.

In Kenya, non-performing loans have been increasing, despite the interest rate capping policy implemented in 2016. The trend of NPL before and after interest rate capping has remained the same. Studies on interest rates and NPL in Kenya show mixed findings. For instance, Mwangi (2014) found that interest rates have negative impact on NPL in Commercial bank in Kenya for the period between 2009 and 2013. However, Ng'etich and Wanjau (2017) indicate that the NPLs are affected by interest rate through increased interest rate charged to people taking up loans. The research also indicates that the ability of the person taking the loan facility is influenced by the mode of interest charged. The type of charged interest can either be float or fixed. Furthermore, Kiplangat (2015) revealed interest rates spreads positively influences the NPLs in tier banks located in-Kenya, more so in Tier 1 banks than Tier 2 and also Tier 3 banks for a period between 2003 and 2012.

Obillo (2015) confirms the assumption that increased market interest rates affects the non-performing loans. Furthermore, the effect of changes in interest rate spreads on bank performance is said to be asymmetric, with the impact originating from lending rates being above that originating from deposit rates. The market rates' stochastic behavior is also suggested to be an important factor in determining the mode in which banks deliver their services. Additionally, Collins and Wanjau (2011) claim that increase in interest rates makes current-income savings more appealing; it increases repayment of existing floating-rate debt hence reduces disposable revenue, potentially leading to default on a loan. Furthermore, it raises cost of goods acquired on credit, resulting in loan defaults.

1.1.1 Interest Rates

Interest rate refers the total monetary amount that should be paid at a specified period of time. This interest is a percentage of money lent, deposited, or borrowed. The key determinants of gross interest on the principal is the total (principal) borrowing, frequency of compounding, period of time for repayment as well as the rate of interest (Chege, 2014). The quotation of the consumer interest rate is done on the APR rate. This is the rate that

the lender or the entity giving out the money needs for one to access the credit facility. Bahruddin and Maish (2018) argues that there is an implicitly cost on the lending interest rate which is on the advanced credit. In this perspective, increased rate of NPLs leads to a retarded growth of the economy hence discouraging lending from the banking sector. Ngure (2014) indicates that the performance of loans is influenced by instability of interest rates. Increasing rate of interest leads to increased income in the banking sector, this increase lowers demand for loans. Instability of the interest rates does not attract either domestic investor or foreign investors hence making the resources to be channelled elsewhere.

The main components of interest rates in commercial banks include credit size, bank lending rates and interest on deposits. Credit size, which is also known as loan book represents total value of all the loans held by a financial institution (Wells, 2013). Credit size comprises the list of loans advanced by the lender and are treated as assets in the financial statements of the lender. There are various determinants of the credit size which includes the repayment quality of the loans together with the interest rate on loans or given to the borrowers. Among the primary functions of the banking institutions is to give loans to borrowers (Albentosa & Beyaert, 2014). Credits are termed as the largest or the massive investments of the banking institutions and are given the largest financial allocation. Consequently, if debtors fail repay their debts, financial institutions are endangered since they give the loans from the saving of the customers. This implies that through extending credit facilities, both the lender and the borrower are in a great risk. This is because if the borrower fails to honour his/her commitment of repaying their loan puts in danger the smooth functioning of the banking institutions.

Among the key functions of the banking institutions, lending money is the most essential activity. This is because the banking sector receives its cash flow through charging interest on loans. The amount of money paid by borrowers to the banking institutions for use of borrowed money or borrowed asset is called BLR. This lending rate gives a true picture of the extent to which borrowers are willing and able to payback their loans to the lenders and at the same time it shows an extent to which lenders are prepared to give out their money as an exchange of interest rate (Ng'etich & Wanjau, 2017). Due to the fact that it is very

hard to predict the type of borrower and commence a banking relationship, it is advisable that lending institutions put into consideration the adverse selection problem together with the moral hazards. In case the banking institutions charge a very high interest rate, the problem of adverse selection might be induced since only the high risk borrowers will be willing to borrow at this high interest rate. Mishkin and Eakins (2012) suggest that the level of NPLs is linked with constant changes in the interest rates of lending. This is the case because the borrower's burden is broadened by the increased interest rate of lending hence leading to increased loan defaults.

The holders of deposit accounts are paid savings deposit interest rate by the banking institutions. If the banking institutions have a high amount of cash deposits, they will be in a position to advance increased lending services to their clients which includes provision of loans as well as credit cards (Etale & Ayunku, 2016). The amount of interest that a depositing person will get from the financial institution after a particular time is determined through the interest rate. Increasing interest make deposits more beneficial hence encouraging people to save. Nevertheless, a reduction in interest rate lowers the benefit of saving and hence discourages saving. Nevertheless, this becomes more complicated in the real life situation. This is because there are many factors that influence saving hence the link between saving and the rate of interest becomes unclear. Decrease in rate of interest leads to a direct decrease in the benefit of saving. In this situation, holding cash is more preferred than saving (Kiplangat, 2015). This is referred to as the substitution effect whereby, when the interest rate is low, the consumers prefer spending than saving. Nevertheless, if the rate of interest goes down, then there is an automatic decline in the income from saving since income payment decreases.

1.1.2 Non-performing loans

This relates to whether the customer is paying on time or is in default, as well as meeting their commitments in terms of principal and interest payments, as well as any other requirements outlined in the Loan Contract (agreement) (Kihwan, 2006). Non-performing loans are a financial sector crises' indicator in numerous economies across the world. For instance, since the great depression, the US economy was badly affected by financial crisis

of 2007 to 2009. In this crisis, various banks not only failed but also died among them being two of the largest US investment bank (Bear Stearns and Lehman Brothers). This was facilitated by the defaults in subprime residential mortgages (Mishkin & Eakins, 2012).

Non-performing loans need to be controlled and monitored closely as they have frequently been linked with bank failures as well as financial crises in developed as well as developing nations. The 1997 Asian Financial Crisis for example which saw big business conglomerates running into financial distress, resulting in high accumulation of Korean banks' NPLs, thus undermining domestic banking institutions' financial soundness (Kihwan, 2006). Likewise, during similar crisis, Indonesia had over sixty banks collapsing since NPLs represented nearly 75 percent of total asset portfolios. Fofack, (2015) revealed that a significant increase in NPLs and incredibly high credit risk in many African countries is caused by the fluctuations of the interest rate. He further indicated that macroeconomic volatility enhances the dramatic increase in these loans. Nevertheless, this reflects the African economies that are highly vulnerable to external shocks.

In Kenya, level of NPLs was estimated to be 30% or Shs.80 billion of advances in 2008, from 27% in 2007 and 81.3 billion or 33.4 percent of total loans in 2011. This can be compared to NPL levels in other countries. Taiwan News (2012) claims that by the end of 2011, the NPLs ratio among banks operating in Taiwan was approximately 7.7 percent, whilst the ratio of grassroots financial institutions was 16.37%. In Philippines, the NPLs ratio was 16.81% of total loan portfolio as of July 15, 2011, up from 16.76 percent the previous month (Atem, 2017). In Kenya, the ratio of NPLs was 33 percent as at December 2010. In comparison, the ratio is lower in Zimbabwe (24 percent), Nigeria (11 percent), and South Africa (3 percent) (CBK, 2011).

Various studies conducted on non-performing loans have used varying measures of non-performing loans. For instance, Sheefeni (2016) measured NPLs in Namibia in terms of ratio of NPLs to total loan. In Pakistan, Ilyas, Ul Hassan and Rehman (2015) measured nonperforming loans in terms of the amount of money that was in default for more than 90 days. In Kenya, Mwangi (2014) measured NPLs in commercial banks in Kenya using ratio

of NPLs to total loan as well as advances. In addition, Ng'etich and Wanjau (2017) measured non-performing loans in terms of non-performing asset ratio.

1.1.3 Commercial Banks in Kenya

There are various acts in Kenya that govern the banking industry, these acts include the CBK Act, Companies Act, Banking Act as well as other guidelines that are issued by the CBK. At the end of year 2019, the Kenyan banking industry had a total of 41 commercial banks. Nevertheless, among these banks, Chase Bank (K) Limited together with Imperial Bank Limited is currently under receivership. In addition, Charterhouse Bank Limited is currently under statutory management. In addition, CBA and NIC banks merged in the year 2019 to form NCBA (CBK, 2019).

Banking Act, company Act, CBK Act among other CBK directives are major policies governing Kenyan financial institutions. The CBK has a duty for developing as well as implementing monetary or financial policies, foster solvency and liquidity and also ensure the easy operation of Kenyan financial systems. A union referred to as the Kenya Banker Association (KBA) has been formed by financial institutions which usually lobby for interest of the banking industry. There are 39 Kenyan commercial banks (CBK, 2016).

Over the years, the banking sector has used an oligopolistic market model in which credit pricing does not reflect market fundamentals. This gave rise to the outcry from the general public that banking institutions are making significant profits to borrowers' detriment. As a result, the Kenyan Parliament, on July 27th 2016, amended the Banking Act whereby a restriction was attached to the act stating the interest rate that the banking institutions should charge on loans as well as on deposits. This amendment placed a cap where by the lending rate was set at 4.0% above CBR and a flow on the rate of deposit which was set at 70 percent of CBR (CBR, 2019). Proponents of the law argue that it benefits the consumers by lowering loan interest rates and therefore increasing their financial access. Additionally, they reason that maximum interest rates should be utilized in advancing certain sectors in the economy that are characterized by market failure and financial resources are needed to revive the sector. In this case, the market failure is facilitated by information asymmetries as well as the fact that banking institutions are not in a position to identify risk and safe

customers. Furthermore, it is argued that in the banking sector there is a perception that customers have the same risk profile despite the fact that there are some customers who have lower risk as compared to others (Kenya Bankers Association, 2019).

In November 2019, a law was signed scrapping a cap on banks 'lending rate where blame was placed for minimizing lending to businesses. The cap was blamed by both the government and banking institutions. The government had implemented the cap in the year 2016 whereby the main aim was to reduce the high rate of interest. The imposing of the cap led to restrictions of private sector in terms of lending growth hence, lowering functionality of the monetary policy. A report from the Kenya Bankers Association (2019) indicated that over one million "risky" customers were restricted from accessing credit facilities after imposition of the cap by the government. This cap gives a limit to the commercial rates to be charged by the banking institutions which is set to be within 4% above the CBK rates currently 9%. In addition, the report indicated that there was a drop by 1.8 trillion shilling in the lending to SMEs since the imposition of the cap. Apart from enhancing the credit flow to operations, lifting the cap would also be of great benefit through facilitating the stand-by facility with the IMF when the government commits itself to closing the fiscal deficit gap (Kenya Bankers Association, 2019).

According to CBK report (2014) there was an increase in gross NPL ratio to gross loan from 5.2% in the year 2013 to 5.6% in the year 2014. In addition, this ratio further increased from 5.6% in the year 2014 to 6.8% in the year 2015. From the CBK report 2016, there was also an increase in the ratio from 6.8% to 9.2% in the 2015 and 2016 respectively. There was a further increase in the ratio from 9.3% to 12.3% in the year 2017 after which the ratio further increased to 12.7% in the year 2018.

1.2 Statement of the Problem

Commercial banks world face many overwhelming challenges that often curtail their growth and profitability. The performance of the general economy sometimes depends on the wellbeing and performance of commercial banks and their ability to operate efficiently. The query whether interest rates has an effect on the non performance loans and the overall performance of commercial banks has been a matter of interest for researchers. High

interest rate changes have impacted negatively in the growth of the economy. Apart from negating the growth, there is also a high chance of default among the borrowers due to apparent increase in the interest payable from their loans. Despite all the models and controls put in place by financial institutions in measuring credit risk, the level of nonperforming loans has continued to increase, thus posing a great danger to the financial system in Kenya (Omagwa, 2015).

In 2013, CBK mandated that banks write-off loan accounts that had not been serviced for more than 3 months from their accounting systems. Bad loans grew by 30.9 percent, from Ksh. 61.6 billion to Ksh. 80.6 billion, the highest level in six years, even exceeding growth in new credit extended by lenders. In addition, the bank supervision report by the CBK indicates that the ratio of gross NPLs improved from 5.2 % in 2013 - 12.7 % in 2018 (CBK 2013 to 2018). Further, Kenya has been experiencing high lending rates and low interest on deposits over the years. According to Sheefeni (2016), high lending rates influence the capacity of those borrowing to repay back their loans since the accumulation of interest tend to be unbearable, hence making business to shy away from taking loans. In addition, Kihara (2017) argues that an increase in interest rate increases cost of loans charged on borrowers, making harder for clients to pay from their businesses and other activities.

