MACRO ECONOMIC FACTORS AND NON-PERFORMING LOANS IN COMMERCIAL BANKS IN KENYA

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DECLARATION

This project has not been presented to any other institution of higher learning for the award of a degree or any other certification and I declare that it is my original work.

Signature……. Date……

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Supervisor's Declaration:

I confirm that this project, has been done by the candidate under my supervision as the university supervisor.

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DEDICATION

This project is dedicated to my late mother, Bridgit Ndivi Kigamwa, my late father, Safan Julius Kigamwa, my husband, Cecil Otira, my daughter, Sharon Akoth and sons, Joseph Warwa and Emmanuel Chweya.

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ABBREVIATIONS AND ACRONYMS

ANOVA:	Analysis of Variances
CBK:	Central Bank of Kenya
EU:	European Union
FCY:	Foreign currency namely US dollar (USD), Great Britain Pound (GBP), European currency (EURO) and Japanese Yen (JPY)
GDP:	Gross Domestic Product
GLs:	Gross Loans
GNPLs:	Gross Non-Performing Loans
IMF:	International Monetary Fund
KBA:	Kenya Bankers Association
KES:	Kenyan Shillings
KNBS:	Kenya National Bureau of Statistics
NPLs:	Non-Performing Loans
Q1, Q2, Q3, and Q4:	One quarter represents three months in a year. Q1 is January to March; Q2 is April to June; Q3 is July to September; Q4 is October to December.
SMEs:	Small to Medium Enterprises
SPSS:	Statistical Package for Social Sciences

OPERATIONAL DEFINITION OF TERMS

Commercial Bank:	Is an entity licensed by Central Bank of Kenya to lend money as per defined interest rate ceilings.
Exchange rates:	These rates show amount of local(home) currency that is equivalent to a unit of foreign currency
Gross Domestic Product:	Final overall output of goods plus services made by the economy of a country inside the country
Inflation:	Increase in percentage price levels and it causes value of money to depreciate or fall.
Interest Rates:	Price of money in percentage per annum. It's the price to paid by a borrower to use funds loaned by a bank. For the bank, this is the charge levied to the borrower and covers the risk taken in loaning the money. It represents investment's returns to the saver and investor.
Interest Income:	Is income from money lent to debtors
Kenyan banking industry:	Comprises of 42 commercial banks
Loan loss provision:	Guideline where an amount is set aside to bear loss for loans issued to customers
Macro-economic factors:	These factors affect performance of an economy, sector such as the banking industry sector. These are real GDP, inflation, real interest rate and exchange rates.
Non - Performing loan:	Loan owed by a borrower that is likely not to be paid back to the lender (bank)
Profitability:	The indicator of a bank's ability to return profits from their activities.
Real Interest Rate:	Commercial Banks average lending rate less Inflation
Real GDP:	Actual year on year growth of a country's economy

ABSTRACT

Studies portray Non-Performing Loans as an accurate pointer to the health status of a bank; where a high percentage of these loans indicates the institution is unable to collect the interest and principal for the amount advanced to the customers. In response to this, the researcher sought to study the effect of macro-economic factors on Non-Performing Loans in commercial banks in Kenya. The study was guided by four objectives, namely; to establish the effect of interest rate on non-performing loans in commercial banks in Kenya, to determine the effect of inflation rate on non-performing loans in commercial banks in Kenya, to establish the effect of exchange rate on non-performing loans in commercial banks in Kenya and to determine the effect of Gross Domestic Product on non-performing loans in commercial banks in Kenya. The study was based on four theories; moral hazard, asymmetric information, agency and the interest theory. Descriptive research design was applied. The target population was 42 commercial banks. The sample frame size was 210 objects. The study used secondary data from Central Bank of Kenya annual supervision reports and Kenya Bankers Association. The number of entries of the data were grouped into four quarters per year of study. Data was analyzed using descriptive and inferential statistics namely, correlation and panel data regression with the help of Statistical Package for Social Sciences(version 22.0). The key findings were as follows: the relationship between real interest rate and non-performing loans was positive; the relationship between inflation and non-performing loans was negative; the relationship between exchange rate and non-performing loans was as follows: for the following three currencies USD, GBP, and EURO this was positive; for JPY this was negative. The effect of real gross domestic product was insignificant. The study also found that changes in exchange rates were a major contributor to non-performing loans followed by Inflation, then Real Interest rate and lastly gross domestic product. The study recommends the following to Central Bank of Kenya and Government of Kenya-stabilize exchange market by maintaining desirable exchange rates; employ fiscal policy to control inflation; manage interest rates and money in circulation. It also recommends the following to the commercial banks and Kenya Bankers Association- formation of a platform for banks to exchange information on borrowers' creditworthiness; banks to shift their focus from how to increase assets (loans) to early detection of non-performing loans; change consumer behavior by introducing risk-based pricing rule that will be dependent on a customer's borrowing & loan repayment discipline; offer struggling customers a loan restructure option as guided by Central Bank of Kenya during Covid19 period; increase lending in secure loans;lastly, KBA to organize quarterly meetings where banks with high non-performing loans meet with banks that have low non-performing loans so as to learn measures that these banks have implemented.