In addition, high levels of non-performing loans negatively influence credit demand and supply hence decreasing lending to real economy a period when aid to the economy is required (Sheefeni, 2016). In addition, Ng'etich and Wanjau (2017) argues that the effect of past-due debts on the banks' profitability can be identified with a possible bank failure, hindrance to lending, decrease in profit level as well as negative economic advancement in society. In order to manage NPLs in Kenyan Commercial banks, it is important to understand how they relate with interest rates.

Studies conducted in Kenya on interest rates show mixed findings. For instance, Mwangi (2014) examined the interest rate and NPLs in banking sector in Kenya and found that interest rates have a negative influence of NPLs (2009 – 2013). However, Mwangi (2014) study was conducted before the introduction of interest capping in 2016 and the removal of interest rate capping in 2019. In addition, the study only looked at one component of

interest rates, lending interest rate. Ng'etich and Wanjau (2011) studied influence of interest rate spread on NPAs' level and found that interest rate affects NPAs in banks positively (1999 - 2008). However, this study did not show how various components of interest rates affect NPLs.

Kinoti (2015) examined the association between NPLs and the extent of loan portfolio in banking sector. Moreover, descriptive research approach was employed. However, this research was done before the implementation of the capping act in Kenya in 2016 and its removal in 2019. In addition, the study used correlation analysis and linear regression analysis and did not put into consideration the aspects of time and number of observations in the regression model. Ndambiri, Muchiri and Wanjohi (2017) researched on loan size and NPLs' level for SACCOs in Kirinyaga County. However, the study was conducted among SACCOs in Kirinyaga County, which are different from Kenyan commercial banks in terms of regulators and regulations. Khan, Siddique and Sarwar (2017) performed a research in Pakistan on influence of credit size on NPLs. This study was focused on the commercial banks in Pakistan. Rajha (2017) conducted a research on influence of credit size on NPLs in Jordanian Banking Sector. This study was focused on the Jordanian Banking Sector. This study thus examined the association between interest rates and NPLs of banking institutions.

1.3 Objectives of the study

1.3.1 General Objective

General objective in this research was to determine the relationship between interest rates and NPLs of Kenyan commercial banks

1.3.2 Specific Objectives

Specific study objectives were;

1. To examine effect of credit size on NPLs in commercial banks in Kenya
2. To evaluate effect of bank lending rates on NPLs in commercial banks in Kenya
3. To establish effect of interest on deposits on NPLs in commercial banks in Kenya

4. To assess moderating effect of central bank rate in the relationship between interest rates and NPLs in commercial banks in Kenya

1.4 Study Hypothesis

The Null hypotheses were;

H0₁: Credit size has no statistically significant effect on NPLs in commercial banks in Kenya

H0₂: Bank lending rates has no statistically significant effect on NPLs in commercial banks in Kenya

H0₃: Interest on deposits has no statistically significant effect on NPLs in commercial banks in Kenya

H0₄: Central bank rate has a moderating effect on the relationship between interest rates and NPLs in commercial banks in Kenya

1.5 Significance of the Study

The on-going research may be vital to managers in banking industry, policy makers and also other scholars, academicians and researchers. The research may assist the commercial banks' management since it may provide information on association between interest rates and NPLs. Findings may help them take appropriate measures to offer rates that appeal to their clients and at the same time maintain their profitability and reduce NPLs. In addition, the findings may help the management of commercial banks to come up with strategies based on interest rate to reduce NPLs.

Interest rate is a key component of the economy and hence the findings may help the Kenyan policy makers to ensure better planning as well as forecasting the influence of policies on attainment of the goals of the banking institutions and at the same time protect the borrowers from being exploited by the lenders. Further, this research might be useful to the policy makers through providing information on how NPLs is influenced by the interest rate. Through making of better policies aiming at reviving the functionality of the loans, the economic sector may be revived as well. The findings of this study may be used

to revise the existing policies such as the interest-rate capping policy and the new policy removing interest rate capping as a proper way of decreasing NPLs in commercial banks.

To other researchers as well as scholars, a basis may be formed by this research on which further research may be conducted on interest rates and NPLs. Students may also use the results of this research to identify research gaps and also make discussions based on the interest rates and NPLs. The results of this research may also be used by other researchers in future as a reference material and also carry out further detailed research on the same topic. Furthermore, this research may enrich the body of knowledge through provision of information on interest rates and NPLs.

1.6 Scope of the Study

The current study was based on three components of interest rates in Kenya: credit size, bank lending rates, and interest on deposits. The study was performed among Kenyan commercial banks. Central Bank reports that in Kenya, there are forty two commercial banks. However, Chase Bank (K) Limited as well as Imperial Bank Limited were in receivership, whereas Charterhouse Bank Limited is under legislative Management. In addition, CBA and NIC banks merged in the year 2019 to form NCBA. Hence the researcher focussed on 39 commercial banks operating in Kenya. The research covered duration between 2016 and 2020. The choice of this study was informed by the fact that there was a record number of non performing loans witnessed among commercial banks in Kenya.

1.7 Limitations of the Study

Data on interest of deposits and lending rates in each of the commercial banks may not be available in CBK website. The data in this study was therefore obtained from websites of each commercial bank. Nonetheless, some commercial banks in Kenya had not indicated their interest on deposits and lending rates in their websites. Therefore, the researcher sought this information from the management of various Kenyan commercial banks. The researcher also notified the management that this study was to be utilized for learning purposes.

1.8 Organization of the study

Chapter one consists of study background, problem statement, study objectives which has general study objective as well as specific study objectives, importance of conducting the research and finally the scope. Moreover, second chapter is the literature review and composes the empirical and theoretical review, summary of related literature, conceptual framework and finally research gaps. Third chapter covers research methodology and comprises research approach, sampling approach, population under study, data collection tools, data gathering procedures, data analysis as well as presentation. Fourth chapter sets out discussions of the findings. Chapter five presents the summary of the findings, conclusion, recommendations and finally suggestions for further research.

CHAPTER TWO

LITERATURE REVIEW

2.1 Introduction

This chapter examines literature concerning the relationship between interest rates and NPLs. The chapter starts with theoretical and empirical review, conceptual framework and finally research gaps.

2.2 Theoretical Review

Theory refers to a framework of statements that have been used over the years and tested repeatedly and accepted for use. These statements can be used in predicting or describing the nature of a certain phenomenon as it exists. The research was anchored on theories related to interest rates as well as non-performing loans. These theories include the classical theory of interest rate, Keynes theory of liquidity preference and information asymmetry theory as well as adverse selection theory.

2.2.1 The Classical Theory of Interest Rate

The above theory dates back to the early writers such as David Ricardo, Marshall Pigou, Cassels, Walras, Taussing and Knight in 1936. The classicalists defined interest rate as the marginal productivity of capital and thus the reward one gets from the productive use of physical capital. The theory is mainly based on assumption of general equilibrium theory (McGregor, 2017). Therefore, the point at which demand and supply meet for capital determines interest rate. Equilibrium interest rate is determined when demand equals to the supply of capital. Investments are the main reasons for the demand of capital. Therefore, the investment schedule represents demand curve for capital and supply curve for capital represents savings.

Fredman and Kuttner (1991) following the classical theory postulated the demand for capital is influenced by the availability of savings as well as the productivity of capital whereas supply of capital or savings is determined by prudent habit of individuals in the economy. The classical theory of interest thus suggests thrift, productivity and real factor as the main variables that determine interest rates in any economy.

Keynes levelled major criticisms against the classical theory of interest. Firstly, he disputed the assertion that interest is a reward for saving only but further points out that an interest can be earned on the funds that are not saved like interest earned on funds lend out that may have been inherited and also the amount of savings is not only influenced by the rate of interest but also the level of income (Potts, 2015). He also undermined the classicalist theory of interest by arguing that it is indeterminate as one can only know the interest rate if the saving and investment functions are known. Keynes further argued that people hold money for other reasons than just a medium of exchange; there are other roles of money which is not considered by the classical theory.

The Classical Theory of Interest is employed in this study in that it helps explain the influence of the association between IR and NPLs. This theory is centred on intersection of demand and supply for capital, which determines the interest rates. Individuals will save money in their bank accounts to earn some income and the bank lends that money to other individuals to invest. When there is oversupply of savings and no investors is borrowing the money to invest, the interest on savings will reduce. However, when there is more demand for money than supply (savings), interest rates will increase. In addition, when the high demand leads to increase in interest rates and hence makes it hard for the investors to pay back leads to increase in NPLs.

2.2.2 Keynes Theory of Liquidity Reference

Keynes (1938) theory of money demand also known as the liquidity reference theory came about as a result of the criticism he levied against the classical theory of interest. The theory postulates that people prefer their assets in a more liquid form therefore people have to be compensated for parting with their liquidity (Miloud, 2014). The theory indicates that peoples demand for money rests on three motives; transactions, precautionary and speculative motives. The transactions motive is holding money for current transaction of goods and services. However, in periods of inflation, the cost of holding money for transactional purposes increases, this is because so as to acquire the same level of goods as well as services more money is required. Thus banks charge higher interest for their services so that funds in their possession do not lose their value. Demand for transactional

purposes is independent of the rate of interest but rather, it is influenced by income (Vamosi, 2013).

The second reason for holding money is for purposes of precautionary; need to hold money to safeguard against unforeseen circumstances or emergencies which includes accidents and health related problems. Vamosi (2013) stated that the desire to hold money for precautionary purposes is influenced by the level of financial confidence, accessibility of credit facilities, income and level of economic activities in the economy. Due to uncertainties and risks, banks charge interest to help compensate for the risk associated with default.

Finally, people hold money for speculative purposes, that is to invest in business or ventures that might produce higher returns. The third motive indicates people can hold assets that yield interest if they have money that they do not have an immediate use for it. An example of such assets includes bonds (Miloud, 2014). According to Keynes, an individual may decide to hold bond depending on the interest that can be earned and the capital gained from holding the bond. There is however an inverse link between price of the bond and expected IR. In other words as IR increases, price of the bonds is expected to fall. On the other hand, if interest rates are falling, people will demand more bonds in the anticipation to make capital gains when bond prices increase. This relationship Laumas (1976) indicates is the basis for interest offered in forward rates as opposed to spot rates.

The liquidity preference theory by Keynes is relevant to this study in that it provides a strong basis for interest rate spread in the financial sector. This is because if people prefer holding money instead of saving, it will cause the interest rate spread to widen (because the banks will have only limited liquidity and thus they will intend to charge a higher interest due to high demand). But if people are willing to part with their funds easily by saving, then the spread will be low. However, the high interest rates by the banks may negatively influence the ability of the customers to pay the loans thus increasing the non-performing loans.

2.2.3 Information Asymmetry Theory

Michael Spence, George Akerlof and Joseph Stiglitz coined above mentioned theory. In the year 2001, the three proponents of the theory won a Nobel Prize for their excellent contribution in economics. Akerlof was the first person to write on information asymmetry on his book “The Market for 'Lemons” in years 1970. In this book, the author argued that the information seen by the car buyers is very different from the information possessed by the car sellers; this presents an incentive for the sellers to find customers for their goods which are of less market quality (Hossain, Rahman & Su, 2018). In the year 1973, this information was enriched by Michael Spence who wrote a book on "Job Market Signalling." In his book, he argued that staffs are uncertain investments for the organizations. This implies that when an employer is hiring new staff he/she is taking a risk since he has no information on the level of productivity of the employees. This act of employers taking risk was compared to a lottery. According to Spence, there is information asymmetry between employers and the staff which brings up scenarios whereby a persistent equilibrium trap is created by low-paying jobs. This trap does not in any way encourage the bidding up of salaries in various markets. Through Stiglitz, information asymmetry has been facilitated to reach mainstream acclaim. Market screening theory was used in co-authoring several papers which included very essential work of information asymmetry in both banking sector and insurance sector (Hossain, Rahman & Su, 2018).

The theory of information asymmetry holds that in a transnational relationship, asymmetric information prevails when one party is more informed as compared to the other party. In the financial decision perspective, the literature on the information asymmetry is concerned with influence of decisions made from the differing information as well as different parties (Brennan, Kirwan & Redmond, 2016). In the banking institutions, lenders take a great risk of advancing credit facilities to borrowers since the lenders are not in apposition to tell the credit-worthy customers and those that are not, due to lack of enough information on the borrowers. Information asymmetries further leads to adverse selection which is referred to as “lemon Principle”. In 1970, Akerlof was the first person to describe the moral hazard problems.

This theory was used in this study to show how interest rates contribute to NPLs. In case the lenders are not in a position to differentiate credit-worthy customers from those who are not, then they charge all of them a normal interest rate that shows a reflection of their pooled experience. Nevertheless, increasing the rate of interest automatically eliminates some of the borrowers from the borrowing bracket. This filters the creditworthy borrowers from those who are not. In this case, through adverse selection there is displacement of high quality debtors by the low quality ones.

2.2.4 Adverse Selection Theory

The above mentioned theory originated in 1981 from Weiss and Stieglitz work. In their explanation, interests charged by money lending institution are supposed to have double responsibility of influencing the borrowers' actions (resulting to incentive impact) and sorting possible borrowers (resulting to adverse selection). Interest rates therefore are believed to influence the kind of transaction and also do not essentially clear the market. The two effects are viewed consequently of the inadequate information which is inherent in credit markets. Moreover, formal lenders persistence on collateral security shares impedes many borrowers from the credit market and leaving only the small number of those who can afford the needed collateral. As stated by Halim, Jaafar and Akbar (2017) since the expected returns of the banks rely on the likelihood of repayment, lenders would like to recognize borrowers who are most likely to pay back their loans. Moreover, formal institutions do not satisfy credit requirements for SMEs.

Adverse selection occurs when enhancement in IR encourages debtors with risky projects to borrow in the absence of perfect information about the borrower, while those with minimal risky projects stop borrowing. Thus, interest rates will influence the average quality of lenders' loan portfolios. Lenders will always fix interest rates at lower level and limit credit availability. Imperfect information is thus critical in explaining presence of credit rationing for SMEs.

In developing countries, the adverse selection theory was intended to apply relatively generally, instead of particular setting of informal credit. In latter setting, this theory has frequently been criticized because of its fundamental assumption that lenders are unaware

of borrower characteristics. Close knit character of belief that many close knit in urban and traditional rural societies denotes that lenders have huge information concerning relevant attributes of the borrowers, for example quality and size of assets, risk attitudes and business ability. Criticism begins since it disregards the reality that borrowers who can look for ways to give assurance to the lender that they are not "lemon" therefore can gain access to credit.

The adverse selection theory is relevant to this study in that it examines the association between interest rates and NPLs of Kenyan commercial banks. Moreover, the theory argues that interests charged by money lending institution are said to have two roles of influencing the borrowers' actions (resulting to incentive impact) and sorting possible borrowers (resulting to adverse selection). Interest rates therefore are presupposed to influence the kind of transaction and also do not automatically clear the market. Through adverse selection, the financial institution can be in a position to differentiate risky borrowers from safe ones.

2.3 Empirical Review

This sub-section examines empirical literature regarding effect of credit size, bank lending rates, interest on deposits on NPLs and moderating effect of Central Bank Rate in association between interest rates and NPLs in Kenyan commercial banks.

2.3.1 Credit Size and NPLs in Commercial Banks

Khan, Siddique and Sarwar (2017) performed a research in Pakistan on influence of credit size on NPLs. The sample comprised of banking sector (commercial banks) quoted in Pakistan Stock Exchange for the duration between 2005 and 2017. Moreover, banking factors, such as profitability, income diversification, operating efficiency as well as capital adequacy were assessed. Additionally, estimations were carried out by regression modelling using random as well as fixed effects. The study found that credit size influence NPLs in selected commercial banks. It was concluded that amount of loans and advance influence NPLs in commercial banks. However, the research was conducted in Pakistan which has diverse macroeconomic environment and legal environment governing interest rates form that of Kenya.

Kumar and Kishore (2019) conducted a study on macroeconomic as well as bank specific determining factor of NPLs in UAE Conventional Bank. Since panel data methods offer numerous advantages, they were employed. The degrees of freedom increase as the number of observations also increases, decreasing collinearity between explanatory study variables, which consequently helps attain robust results. Among the specific determinants of the bank, NPLs indicate that all the macroeconomic determinants, including the credit size emerged to be insignificant in ascertaining the level of NPLs. This study therefore concluded that there exists insignificant link between credit size and NPLs in commercial banks. However, this research took place in United Arab Emirates and hence findings cannot be applied to Kenya.

Rajha (2017) conducted a research on influence of credit size on NPLs in Jordanian Banking Sector. The researcher employed descriptive survey approach. Moreover, the study population composed of 33 banks located in Jordan. NPLs in commercial banks are influenced by size of the loan extended to the borrower according to the report. Further, the study found that the amount of loan awarded influences the NPLs in commercial banks. Nonetheless, the study was conducted in the Jordanian Banking Sector, which is governed by different policies as compared to Kenyan commercial banks.

Aynalem (2016) researched on factors affecting NPLs in Ethiopian commercial bank. Mixed research approach was employed in conducting this research. Moreover, secondary data were gathered from audited yearly reports and also bank performance reports; and the desired ratios were also computed. Additionally, the researcher interviewed 12 credit professionals from the targeted departments as well as functional units who are responsible with lending in the bank. The results acquired from regression output showed that among the variables studied, loan size as well as financial performance which were measured using capital adequacy and ROE were statistically significant determining factor of NPLs. However, this study adopted mixed research approach, which cannot be used to establish causation in a study.

In Kenya, Kinoti (2015) examined the association between NPLs and the extent of loan portfolio in banking sector. Moreover, descriptive research approach was employed. Data acquired accounted for duration of 5 years from 2010-2014. Further, both regression and

correlation analysis was used. It was found that the spread of loan portfolio is negatively but insignificantly correlated with NPLs. The statistically insignificant association of the two variables could be as a result of NPLs being lower than commercial banks' acceptable limit level. However, this research was done before the implementation of the capping act in Kenya in 2016 and its removal in 2019. In addition, the study used correlation analysis and linear regression analysis and did not put into consideration the aspects of time and number of observations in the regression model.

In Kenya, Ndambiri, Muchiri and Wanjohi (2017) researched on loan size and NPLs' level for SACCOs in Kirinyaga County. Moreover, the researcher deployed descriptive research approach and size of the loan was measured using the amount of money disbursed as a loan. The target population was six SACCOs in Kirinyaga County and covered the period between 2011 and 2014. Loan size was found to be significantly influencing NPLs for the SACCOs. It was found that high possibility of defaulter was on the SACCOs that issued huge loans. The research indicated that clients who borrowed low amounts of money were most financially unstable therefore there was high possibility of defaulting or servicing their loans halfway. However, the study was conducted among SACCOs in Kirinyaga County, which are different from Kenyan commercial banks in terms of regulators and regulations. For instance, SACCOS are regulated by SASRA while the banking institutions in Kenya are regulated by CBK.

Atem (2017) assessed the factors affecting NPLs in KCB Bank. Quantitative research design was employed and data was gathered mainly from secondary sources in order to accomplish the research objective. Moreover, the data in this study was obtained from Supervisory reports from CBK as well as KCB yearly reports, bulletins, procedures and directives from the bank. Additionally, data was then analysed by use of multiple regression with assistance of E-views version 9. Moreover, this study gave policy implication as well as areas for further research. Study findings revealed that NPLs are influenced significantly by interest rate whereas gender, credit size, age and bank size did not significantly impact NPLs in KCB bank. Therefore, the study concludes that credit size had no statistical influence on NPLs. However, this study employed quantitative research design while the present study will utilize explanatory research approach.

2.3.2 Bank Lending Rates and NPLs in Commercial Banks

Viswanadham and Nahid (2015) examined determinants of NPLs. The researcher was limited to NBC Bank located in Dodoma, Tanzania. Methods of collecting data deployed during the study comprised interview, documentary evidence and questionnaire. Lending activities concentration, IR, GDP, ability for supervision of bank's loan as well as economic situation were examined, and findings propose that GD, interest rate, supervision capacity of bank's loan as well as economic situation influence the level of NPLs. The research examined Commercial Banks operating in Tanzania therefore, findings are not applicable to commercial banks in Kenya.

Munialo (2014) examined interest lending rates and NPL in the Kenyan banking sectors. Descriptive survey design was adopted. The research data used covered four years between 2009 and 2013. Lending rates was noticed to influence NPLs in banking sector in Kenya insignificantly. The author argued that regardless of the public view that commercial high lending rates influence NPLs positively, the study finding indicated that the association was insignificant. However, this research was done before the implementation of the interest rate capping in 2016 and its removal in 2019. Nonetheless, this study utilized primary data which is based on perceptions of the respondents.

In Kenya, Mwangi (2014) researched whether rate of interest influences NPLs in the banking industry. Moreover, descriptive survey design was deployed. Target group of interest comprised of the 43 licensed banking institutions in Kenya. Data collected was obtained for duration of five years between 2009 and 2013. The rate of interest was found to strongly influence the NPLs. Nevertheless, this research was done prior to the introduction of the capping act in 2016 and its removal in 2019, the study shows that the findings are contrary to Munialo (2014) who found insignificant association between interest rates and NPLs.

Obillo (2015) conducted a study on association between IR and NPL. Moreover, the main research objective was to examine the degree in which lending interest rates impacts NPL in Kenyan commercial banks. Additionally, descriptive research design was employed using secondary data acquired from CBK for duration of five years between 2010 and 2014

and also published annual reports by commercial banks. The study noted that lending interest rates influences NPL in Kenyan commercial banks in significant and positive way at 95 percent confidence level. Moreover, the link between lending interest rates and NPL was as well linear with higher profitability resulting from increase in lending interest rates. However, the study covered five years from 2010-2014, but current study will cover the period between 2010 and 2020.

Collins and Wanjau (2011) assessed the influence of IR on NPLs in Kenyan commercial banks. Moreover, the researcher sampled all the 43 Kenyan commercial banks operating by year 2008 and deployed a descriptive research design. Moreover, primary data sources were gathered using questionnaires whilst secondary data were obtained from Supervision Report, to supplement primary data results. The researcher employed quantitative as well as qualitative methods in analysis of data to evaluate the association between interest rate spread and NPLs. Moreover, data gathered was then presented using graphs, Pie-Charts and table. The research concludes that IR influences the banks' performing assets since it raises loan interest rates which is imposed on borrowers, monitoring interest rate has strong influence on NPAs; for such monitoring ascertain interest rate and further assist alleviate moral risks related to NPAs in the banks. However, the study used primary data, which is based on perceptions of the respondents.

Musa (2011) assessed the association between interest rates on bank loans and NPL in Kenyan commercial banks. To accomplish the study objective, regression models were formulated using NPL as independent variable and bank lending rates as dependent variables. Secondary data were obtained from published reports for duration of 5 years between 2006 and 2010. Findings and analysis revealed that bank lending rates influence NPL in Kenyan commercial banks. Moreover, the researcher employed regression analysis to assess the link between IR and NPL. Results from regression model showed positive association between bank IR on loans and NPL in Kenyan commercial banks. However, the study covered the period between 2006 and 2010, but this study will cover duration between 2010 and 2020.

In Kenya, Njeri (2016) examined whether lending practices influences commercial banks' performance. Specifically, the study evaluated influence of knowing customer procedures, bank credit policies and interest rates on commercial banks' financial performance. Essentially, this research aimed at examining influence of lending practices on Kenya commercial banks' profitability. The researcher focused on NSE-quoted commercial banks. To achieve the research objectives, descriptive research approach was deployed. Study population composed all quoted commercial banks within Nairobi County. To choose 57 participants to take part in the study, purposive sampling was employed. The researcher deployed structured questionnaire to obtain data. The study revealed that interest rates significantly influence the volume and rate of borrowing in Kenya commercial banks. Additionally, the researcher employed regression analysis to identify significant association that was present between interest rates on loans and financial performance. Moreover, credit policies guidelines were essential in improving efficiency in lending activities and lastly the study indicated a significant association between credit guidelines policy and financial performance. Nonetheless, the study deployed primary data based on the perceptions of the respondents and used financial performance as the dependent variable.