CHAPTER ONE

INTRODUCTION

1.1 Background of the Study

The banking industry represents a strong foundation that the Kenyan nation has been built on. Kenya attained independence on December 12th 1963 and since then, the banking industry has contributed to growth of the country's economy and wellbeing of millions of its Citizens. NPLs are a pointer of the banks performance (Beck, Jakubik & Piloiu, 2015); a bank is seen as performing well if the number is low. Studies by Klein (2013) show that banks with big profits have less NPLs. This is due to these banks acquiring interest income from a greater percentage of the loans they advanced to borrowers, which has a net effect of increasing the profits.

Banks with a high percent of NPLs give a picture that they have difficulties in collection of the total amount advanced known as the principal and the interest accrued. A company's income from interest falls as the amount of non-performing assets climbs (Masavu, 2015); because of this, banks report decreased profits; and may consequently close the doors. This scenario also translates into reduced collection of interest and flow of cash for the bank (Agyemang, Bardai and Ntoah-Boadi, 2020). The impact of NPLs to bank profitability is reduced income.

World bank data obtained from a global sample of 123 countries, indicates NPLs as a percentage of all bank loans, averaged at 7.44 %; Ukraine led with an index of 54.54 %; Monaco's was last with an index of 0.23 %. Kenya attained position 30 out of 123 with an index of 11.7% and position 13 out of in the African continent. In East Africa, the index is 4.7% for Uganda and 9.9% for Tanzania (Worldbank, 2018). KBA, June 2019 report on status of the banking industry, shows a steady and aggressive rise in NPLs number here in Kenyan

banks. Statistics indicate GNPLs as a proportion of GLs rose by 6.4 percent between 2014 and 2018 to stand at 12 percent; thus further attesting that this is one of the main challenges affecting banks in Kenya (KBA, 2019). The NPL trend is depicted in figure 1.1 which indicates the ratio of GNPLs to GLs has been on the increase in 2012 to 2018.