Maina (2016) investigated whether bank lending rates influences NPL of Kenyan commercial banks. Additionally, the researcher utilized descriptive research approach. Moreover, the study population composed all quoted commercial banks within Nairobi County. In order to select 57 participants to take part during the study, purposive sampling was employed. The major tool for obtaining data was structured questionnaire. The study found that bank lending rates impact the NPL in Kenya commercial bank. Therefore, the study arrived at a conclusion that there exists positive and also significant relation between bank lending rates and non-performing loan. However, the study utilized primary data based on perceptions of respondents.

Mwenda (2017) analysed the effects of lending interest rates on Kenyan commercial banks' financial performance. The descriptive research approach was employed. The study employed a census in which all 43 Kenyan Commercial Banks registered with the CBK were chosen. The research entailed usage of secondary data. Data obtained was analysed

by employing multiple regression analysis models. Results established that lending rates have positive effect on financial institutions' financial performance since it is the key determining factor of interest income. Nonetheless, the dependent study variable was Kenyan commercial banks' financial performance, which is different from the non-performing loans.

2.3.3 Interest on Deposits and NPLs in Commercial Banks

In Zimbabwe, Mashamba, Magweva and Gumbo (2014) studied the impact of IR on deposit mobilization in banking industry. Data used in this research covered duration between 1980 and 2006. The research used Pearson correlation analysis. Savings' deposit interest rate was measured by use of interest rate offered for savings and deposit mobilization was measured by the use of the amount deposited annually on savings accounts. Interest was found to influence deposit mobilization in Zimbabwean Commercial banks. However, besides being limited to banking institutions in Zimbabwe, the dependent variable was deposit mobilization, which is different from NPLs.

Sheefeni (2016) examined whether interest rate spread influences NPLs in Namibia. Moreover, the research deployed the methods of unit root, co-integration and also error correction model method on quarterly data for period between 2001 and 2014. Results discovered that IR spread significantly as well as positively influence NPLs. Moreover, inflation positively as well as insignificantly influences NPLs in Namibia according to the report. Hence, positive effect of IR spread proposes that improvement in interest margins has a possibility of improving possibility of clients default. However, this study took place in Namibia, and hence findings are not applicable to Kenya because of differences in legal framework governing financial institutions.

In Kenya, Wambari and Mwangi (2017) researched on interest of deposits and the performance of financial entities in Kenya. Explanatory research approach was employed. Moreover, target group of interest for the research was the 43 banking entities in Kenya. Interest rate was measured by use of Deposit rate ratio and performance of the institutions was measured by use of asset quality and liquidity management. The study adopted an explanatory research approach. The research showed that deposit interest ratio influenced

bank performance negatively. However, the research did not put into consideration the number of observations and time. Additionally, dependent variable was financial performance, which varies from non-performing loans.

In Kenya, Catherine, Alala and Charles (2018) assessed the association between interest rate on deposits and NPL in commercial banks. Moreover, study's purpose was to assess the association between deposit interest rate and NPL. Moreover, the study population was all Kenyan commercial banks. To obtain a sample, the study used simple random sampling. The study concluded that bank lending rates in Kenya had a very weak positive relationship with commercial bank NPLs. As interest rates rise, commercial bank performance raises because lending rates rise as well, resulting in a wider spread between lending rates and central bank rates as banks respond to interest rate hikes faster than they respond to what they pay on deposits, boosting their net interest margin. Nonetheless, this study deployed primary data, which is subject to recall bias and their willingness to be honest.

Maigua and Mouni (2016) assessed interest rates determining factors on Kenyan Commercial Banks' performance. The study population comprised all 43 commercial banks. Moreover, the sample size consisted of twenty six commercial banks acquired from the study population. In this study, the technique of data analysis employed was multiple regression analysis. According to the findings, inflation rates, discount rates and exchange rates positively influenced the Kenyan commercial banks' performance whereas reserve requirement ratio on the other hand had negative effect. The research concluded that increased inflation rates, discount rates as well as exchange rates results to improved performance of Kenya commercial banks; reserve requirement ratio of higher levels lowers bank performance in Kenya. However, dependent variable was Kenyan Commercial Banks' performance, which differs from non-performing loans.

In Kenya, Fridah (2019) evaluated the influence of interest rate capping on commercial banks' performance. Key objectives were to examine influence of IR capping on Kenyan commercial banks' profitability; investigate impact of IR capping on credit uptake; and analyse the association between IR capping and lending patterns in Kenyan commercial banks. Descriptive research approach was deployed to describe the association between

interest rate capping and Kenya commercial banks' performance. The study population composed the 44 licensed Kenyan commercial banks. The computed study's sample size consisted of 39 Kenyan commercial banks. The findings indicated a significant weak positive association between IR and selected commercial banks' profitability. This gives the reason as to why the induction of interest rate caps reduces the income. Moreover, the results indicated that there was increase in the loans average size offered by Kenyan commercial banks. This denotes that banks preferred giving a loan to business entities with lesser risks. The study discovered positive significant link between IR and credit uptake from regression analysis. However, besides using primary data which is dependent on the respondents' perception, the study used banks performance as the dependent variable, which is different from NPLs.

Collins and Wanjau (2011) evaluated the influence of IR spread on level of NPAs of Kenyan commercial banks. This study deployed exploratory research approach on study's sample of 43 Kenyan commercial banks. Additionally, primary data sources were gathered using questionnaires whilst secondary data was retrieved from Supervision Report, to supplement primary data results. The researcher employed quantitative as well as qualitative methods in analysis of data to the association between interest rate spread and NPLs. Moreover, data obtained was then displayed using graphs, Pie-Charts and table. The research concludes that IR spread influence banks' performing assets since it raises loan interest rate which is imposed on debtors and monitoring interest rates have strong influence on NPAs. However, this study utilized descriptive research technique, which the researcher cannot deploy to show causation between independent and dependent variable.

2.3.5 Central Bank Rates, Interest Rates, Non-Performing Loans

Kavwele, Ariemba and Evusa (2018) conducted an assessment of moderating effect of CBK rates on association between interest rates and NPL in commercial banks. Data was gathered for variables for 4 quarters of financial year prior to induction of capping and 4 quarters of financial year after induction of capping. Paired sample T-test was employed in analysis to evaluate the link between variables. Results found that IR capping has significant negative influence on Kenya commercial banks' performance and particularly

from interest earnings whose negative effect could however not be reimbursed by decrease in interest expense or rise in non-interest income, therefore reducing the profits. Further, the study found that CBK rates have substantial moderating influence on association between rate of interest and NPL Performance in commercial banks. Moreover, the research utilized descriptive research design, whereas explanatory research approach will be utilized in current research. Each research approach has limitations hence findings are not applicable to this study due to variation in research designs.

In Kenya, Ondieki and Jagongo (2013) evaluated the influence of lowering CBR on bank's prime rate: a case of Commercial Banks. Moreover, the study deployed descriptive research approach to examine study's general objective. This consisted group of techniques that explain the study variables by use of statistical logic. The findings indicated that regardless of combined efforts put by CBK to enable commercial banks to decrease lending rate, little benefit was achieved since major determinant relied on high NPLs' level, stiff industry competition, lending channels and barriers of internal policy. The CBK authority to effectively control channels was against the large number of beliefs that Kenyan banks would only function with vigour without visible and strong hand of regulator. Additionally, the researcher utilized descriptive research approach which differs from explanatory research IR hence findings are not applicable to the present study.

Ng'ang'a (2017) focused on moderating effect of CBK rates on correlation between IR and NPL in Kenyan commercial banks. Descriptive research approach was employed to analyse whether interest rate capping influences commercial banks' financial performance. Descriptive research was combined with content analysis. All the 42 banks in the country were the population of this project. Secondary data was used which comprised of information acquired from financial statement of the banks. The study revealed that central bank rates have a moderating effect on association between interest rates and NPL in selected commercial banks. Dependent variable was financial institutions' performance while the present study will be limited to non-performing loans therefore results are not applicable to the present study.

Ngondo (2018) assessed CBK rate on performance of loans in Kenyan commercial banks. Data was obtained using secondary data collection techniques for all commercial banks licensed for the period 2013 to 2017. However, full information was obtained for 35 commercial banks as some banks did not have information on some years for the study period. The study discovered positive significant correlation between lending rates and NPLs. Additionally, there is a moderating influence of the central bank rates on association between interest rate and loans performance. Nonetheless, the study failed to show moderating effect of CBK rates. In addition the study utilized descriptive research IR which differs from explanatory research IR hence findings are not applicable to the present study.

Kerage and Jagongo (2014) focused on moderating effect of CKB rate on correlation between interest rate and NPL in commercial banks. Moreover, the researchers deployed census survey of licensed Kenyan commercial banks. The research covers duration of 5 years between 2008 and 2012. Additionally, study employed primary as well as secondary data. According to the findings, interest rate influence NPLs in commercial banks. Additionally, the study also found commercial banks' moderating effect on correlation between IR and NPLs in Kenyan commercial banks. However, this study utilized mainly primary data based on the perceptions of the respondents and is limited by the respondents recall bias.

2.4 Summary of Research Gaps

Researches have been done on influence of IR on NPLs. Nevertheless, these studies were conducted in a variety of countries, institutions, and sectors, with a wide range of target populations. As a result, generalizing the findings to the current study is risky.

Table 2.1: Summary of Research Gaps

Writer	Study	Results	Research gaps	Current study's primary focus
Credit Size and NPLs in Kenyan commercial banks				
Khan, Sarwar and Siddique (2017)	influence of credit size on NPLs in Pakistan commercial banks	The study discovered that credit size influence NPLs in commercial banks	This research was only limited to Pakistan commercial bank hence study results cannot be applied Kenyan commercial banks due to variation in legal as well as institutional frameworks governing banking sector in the two countries	The present study was conducted among Kenya commercial banks
Kinoti (2015)	The association between NPLs and extent of loan portfolio in Kenya banking sector	Results discovered that spread of loan portfolio is negatively but insignificantly correlated with NPLs	This study was done before the implementation of the capping act in Kenya in 2016 and its removal in 2019. In addition, the study used correlation analysis and linear regression analysis and did not put into consideration the aspects of time and number of observations in the regression model.	This study covered the period between 2010 and 2020.
Ndambiri, Muchiri and Wanjohi (2017)	Researched on loan size and level of NPLs for SACCOs within Kirinyaga	Loan size was found to be significantly influencing NPLs for SACCOs. It was found that high possibility of defaulter was on	The study was conducted among SACCOs in Kirinyaga County, which are different from Kenyan commercial banks in terms of regulators and regulations. For instance, while SACCOS are regulated by SASRA the banking institutions in Kenya are regulated by CBK	This study covered 39 commercial banks

	County, Kenya.	the SACCOs that issued huge loans.		
Bank Lending Rates and NPLs in Kenya commercial banks				
Viswanadham and Nahid (2015)	Examined the determining factors of NPLs in Kenya Commercial Banks	Bank lending rates influence the NPLs in the commercial banks	Nevertheless, findings did not propose that focus of lending activities improves NPLs' level therefore results are not generalizable to this study	The present study showed how interest rate influence non-performing loans
Munialo (2014)	The association between BLR and NPLs in banking sector	Lending rates have insignificant impact on NPLs in banking industry in Kenya.	This study was conducted the period before interest rate capping was introduced in 2016 and its removal in 2019.	This study covered the period between 2010 and 2020.
Mwangi (2014)	The impact of interest rates on NPLs in the banking industry within Kenya	The rate of interest was found to strongly influence the NPLs in banking industry	Despite the fact that the research was conducted before interest rate capping was introduced in 2016 and its removal in 2019, the study shows findings contrary to Munialo (2014) who found insignificant association between interest rates and NPLs.	This study covered the period between 2010 and 2020 and examined the effect of interest rate on non-performing loans during this period
Interest on Deposits and NPLs in Kenyan commercial banks				