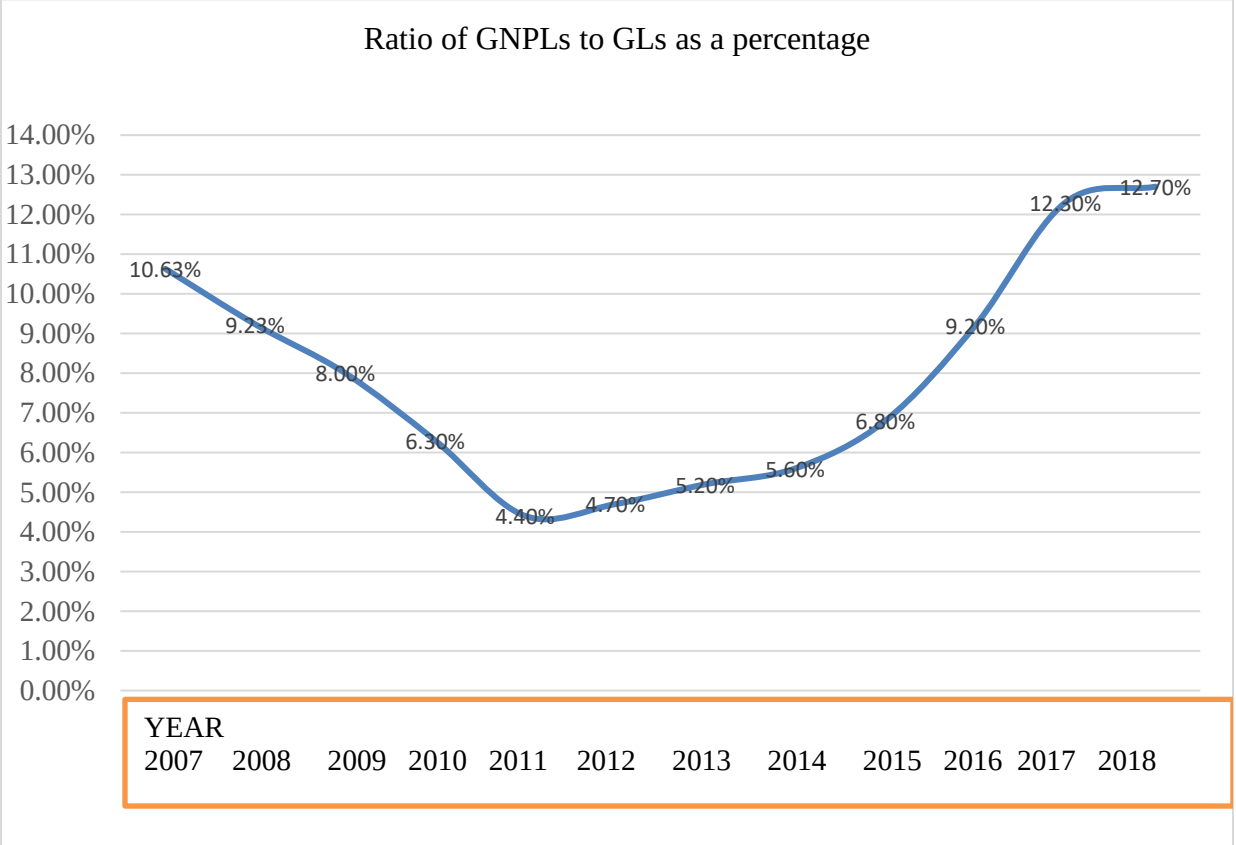

Figure 1.1: GNPLs as a ratio of GLs
Source: (KBA, 2019)

1.1.1 Macro Economic factors and Non-Performing Loans

Scholars adopt various definitions for NPLs. According to Nkusu (2011), this represents any loan where the interest and principal has not been paid for more than 90 days; once this is past, the loan is said to be close to or in default.

As per CBK prudential guidelines, NPLs occur for loans and advances that have prior established repayment programs when the principal or interest is due and unpaid for 90 days or more (CBK, 2016).

Beck et al., (2015) found that foreign currency rates, lending rate and economic growth (Real GDP) which are classified as macro-economic factors affect NPLs significantly. The rate, one currency trades with another is the exchange rate Haniifah (2015). The exchange rate pricing is key in an economy. A drop in home currency value will lead to pricy imported goods. In instances where an importing trader has a letter of credit issued by commercial banks, the exchange rate is fixed and drop means that any fluctuations on the LC will be borne by the importer and once the goods are received, the sale price will be high /unaffordable hence making the goods unsellable thus increasing the probability of default.

Interest rate is the price of money indicated as percentage per year. Prior studies define it as the sum of money a debtor pays in order utilize the funds borrowed (Crowley, 2007). It plays a huge part on both sides of a deal; to the debtor, this is the fee paid for use of the loan or credit granted; to the creditor, this is the income earned in granting a loan or credit and also for bearing the lending risk. The interest rate represents the return on investment to the saver and investor. Interest rate increments impact asset performance in banks primarily because it increases loans costs applied on the debtors (Ombaba, 2013). Studies have shown one leading source of bank income is interest due from advances and loans. Data from KBA (2006-2018) indicates the larger the interest spread, the greater the income received from interest as depicted in appendix I.