Mashamba, Magweva and Gumbo (2014)	Carried out an analysis of the impact of interest rate on the deposit mobilization in the banking industry in Zimbabwe	Interest was found to influence deposit mobilization in Zimbabwean Commercial banks	Besides being limited to commercial banks in Zimbabwe, the dependent variable was deposit mobilization, which differs from NPLs.	The present study took place among Kenya commercial banks
Wambari and Mwangi (2017)	Association between interest on deposits and the financial entities' performance in Kenya	The research discovered that interest on deposits affects the performance of financial entities	Dependent variable was performance of financial institutions while this study will be limited to non-performing loans hence the findings are not applicable in this study.	Dependent variable was NPLs
Catherine, Alala and Charles (2018)	Association between interest rate on deposits and NPL in Kenyan commercial banks.	The research found that bank lending rate had very weak positive association with NPL of Kenya commercial banks	Nonetheless, this study used primary data, which is subject to recall bias and their willingness to be honest.	This study used secondary data
CBK rates, Interest rates and NPLs in Kenyan commercial banks				

Kavwele, Ariemba and Evusa (2018)	The moderating effect of CBK rates on association between IR and NPL in Kenya commercial banks	Findings indicated that CBK rates significantly moderates the association between interest rate and NPL Performance	The descriptive research approach was deployed whereas explanatory research approach will be utilized in the current research. Each research approach has its limitations hence results cannot be applied in this research due to variation in research approach.	This study made use of an explanatory research design
Ng'ang'a (2017)	Investigated moderating influence of CBK rates on the link between IR and commercial banks' performance	Findings revealed that central bank rates have moderating effect on association between interest rates and Kenyan commercial banks' performance	The dependent variable was financial institutions' performance while this study will be limited to non-performing loans hence the findings are not applicable in this study	Dependent study variable was NPLs
Ngondo (2018)	Effect of CBK rate on NPLs of Kenyan commercial banks	There exists positive and significant link between lending rates and NPLs according to the report.	This study failed to show the moderating effect of CBK rates. In addition the study utilized descriptive research approach which is varies from explanatory research approach hence findings are not applicable in this study.	This study employed explanatory research design

Source: Author (2021)

2.5 Conceptual Framework

Conceptual is one of the components of scientific research procedure whereby a particular concept is described in measurable terms or as a measurable event that basically provides a clear meaning of a given concept. As stated by Collis and Hussey (2014) conceptual framework describes relationship between variables which are considered as essential. Bryman and Bell, (2011) suggest that conceptual framework uses diagrams to present the association between independent and dependent study variables. Independent variables were credit size, bank lending rates, interest on deposit. The dependent variable was NPLs of commercial banks. The moderating variable was CBK rates.

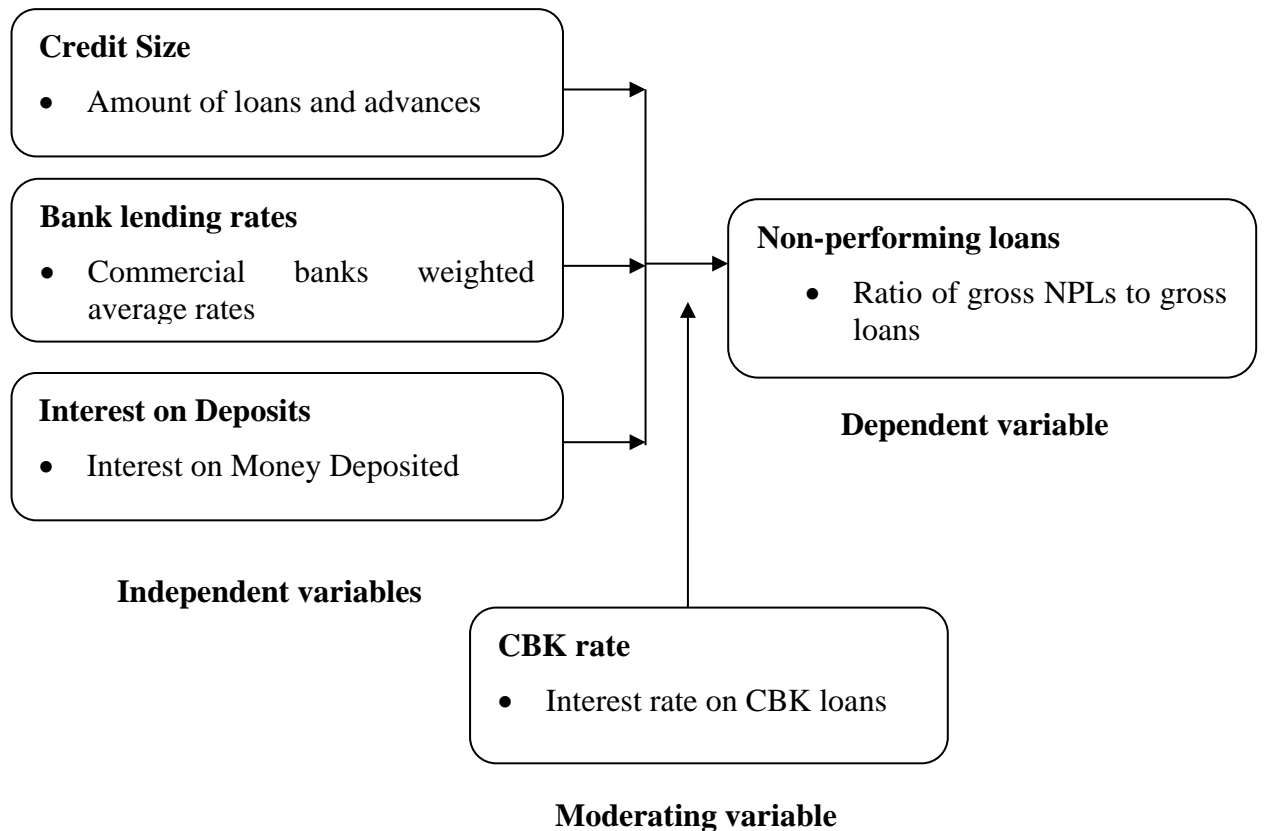


Figure 2.1: Conceptual Framework

NPL refers to the loan that is close to being in default or is in default..NPLs will be measured using terms of ratio of gross NPLs to gross loans. Credit size refers to the amount that the borrower promises to pay back, as set forth in loan contract. It is employed for

credit cards, standard loans and line-of-credit. The credit size will be measured using amount of loans as well as advances. Bank lending rates refers to the IR charged by a financial institution for lending money. Interest rate refers to the quantity of interest owed per period, as ratio of money borrowed. In this study, bank lending rates will be measured in terms of Commercial banks weighted. Interest on deposit refers to the reward of saving money is calculated as a percentage of the amount saved. In this study, interest on deposit will be measured in terms of the interest on the money deposited. Bank rate refers to the IR at which country's central bank lends money mostly in form of short-term loans to domestic banks. In this study, CBK rate will be measured in terms of interest rate on CBK loans.

CHAPTER THREE

RESEARCH METHODOLOGY

3.1 Introduction

This section covers the practices and techniques which will be deployed in collecting as well as analysing data. Particularly, it encompasses research approach, study population, sample design, sampling procedure, procedures for obtaining and analysing data and operationalization and measurement of study variables.

3.2 Research design

There are three basic types of research design: exploratory, causal and descriptive. The goal of exploratory research is to discover ideas and insights. Causal research is used to establish cause-and-effect relationships between variables while descriptive research is usually concerned with describing a population with respect to important variables. The present research deployed explanatory research approach which discloses that any research questions are aimed to describe event being studied. Moreover, explanatory studies are intended to examine whether one particular occurrence triggers another (Bhattacharjee, 2012). In this survey, explanatory research approach was the most appropriate research approach. Therefore, this study made use of the explanatory research in order to determine the interrelationship among the study variables. This involves showing how interest rate relates with NPLs of Kenyan commercial banks.

3.3 Target population

Population refers to all units, components or persons that meet criteria of selection to study a group and from which the purpose of detailed examination, a representative sample is obtained (Bryman & Bell, 2011). Target population is the whole collection of units in which research data are to be employed to make conclusions. The inclusion criteria encompassed all Kenyan commercial banks that have been in operational for a period between 2016 and 2020. The CBK (2019), reports that there were 39 operational Kenyan Commercial Banks. Study population was 39 Kenyan commercial banks that were operational between 2016 and 2020.

3.4 Sampling Design and Procedure

Since study's sample size was not large (39), this was a census study therefore, entire population was included. Census attempts to outline all the components in a group and then measure one or more features of those components (Babbie, 2017). Census is a quantitative research technique, in which entire members in study population are enumerated. Moreover, it is viewed as a complete count of entire population, where in every unit of study population is involved in data collection. Census is beneficial since the findings drawn by carrying out a census are reliable and accurate while there are possibilities of errors in findings obtained from the sample.

3.5 Data collection

Secondary panel data was utilized in this research. The choice of panel data is informed by the fact that this study involved all Kenyan commercial banks that have been in operational for a period between 2016 and 2020. This study used secondary data. The advantage of deploying secondary data is that the majority of initial work is completed. In this research study, secondary data on credit size, bank lending rates, interest on deposits and NPLs of commercial banks was acquired from financial statements owned by Kenyan commercial banks and from CBK bank supervision reports. The study used a data extraction tool to gather secondary data. Bryman (2013) suggests that data extraction involves retrieving all categories and formats of data from unstructured data sources.

3.6 Data analysis

The secondary data generated panel data. Panel data is a multi-dimensional data composing measurements over period of time. Moreover, panel data comprise multiple phenomena observations attained over multiple periods of time for similar individuals/firms (Collis & Hussey, 2014). This research involved a time period of 5 years and further involved 39 commercial banks. Additionally, in analysis of data, the research utilized both inferential and descriptive statistics and all statistical analysis was carried out using STATA version 14. Descriptive statistics comprised of frequency distributions, mean, percentages, variances as well as measures of dispersion (standard deviation). Inferential statistics were

carried out using regression analysis. Study results obtained were displayed in both tables and also figures such as line graphs.

3.6.1 Empirical Modelling

The study used Panel Vector Autoregressive Model (PVAM) to estimate a functional model. The choice of Panel Vector Autoregressive Model (PVAM) was informed by the fact that the researcher is dealing with secondary panel data where nonperforming loans were treated as dependent study variable whilst independent variables included credit size, bank lending rates and interest on deposits.

The functional relationship of the empirical model appeared as follows:

$$NPL = f(CS, BLR, IOD) \dots\dots\dots (1)$$

The regression model of the on-going study is as shown below;

$$NPL_t = \beta_0 + \beta_1 CS_{1t} + \beta_2 BLR_{2t} + \beta_3 IOD_{3t} + \varepsilon_t \dots\dots\dots (2)$$

NPL_t is dependent variable (Non performing loans), B_0 is y intercept (Constant), β_1 — β_3 are coefficients of determination, CS is Credit Size, BLR is Bank Lending Rates, IOD is interest on deposits, ε is error term, and t subscript represented time

In analysis of moderating impact of Central Bank Rate in association between interest rates and commercial banks’ NPLs, this study will use step-wise regression analysis in line with the methodology suggested by (Baron& Kenny, 1986). Moderator is a variable that influences strength and direction of relationship between independent or predictor variable and dependent criterion variable (Yevale, 2016). This variable can change the direction of the link between predictor variable and a dependent variable, or it can change direction of the link from positive to negative (McNabb, 2015). If interaction of a predictor and a moderator on outcome of dependent variable is significant, a moderator is supported.

$$NPL_t = \beta_0 + \beta_1 CS_{1t} + \beta_2 BLR_{2t} + \beta_3 IOD_{3t} + \beta_4 CBR_t + \beta_5 CS_{1t} * CBR_t + \beta_6 BLR_{2t} * CBR_t + \beta_7 IOD_{3t} * CBR_t + \varepsilon_t$$

..... (2)

NPL_t connotes dependent variable (Non-performing loans), β_0 connotes y intercept (Constant), β_1 -- β_4 connotes coefficients of determination, CS is Credit Size (independent variable), BLR is Bank Lending Rates (independent variable), CBR is Central Bank Rate (Moderating Variable), IOD is interest on deposits, ε is the error term, and t subscript represented time.

3.6.2 Diagnostic Tests

The key assumptions of linear regression include; linear relationship; data is normally distributed, no multi collinearity, no homoscedasticity, auto-correlation, Stationarity Test and Hausman Test.

3.6.2.1 Linearity Test

Linear regression requires association between study variables in order to be linear. Additionally, it's further essential to look for outliers because linear regression is very quick to respond to outlier impacts (Creswell, 2014). Linearity supposition can be effectively measured by scatter plots which are obtained by deploying residuals and also y values. Moreover, Y values are drawn on y axis, while standardized residuals are afterward plotted on x axis. Nonetheless, if a linear pattern is afterward followed by a scatter plot that implies that linearity assumption is attained. An association between independent and dependent study variable is considered linear if there is a line of best fit and the r-squared should be more than 1.

3.6.2.2 Normality Test

Majority of parametric tests need normality assumption to be met. Additionally, normality implies that test distribution is normally distributed or bell-shaped with 1 as standard deviation, with 0 mean, and a symmetric curve which is bell shaped (Greener, 2011). It is almost impossible to gather data from exact normal distribution. Nonetheless, numerous naturally happenings phenomena normally follow close estimated normal distribution

(Greenfield & Greener, 2016). To fulfil normal distribution requirement and examine whether variables are distributed normally or not Shapiro Wilk test will be deployed (Greener, 2011). The test of null-hypothesis is that study population is distributed normally. Hence, rejection of null hypothesis is done if p-value is not more than alpha level, and there is a proof that tested data are however not obtained from a population that is normally distributed.

3.6.2.3 Multicollinearity Test

Multicollinearity is an occurrence in which either predictor variables in multiple regression models are greatly interrelated, denoting that one can be predicted linearly from least with considerable level of correctness. In this survey, testing of multicollinearity will be done by deploying VIF. The VIF quantifies multicollinearity severity in a regression analysis of ordinary least squares (Russell, 2013). It gives an index that gauges the variance of approximated regression coefficient is improved as a result of collinearity. Moreover, general rule of thumb indicates VIFs beyond 4 indicates more research, whilst VIFs beyond 10 are indicators of serious multicollinearity necessitating correction.

3.6.2.4 Heteroscedasticity Test

In regression analysis application, existence of heteroscedasticity is a key affair, including variance analysis, as it can invalidate significance statistical tests which believe that modelling errors are uniform as well as uncorrelated - thus their variances don't differ with impacts being modelled (Russell, 2013). For example, while estimator of ordinary least squares are yet unbiased in presence of heteroscedasticity, it is not efficient since true covariance and variance and are underestimated. The study will utilize Breusch-Pagan test in order to assess Heteroscedasticity. Moreover, Breusch-Pagan tests' null hypothesis is that there exists no heteroscedasticity in data.

3.6.2.5 Autocorrelation Test

Autocorrelation give rise to bias hence spurious estimates. Additionally, serial correlation normally denotes that there is association between terms for stochastic random error of following time durations (Singpurwalla, 2013). In order to test for this, present study deployed Breusch-Godfrey LM test which is an autocorrelation test in the errors within a

regression model. Moreover, it normally uses residuals from the model under consideration in any regression analysis and also a test statistic is obtained from these. According to null hypothesis, there is absence of serial association.

3.6.2.6 Stationarity Test

In order to examine data stationarity, this survey utilized IPS test which sanctions for heterogeneous coefficients. IPS proposes test for unit roots in panels which integrates information from cross section as well as time series dimension (Greenfield & Greener, 2016). Under null hypothesis, there exists unit root, whereas under substitute hypothesis is that there exists partial unit root.

3.6.2.7 Model specification Test

This is a test that is asymptotic, chi-square test based on the quadratic form. The Hausman Test, also referred to as Hausman specification, is deployed in endogenous repressors detection in regression model (Cooper & Schindler, 2006). In regression model, endogenous repressors presence may bring about estimators of OLS to fail. Due to this it is believed that association is not existence between error term and predictor variable. Null hypothesis is that random impact is preferred model whereas fixed impact mode is alternative hypothesis.

3.7 Operationalization and measurement of variable

Table 3.1 indicates operationalization of all variables which includes their respective indicators, measurement, operationalization, and hypothesized direction.

Table 3.1: Measurement and Operationalization of Study Variables

Variable	Category	Operationalization	Measurement	Hypothesized Direction
NPLs	Dependent Variable	<ul style="list-style-type: none"> • Ratio of gross NPLs to gross loans 	Ratio	<ul style="list-style-type: none"> • Positive • No association • Negative
Credit size	Independent Variable	<ul style="list-style-type: none"> • Amount of loans and advances 	Amount (Ksh)	<ul style="list-style-type: none"> • Positive • No association • Negative
Bank lending rates	Independent Variable	<ul style="list-style-type: none"> • Commercial banks weighted average rates 	0-100%	<ul style="list-style-type: none"> • Positive • No association • Negative
Interest on Deposits	Independent Variable	<ul style="list-style-type: none"> • Interest on Money deposited 	0-100%	<ul style="list-style-type: none"> • Positive • No association • Negative
Central Bank Rate	Moderating Variable	<ul style="list-style-type: none"> • Central Bank Rate 	0-100%	<ul style="list-style-type: none"> • Positive • No association • Negative

3.8 Ethical consideration

The study utilized secondary data that is accessible to general public. As banking sector's or financial institutions' regulator, the CBK requires the KBA to compile data for all Kenyan commercial banks. One of the NSE's requirements is that firms listed on NSE disclose financial statement records to the public. The researcher utilized secondary data. Further, the researcher adhered to ethical consideration when employing secondary data. The researcher recognized other academicians, scholars as well as writers' effort so as to provide evidence to back up the assertions and claims of ownership of this research.

CHAPTER FOUR

DATA ANALYSIS AND INTERPRETATION OF FINDINGS

4.1 Introduction

This section covers presentation and also interpretations of the findings. The purpose of the study was to assess the link relationship between IR and NPLs of Kenyan commercial bank. The study evaluated the effect of credit size, bank lending rates, interest on deposits and moderating influence of central bank rate in the link between IR and NPLs. The chapter covers descriptive data analysis, followed by diagnostic tests, regression analysis and moderating effect analysis. The study sample size was 39 Kenyan commercial banks. Moreover, the data was collected for period between 2016 and 2020.

4.2 Descriptive statistics

Descriptive statistics provides population measurements and summaries. Percentages, spread measurements, frequency distribution, and measures of central tendency are examples of descriptive statistics. Moreover, maximum, minimum, standard deviation, and mean of dependent variable were computed by employing descriptive statistics (NPLs), independent variables interest on deposits, bank lending rates and credit size and moderating variable (CBK rate). Findings were given in Table 4.1.

Table 4.1: Descriptive Statistics

Variable	Obs	Mean	Std. Dev.	Min	Max
NPL	160	.1776875	.136042	.014	.708
CS	160	71.16527	101.8279	3.064	544.837
BLR	160	12.88125	1.10523	9	17.7
IOD	160	6.086456	.7686595	4.5	7.53
CBR	160	9.21906	1.188213	7.1667	10.6667

There were 160 observations from 32 commercial banks in Kenya covering 5 years (2016 to 2020). The findings discovered that NPL for commercial banks was 0.178 million and standard deviation was 0.136 million. Minimum NPL was 0.014 percent and maximum was NPL was 0.708 million. The study findings indicate that NPL for commercial banks was fairly high. The CS measured in terms of amount of loans and advances was 71.165 million and standard deviation was 101.828 million. Minimum CS among commercial banks in Kenya, was 3.063 million and maximum was 544.837 million. The findings of the study show that credit size of the commercial banks was fairly high.

The BLR measured using commercial banks weighted average rates for the period between 2010 and 2019 among commercial banks in Kenya was 12.881 million and standard deviation was 1.105 million. Minimum BLR was 9 million and maximum amount was 17.7 million. The study findings for commercial banks were fairly high. IOD measured in terms of interest on money deposited among commercial banks in Kenya was 6.086 million and standard deviation was 0.769 million. Minimum IOD was 4.5 million and the maximum was 7.53 million. The CBR measured in terms of Interest rate on CBK loans was 9.219 million and standard deviation was 1.188 million. Minimum CBR among commercial banks in Kenya was 7.667 million and maximum was 10.667 million. The study findings show that the central bank rate if fairly high.

4.3 Diagnostic Tests

OLS is a commonly used for approximating linear models. To examine the relationship between a number of predictors and dependent variable regression analysis can be utilized. However, if the data set fails to match assumptions of OLS, regression analysis findings may be distorted. Because the assumptions of OLS are met, unbiased estimates and findings that are reasonably close to the truth are obtained. Diagnostic tests were used to test the

OLS assumptions method. Among the diagnostic tests utilized were the normality test, heteroscedasticity test, autocorrelation test, linear test, Hausman test, multicollinearity test, and the UR test.

4.3.1 Test for Normality

Shapiro–Wilk test is used to determine whether or not a sample is normal. The null hypothesis for this test is that the study population is distributed normally. If the p-value is less than the alpha level, the null hypothesis is rejected, indicating that the research data was not drawn from a normally distributed population. If the p-value is greater than the alpha level, the null hypothesis that the data is from a normally distributed population can be accepted.

Table 4.2: Shapiro-Wilk Test

	Statistic	df	Sig.
Non-Performing Loans	.961	160	.111
Credit Size	.917	160	.732
Bank Lending Rate	.936	160	.123
Interest on Deposits	.945	160	.578
Central Bank Rate	.981	160	.876

From the results, NPLs (0.111), credit size (0.732), bank lending rate (0.123), interest on deposits (0.578) and central bank rate (0.876) were normally distributed as p-values were above 0.05. This denotes that independent and dependent variables were all normally distributed.

4.3.2 Heteroscedasticity Test

Cook-Weisberg test was employed to assess heteroscedasticity. Heteroscedasticity is described as a population with numerous variances (independent and dependent variables). When size of error terms differs across independent variables homoscedasticity occurs. The extent of supposition that contradicts the effect of homoscedasticity increases with increase in heteroscedasticity. There exists no heteroscedasticity in null hypothesis, whilst in

alternative hypothesis it is present. The influence of breaking homoscedasticity assumption is equal to the extent of heteroscedasticity.