GDP represents final overall output of services plus goods created by the economy of a country within that country. Badar and Javid (2013) assert that GDP is a key pointer of the economic condition of a country; and that a country's economic production that has incorporated price changes is the real GDP. Improved performance of the economy as reflected in growth of GDP results in fewer NPLs. According to Skarica (2014), times of booming economy results in fewer NPLs; these increase when the economy is in recession.

Inflation rate is the increase in percentage price levels. It depreciates the value of money causing an increment in the cost of commodities thus increasing the debtor's operation costs; consequently a huge percentage of the borrower's income is directed towards coping with increased prices thus antagonizing the borrower's ability to service his or her debt. Gunsel (2012) posits that influence of inflation to credit risk is positive.

The bank's efficiency is affected by inflation (Prakash, 2013). There is an association between interest rates pertaining to loans and inflation: when the rate of inflation is high, the lending interest rate is also high. This affects borrowing cost by causing an increase in both the borrower's obligation and the risk associated with credit advancement.

1.1.2 Banks with High and Low Gross Non Performing Loans Ratios

The CBK (2018) annual report shows banks that had a high and low gross NPL ratio. The top banks ranged within 48.50% to 13%; those with the least gross NPL ratio ranged within 9.20% to 7.30%.

1.1.3 Non-Performing Loans per Sector

The CBK (2018) annual report shows the five foremost borrowers per sector with Non-Performing Loans: Gross Loans percentage that is >10% and who's numbers make up 257B

of the 317B stock of NPLs held by banks as follows: Trade with 25.77% (81.622B); Manufacturing at 16.35% (51.791B); Real Estate at 14.85% (47.033B); Personal/Household at 14.42 %(45.672B) and Agriculture at 9.62 %(30.452B). This summary translates to 81% of the NPLs.

1.2 Statement of the Problem

Beck et al., (2015) studied key determinants of NPLs using a sample of 91 countries in the globe and found that a bank is seen to be doing well if it held NPLs that were low in number. This is due to these banks acquiring interest income from a greater percentage of the loans they advanced to borrowers, which has a net effect of increasing the profits. Nir Klein in his 2013 study titled "Non-Performing Loans in CESEE: Determinants and Impact on Macroeconomic Performance" whose focus of study was parts of Europe namely, South Eastern, Eastern, and Central demonstrates that banks with fewer NPLs make large profits; meaning these banks obtain interest income from most of the loans they book and this improves their total profit. In these two studies, a methodological gap exists to show what percentage of NPLs makes up the definition of "few" NPLs in order for the bank to be seen as making large profits.

According to research by Ahmad, Tahir and Aziz (2014), in Pakistan, there is a negative relation between profitability and loan loss provision; thus low provision for loss results in high profits for the bank resulting in financial stability. There exists a contextual gap since this study did not incorporate data from Kenya.

One of the major concerns in Commercial banks, CBK, KBA is the growing NPL numbers in the Kenyan banking industry that have breached the single digit to stand at 12% per (KBA, 2019). This translates to 12 out of 100 loans become NPLs. NPLs are a pointer of the bank performance. KBA reports released in June 2019 depicted in appendix II shows a decline in

the trend of interest income from loans as seen in the rising numbers of NPLs and interest in suspense. Masavu (2015) confirmed that NPLs influence a bank's interest income. It also depicts the relationship between interest in suspense and NPLs as a positive one. Where the bank has NPLs, an interest in suspense amount is indicated in the balance sheet, which denotes that the bank has pended money that is due as the result of a loan, but that its borrower has not paid on the loan per an agreement. NPLs reduce bank profitability and inhibit their intermediary function due to illiquidity and poor cash flow.

According to Garcia (1997), banks use depositors' funds to finance advances and loans to borrowers; hence recovery of these amounts by the banks is imperative. In occurrences of nonpayment on booked loan payments, the principal is not recoverable leading the financial institution to replenish these sums in order to keep the banks deposit fund intact. A methodological gap exists that needs to show how a rising NPL can contribute to a crisis in terms of liquidity thereby affecting bank capacity to make payments to account holders with deposits; which can lead to risks that touch on bank reputation and trigger bank closure.