Table 4. 3: Breusch-Pagan Test for Heteroskedasticity

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

chi2(1)          =    15.78
Prob > chi2      =    0.0001
```

The p- value of 0.0001 was above 0.05 (significance level) meaning that in the dataset, there exist constant variance. This denotes that in data set there was homoscedasticity.

4.3.3 Multicollinearity Test

VIF measures multicollinearity severity in OLS regression analysis. It provides the indicator that examines the extent to which collinearity increases the variance of approximated regression coefficient. Moreover, a study variable that contains VIF value beyond 10 may necessitate studying further.

Table 4.4: Collinearity Statistics

Variable	VIF	1/VIF
IOD	1.42	0.705349
CS	1.35	0.743137
BLR	1.07	0.937519
Mean VIF	1.28	

The VIFs for the study variables IOD (1.42), CS (1.35) and BLR (1.07) were not more than 10. This implies there was insignificant multicollinearity. Since independent study variables in multiple regression equation are insignificantly related, the results are not inaccurate.

4.3.4 Autocorrelation Test

To examine whether simple OLS regression or random effects regression ought to be used LM test was used. The null hypothesis in LM test is that between entities variances are

zero. This proposes that there is no key variation between units. Findings were displayed in Table 4.5.

Table 4.5: Breusch-Godfrey LM test

Breusch and Pagan Lagrangian multiplier test for random effects

$$NPL[Bank,t] = Xb + u[Bank] + e[Bank,t]$$

Estimated results:

	Var	sd = sqrt(Var)
NPL	.0185074	.136042
e	.0044418	.0666468
u	.011853	.1088713

Test: $Var(u) = 0$

chibar2(01) = 153.48
 Prob > chibar2 = 0.0000

Table 4.5 shows that p-value (0.0000) is below 0.05 (significance level), we can therefore conclude that across entities variances are not zero, which implies that there is panel effect (there is significant variation across units).

4.3.5 Linearity Test

Scatterplots are essential for analysing statistical trends. Scatterplot has 2 coordinates in every observation; first equals to the data first item in the X coordinate. Moreover, second coordinate or Y-coordinate associates to datas' second pair. Moreover, coordinates intersection is whereby point symbolizing observation is positioned. Value (-1) represents perfect inverse correlation and (+1) represents perfect positive link; thus, when value is zero, it implies that correlation is missing. Moreover, if the value is near to +1 or -1, it implies that the association is stronger between study variables. When the figure is very close to 0, it shows weaker relation.

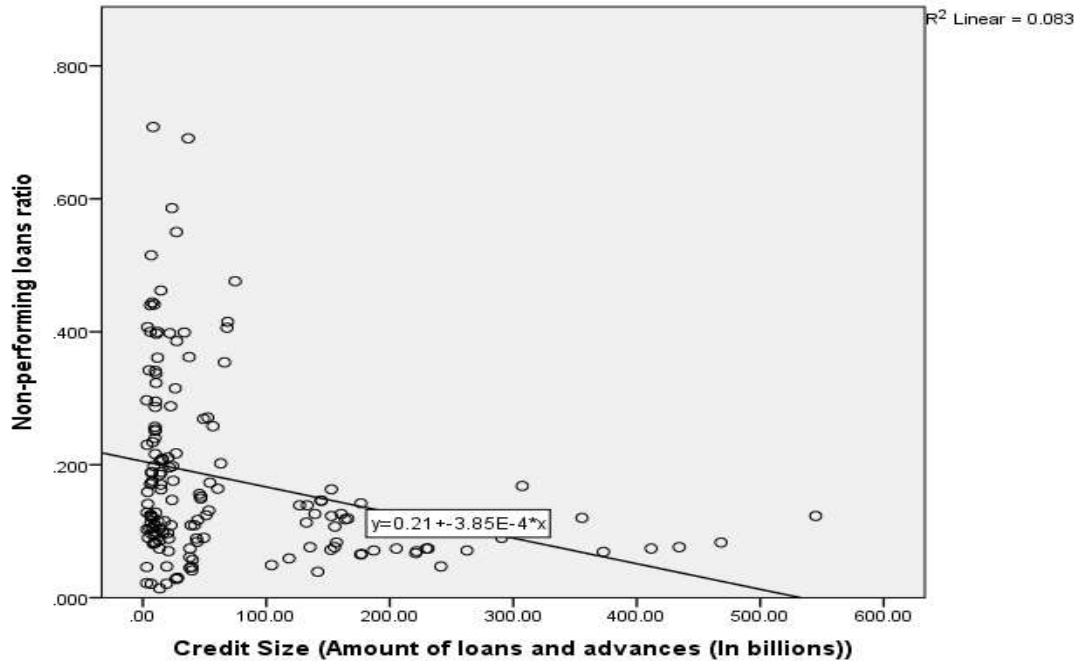


Figure 4.1: Credit Size and NPL ratio

Results show positive linear correlation between NPL ratio and credit size (amount of loans and advances) is indicated using scatter plot. Additionally, credit size (amount of loans and advances) can explain 8.3% (R^2) of NPLs of commercial banks in Kenya, measured in terms of Ratio of gross NPLs to gross loans.

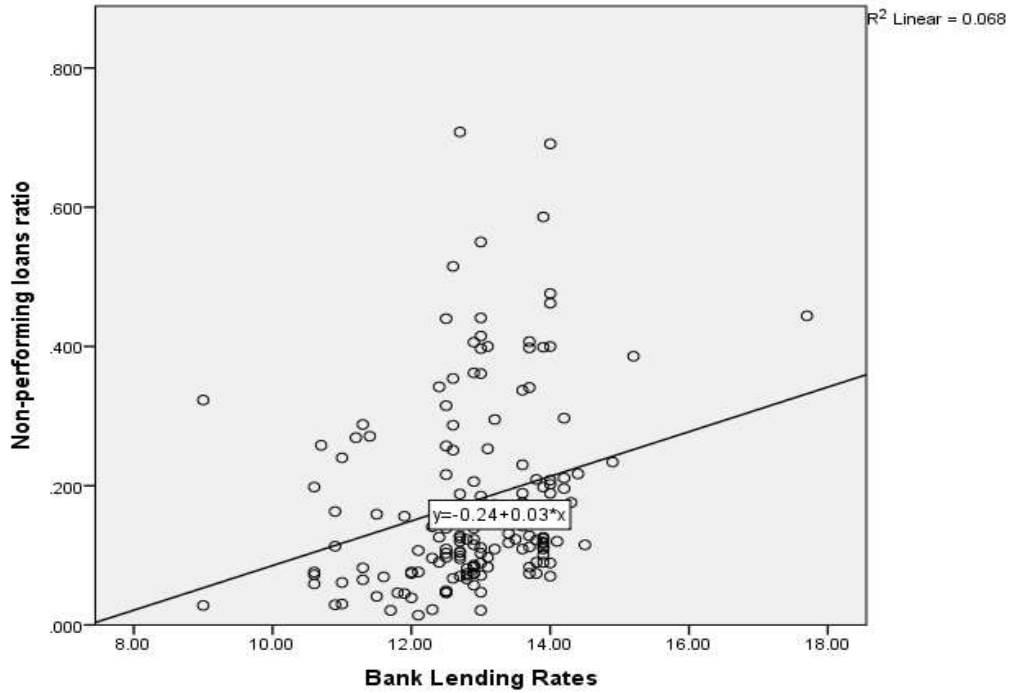


Figure 4.2: Bank Lending Rates and NPL ratio

In Figure 4.2, scatter plot shows positive linear correlation between BLR and NPL ratio of commercial banks. In addition, bank lending rates (Commercial banks weighted average rates) can explain 6.8 percent of NPLs of commercial banks measured using Ratio of gross NPLs to gross loans.

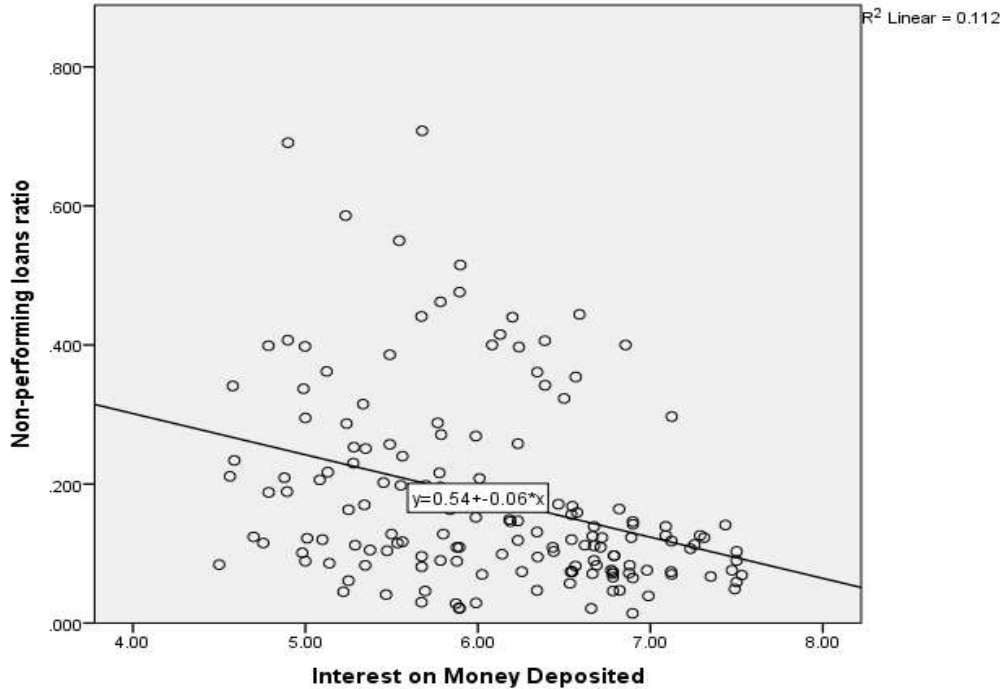


Figure 4.3: Interest on money Deposited and NPL ratio

In Figure 4.3, scatter plot shows positive linear association between interest on deposits (interest on money deposited) and non-performing loans of commercial banks. Further, interest on deposited (interest on money deposited) explains 11.2% of the NPLs of commercial banks measured in terms of Ratio of gross NPLs to gross loans.

4.3.6 Unit Root Test

The IPS presents test for UR presence in panels that incorporate data retrieved from the cross section and time series dimensions. IPS test was employed in the research. Under null hypothesis, there exists unit root, whilst under alternative hypothesis there exist partial UR.

Table 4.6: IPS Unit-Root Test

Variable	t-statistic	p-value	Fixed-N exact critical values		
			1%	5%	10%
NPL	-1.4266	0.000	-2.200	-1.950	-1.850
CS	-2.0964	0.000	-2.200	-1.950	-1.850
BLR	-1.8684	0.000	-2.200	-1.950	-1.850
IOD	-1.3268	0.000	-2.200	-1.950	-1.850
CBR	-1.9569	0.000	-2.200	-1.950	-1.850

The null hypothesis shows that CS measured using amount of loans and advances in all panels (39 Commercial Banks) contains unit roots and alternative hypothesis was that some panels are stationary. The null hypothesis can fail to be accepted as p-value (0.000) was below 0.05. This denotes that CS measured using amount of loans and advances has unit root.

Concerning the Bank lending rates, null hypothesis is that bank lending rates, measured using of Commercial banks weighted average rates, in all panels (32 Commercial banks) contains unit roots and alternative hypothesis was that some panels are stationary. The null hypothesis can be rejected because p-value of 0.000 was below 0.05 (significance level) and hence bank lending rates measured in terms of Commercial banks weighted average rates has unit root.

Concerning interest on deposits, the null hypothesis is that interest on deposits, measured in terms of interest on money deposited in all panels (32 Commercial banks) contains unit root. We can therefore fail to accept null hypothesis because p-value of 0.000 was below 0.05 and hence interest on deposits, measured using interest on money deposited has unit root.

Concerning CBR, the null hypothesis is that CBR, measured in terms of interest rate on CBK loans all panels (32 Commercial banks) contains unit root. We can therefore reject null hypothesis because p-value (0.000) was below 0.05 and CBK, measured using interest rate on CBK loans has unit root.

In regard to dependent variable, NPLs measured by employing Ratio of gross NPLs to gross loans, the null hypothesis is NPLs in all panels (39 Commercial banks) contains unit

root. We can fail to accept null hypothesis because p-value of 0.000 was below 0.05 and hence NPLs measured in terms of Ratio of gross NPLs to gross loans has unit root.

4.4 Hausman Test

The above mentioned test was employed to assess endogenous repressors. The existence of endogenous repressor results to the failure of OLS estimator. Consequently, lack of correlation between error terms and predator factors is postulated (Bryman & Cramer, 2012). The null hypothesis in present research was that alternative hypothesis was fixed influence while random influence was preferred model.

Table 4.7: Hausman Test

	Coefficients		(b-B) Difference	sqrt(diag(V_b-V_B)) S.E.
	(b) fixed	(B) random		
CS	.0000205	-.0000835	.000104	.000308
BLR	.0234954	.0254654	-.00197	.0023262
IOD	-.0758395	-.0678003	-.0080392	.0079072

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(3) = (b-B)'[(V_b-V_B)^(-1)](b-B)
 = 3.08
 Prob>chi2 = 0.3802

The p value (0.3802) was greater than 0.05 alpha value (at 95 percent confidence interval). This meant, null hypothesis was not rejected, and the study would have to deploy random effects model.

4.5 Regression Analysis

The relationship between the study variables was then measured by employing regression analysis. Basic model was:

$$Y_{it} = \beta_0 + \beta_1 X_{1it} + \beta_2 X_{2it} + \beta_3 X_{3it} + \beta_4 X_{4it} + \varepsilon_{it}$$

Y_{it} is dependent variable (Non-performing loans), B_0 is y intercept (Constant), β_1 - β_4 and coefficients of determination, X_{1it} is Credit Size, X_{2it} is Bank lending rates and X_{3it} is Interest on Deposits. While i connote number of observations, t connote number of observations for a specific bank (time series data) and ε_{it} connote error term.

Table 4.8: Regression Results

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Random-effects GLS regression                Number of obs      =       160
Group variable: Bank                       Number of groups   =        32

R-sq:  within = 0.3577                     Obs per group: min =         5
       between = 0.0887                    avg =              5.0
       overall = 0.1579                    max =              5

Wald chi2(3)                               =       71.54
corr(u_i, X) = 0 (assumed)                 Prob > chi2        =       0.0000

```

NPL	Coef.	Std. Err.	z	P> z	[95% Conf. Interval]	
CS	-.0000835	.0001753	-0.48	0.634	-.0004271	.0002601
BLR	.0254654	.0066109	3.85	0.000	.0125083	.0384225
IOD	-.0678003	.0145812	-4.65	0.000	-.0963789	-.0392217
_cons	.2682679	.1491347	1.80	0.072	-.0240308	.5605666
sigma_u	.10887126					
sigma_e	.06664678					
rho	.72740946	(fraction of variance due to u_i)				

R-squared signifies variation in dependent variable that independent study variables can account for. The r-squared for the link between interest rates and NPLs of Commercial Banks was 0.1579. This implies that independent variables (credit size, bank lending rates and interest on deposits) explain 15.79% of the dependent variable (non-performing loans). For F-test, p-value of 0.000 was below 0.05 (significance level). This implies that model used is a good fit for the data. Within each of commercial banks, the three independent variables (credit size, bank lending rates and interest on deposits) explain 35.77% of NPLs of Commercial Banks. The p-value for F-test was 0.000, which is below 0.05 meaning that the model used is good fit for research data.