Banks are governed by a loan loss provision policy where an amount is set aside to bear loss for loans issued to customers (Leaven & Majnoni, 2003). It is a budgeted cost where banks are required to provision for forecasted losses as guided under IFRS9 loss impairment model introduced in the year 2018 here in Kenya. In the previous loss impairment model known as International Accounting Standard 39, banks reported the actual loss incurred thus delayed recognition of asset impairments. There exists a methodological gap to show how this new policy (IFRS9) affects bank liquidity.

From the reviewed literature obtained from various studies, there were contextual and methodological gaps. This study addressed the contextual gap as the research data was for Kenyan banks. NPLs can be caused by macroeconomic or bank-specific factors (Warue, 2013). Focus of the study was macro- economic determinants that represent the systemic risk which is beyond control of the individual borrower. The study sought to find out the relationship between select macroeconomic factors and the NPLs in Kenya. The study will extend existing knowledge on how macro-economic factors affect NPLs.

1.3 Objectives of the Study

1.3.1 General Objective

The general objective of the study was to establish the effect of macro-economic factors on non-performing loans in the Kenyan banking industry with a focus on four variables, namely interest rate, inflation rate, exchange rate and gross domestic product.

1.3.2 Specific Objectives

The study was guided by the following objectives:

i. To establish the effect of interest rate on non-performing loans in commercial banks in Kenya.
ii. To determine the effect of inflation rate on non-performing loans in commercial banks in Kenya.
iii. To establish the effect of exchange rate on non-performing loans in commercial banks in Kenya.

iv. To determine the effect of Gross Domestic Product on non performing loans in commercial banks in Kenya.

1.4 Hypotheses

The researcher formulated the following hypotheses to guide the study.

$H0_1$: Interest Rate on loans has a positive relation with NPLs in Commercial Banks.

$H0_2$: Inflation rate has a positive relation with NPLs in Commercial Banks.

$H0_3$: Exchange Rate can have both negative and positive relation with NPLs in Commercial Banks.

$H0_4$: Growth in Gross Domestic Product has a negative relation with NPLs in Commercial Banks.

1.5 Significance of the Study

Researchers may use these findings to refer when researching on topics related to NPLs. Bank managers may find the findings of the study useful especially in understanding the effect of pricing (interest rates-both lending and deposit) on the bank's books and NPLs. Likewise, commercial bank employees may have insight on how these macro-economic factors affect achievement of organizational goals and importance of processing customer requests for funding or lending diligently and as per set procedures. Existing and Prospective shareholders may use the study to understand how the macro-economic factors contribute to existence of NPLs, which in turn affect bank performance and profitability.

1.6 Scope of the Study

The study focused on commercial banks in Kenya and only on four aspects of macro-economic factors namely; interest rate, inflation rate, exchange rate and gross domestic product. In

addition, the study collected data for the period from 2009 to June 2019. Finally, the study only used secondary data.

1.7 Limitation of the Study

Data is secondary and aged hence may not incorporate current happenings. To overcome the limitation, the researcher cross checked with other sources namely KBA and KNBS in order to confirm current trend and correctness of the data.

1.8 Organization of the Study

Chapter one contains background of the study, objectives, hypotheses, significance of the study, scope of the study as well as limitations of the study.

Chapter two presents review of related literature as per the themes derived from the objectives. Chapter two also contains summary of reviewed literature and the conceptual framework.

Chapter three contains the research design and methodology used in the study, namely, research design, target population, sample size and sampling design, data collection instruments and data analysis techniques.

Chapter four contains findings, interpretations and discussions.

Chapter five presents summary, conclusions and recommendations.

CHAPTER TWO

LITERATURE REVIEW

2.1 Introduction

Chapter two incorporates a review of the theoretical literatures that exists; explains why there is existence of NPLs. Theories covered herein include Moral Hazard Theory, Asymmetric Information Theory, Agency Theory and Theory of Interest. Also included are various studies on both the four independent and one dependent variable namely Interest Rates, Exchange rates, Inflation, GDP and NPL respectively.

2.2 Theoretical Review

The study was anchored on the Moral Hazard Theory, Asymmetric Information Theory, Agency