The interpretation of coefficients is based on between-entity and within-entity effects. When X differs by 1 unit, the data reflects the average influence of X over Y over time and

between companies. If each of the coefficients differs from 0, two-tail p-values are used. To rule out this possibility, the p-value must be less than 0.05; if it is, the study variable has significant impact on dependent variable (Y).

The CS, measured by employing the amount of loans and advances has insignificant negative effect on NPLs of commercial banks as indicated by beta coefficient of -0.0000835. This means that unit increase in CS across time and commercial banks would result to a 0.0000835 decrease in NPLs (Ratio of gross NPLs to gross loans) of commercial banks. The association was insignificant as p-value (0.634) was below 0.05 (significance level). These findings conform to Kumar and Kishore (2019) discoveries that there exists insignificant association between credit size and NPLs in UAE Conventional Bank. Additionally, the results conform to Atem (2017) findings that credit size has no significant effect on NPLs in KCB bank.

According to the findings, BLR measured in terms of Commercial banks weighted average rates, has significant positive effect on commercial banks' NPLs as illustrated by beta coefficient of 0.0254654. This means, unit increase in BLR across time and Commercial banks would lead to a 0.0254654 increase in NPLs. Because the p-value of 0.000 was below significance level (0.05) the link was significant. Moreover, the findings concur with Maina (2016) findings that there exists positive and also significant relation between bank lending rates and non-performing loan in Kenya commercial bank. Moreover, these findings conform to Mwenda (2017) arguments that lending rates have positive effect on financial institutions' financial performance since it is the key determining factor of interest income.

The study found that IOD, measured in terms of interest on money deposited has significant inverse effect on commercial banks' NPLs as illustrated by regression coefficient of -0.0678003. This means unit increase in IOD across time and commercial banks would lead to a 0.0678003 decrease in non-performing loans. Because the p-value of 0.000 was not more than 0.05 the link was significant. Moreover, these findings are contrary to Sheefeni (2016) arguments that IOD positively influence NPLs. Further, the findings conform to Wambari and Mwangi (2017) discoveries that deposit interest ratio inversely affects the bank performance in Kenya.

4.6 Moderation of Central Bank Rate

The study evaluated moderating effect of CBR on the link between dependent and independent variables. Moderation takes place when the link between dependent and independent variables relies on third variable (moderating variable). The effect that moderating variable has is called interaction since it impacts the direction or strength of the link between independent and dependent variable.

Table 4.9: Moderation of Central Bank Rate

Random-effects GLS regression	Number of obs	=	160
Group variable: Bank	Number of groups	=	32
R-sq: within = 0.3939	Obs per group: min	=	5
between = 0.0880	avg	=	5.0
overall = 0.1714	max	=	5
corr(u_i, X) = 0 (assumed)	Wald chi2(7)	=	82.32
	Prob > chi2	=	0.0000

NPL	Coef.	Std. Err.	z	P> z	[95% Conf. Interval]
CS	-.0001716	.0004292	-0.40	0.689	-.0010128 .0006697
BLR	-.0428535	.0398388	-1.08	0.282	-.1209362 .0352292
IOD	-.128547	.0673743	-1.91	0.056	-.2605982 .0035042
CBR	-.1435202	.0758602	-1.89	0.059	-.2922035 .0051632
CS_CBR	.0000136	.0000479	0.28	0.776	-.0000802 .0001074
BLR_CBR	.0071434	.0041934	1.70	0.088	-.0010755 .0153623
IOD_CBR	.006969	.0070053	0.99	0.320	-.0067612 .0206992
_cons	1.600444	.7312665	2.19	0.029	.1671879 3.0337
sigma_u	.11324424				
sigma_e	.06561225				
rho	.74867703	(fraction of variance due to u_i)			

Results indicated that the interaction between the CS and CRB has insignificant positive influence on the NPLs (standardized beta coefficient=0.0000, p-value=0.776). In addition, interaction between the BLR and CRB has insignificant positive effect on commercial banks' non-performing loans (standardized beta coefficient=0.0071, p-value=0.088). Further, IOD and CRB had insignificant positive effect on non- commercial banks'

performing loans (standardized beta coefficient=0.0070, p-value=0.320). There was a change of R^2 change from 0.3577 to 0.3939. Therefore, CBR had insignificant moderating influence on the link between IOD, BLR and CS on the NPLs. Therefore the central bank rate had a moderating effect on the NPLs though insignificantly.

CHAPTER FIVE

SUMMARY OF FINDINGS, CONCLUSIONS AND RECOMMENDATIONS

5.1 Introduction

This chapter integrates summary of the results, conclusion as well as recommendations drawn in effort to address study's purpose which was to evaluate the link between interest rates and NPLs of Kenyan commercial banks.

5.2 Summary of the Findings

The below section reviews findings pertaining to influence of interest on deposits, bank lending rates and credit size on NPLs in Kenyan commercial banks.

5.2.1 Interest on Deposits and non-performing loans

The study found that IOD, measured in terms of Interest on Money Deposited has influences NPLs of Kenyan commercial banks significantly and negatively. Nevertheless, a reduction in interest rate lowers the benefit of saving and hence discourages saving. Nevertheless, this becomes more complicated in the real life situation. This is because there are many factors that influence saving hence the link between saving and the rate of interest becomes unclear. Decrease in rate of interest leads to a direct decrease in the benefit of saving. In this situation, holding cash is more preferred than saving.

5.2.2 Bank Lending Rates and Non-performing loans

The study revealed that BLR measured in terms of Commercial banks weighted average rates, has significant positive effect on NPLs of Kenyan commercial banks. Due to the fact that it is very hard to predict the type of borrower and commence a banking relationship, it is advisable that lending institutions put into consideration the adverse selection problem together with the moral hazards. In case the banking institutions charge a very high interest rate, the problem of adverse selection might be induced since only the high risk borrowers will be willing to borrow at this high interest rate.

5.2.3 Credit Size and NPLs

The researcher established that CS measured using amount of advances and loans has insignificant negative relationship on NPLs of Kenyan commercial banks. Credit size is the amount the borrower promises to pay back, as set forth in loan contract. It refers to maximum loan amount describing the total amount that an individual is allowed to borrow. It is employed for credit cards, standard loans and line-of-credit. The loan amount may perhaps exceed the initial amount the borrower requested if he or she chooses to include points as well as other upfront costs in the loan. The clients who borrow low amounts of money are most financially unstable therefore there are high possibility of defaulting or servicing their loans halfway.

5.3.4 Central Bank Rate, Interest Rates and Non-performing loans

The study discovered that CBR has no moderating effect on the link between interest rates and NPLs in Kenyan commercial banks. Central bank lending is commonly recognized as an important component of the public safety net that helps to keep the banking system and financial markets stable. The rate imposed by the central bank to commercial banks as a lender of last resort is known as the central bank rate.

5.3 Conclusion

The study therefore concludes that interest on deposits measured in terms of interest on money deposited has significant and negative effect on NPLs of Kenyan commercial banks. This denotes that improvement in interest on deposits would decrease the NPLs of Kenyan commercial banks. The bank lending rates measured in terms of Commercial banks weighted average rates, has significant positive influence on commercial banks'. This means that increase in bank lending rates would enhance the commercial banks NPLs in Kenya.

Moreover, the researcher concludes that CBR has insignificant moderating influence on the link between IR (credit size, interest on deposits and BLR) and NPLs in Kenyan commercial banks. This implies that increase in central bank rate has insignificant effect on the link between interest rates and NPLs in Kenyan commercial banks.

5.4 Recommendations

The study found that interest on deposits has negative significant effect on NPLs of commercial banks operating in Kenya. Therefore, this study recommends that Kenyan commercial banks ought to lower the IR charged on deposits since increasing rate of interest lowers the demand for loans and also leads to loan default by the borrowers. Moreover, in this case, financial institutions are endangered since they give the loans from the saving of the customers.

The study discovered that bank lending rate has significant positive influence on NPLs of Kenyan commercial banks. The commercial banks' management should therefore develop proper strategies to increase their lending interest rates to increase their profitability on loans. Increase in profitability of loans is as a result of greater spread between the rate the bank charges its customers and federal funds rate. In these circumstances, demand for loans by the end users and company increases, improving bank profits. Because short-term rates grow at lower rates than long-term rates, spread between long-term and short-term rates increases when interest rates increase.

The researcher established that CS measured using amount of advances and loans has insignificant negative relationship on NPLs of Kenyan commercial banks. Credit size is the amount the borrower promises to pay back, as set forth in loan contract. It refers to maximum loan amount describing the total amount that an individual is allowed to borrow. Therefore, the study recommends that bank managers should not overemphasize the significance of bank loan when dealing with the issue of nonperforming loans.

The study discovered that CBR has no moderating effect on the link between interest rates and NPLs in Kenyan commercial banks. Central bank lending is commonly recognized as an important component of the public safety net that helps to keep the banking system and financial markets stable. Therefore, the study recommends that the central bank should not emphasize the importance of CBR as a means of assisting commercial banks deal with the issue of nonperforming loans.

5.5 Areas for Further Research

The researcher focussed on banking sector hence, findings cannot be generalized to other sectors in Kenya. As such, additional studies ought to be done to assess the relationship between IR and NPLs in other sectors in Kenya. This study found that interest rates explain 35.77% of the NPLs of Kenyan commercial banks. The study hence suggests more research on other factors influencing NPLs of Kenyan commercial banks. Further, the researcher measured NPLs in terms of Ratio of gross NPLs to gross loans. The study proposes further studies to examine how interest rates influence NPLs measured by employing NPLs as a percentage of total loans

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APPENDICES

Appendix 1: List of Commercial banks in Kenya

1. African Banking Corporation Limited
2. Bank of Africa Kenya Limited
3. Bank of Baroda (K) Limited
4. Bank of India
5. Barclays Bank of Kenya Limited
6. Charterhouse Bank Limited
7. Chase Bank (K) Limited
8. Citibank N.A Kenya
9. Consolidated Bank of Kenya Limited
10. Co-operative Bank of Kenya Limited
11. Credit Bank Limited
12. Development Bank of Kenya Limited
13. Diamond Trust Bank Kenya Limited
14. DIB Bank Kenya Limited
15. Ecobank Kenya Limited
16. Equity Bank Kenya Limited
17. Family Bank Limited
18. First Community Bank Limited
19. Guaranty Trust Bank (K) Ltd
20. Guardian Bank Limited
21. Habib Bank A.G Zurich
22. I & M Bank Limited
23. Imperial Bank Limited
24. Jamii Bora Bank Limited
25. KCB Bank Kenya Limited
26. Mayfair Bank Limited
27. Middle East Bank (K) Limited
28. M-Oriental Bank Limited
29. National Bank of Kenya Limited
30. NCBA Bank Kenya PLC
31. Paramount Bank Limited
32. Prime Bank Limited
33. SBM Bank Kenya Limited
34. Sidian Bank Limited
35. Spire Bank Ltd
36. Stanbic Bank Kenya Limited

37. Standard Chartered Bank Kenya Limited

38. Trans-national Bank Limited

39. UBA Kenya Bank Limited

Source: centralbank.go.ke

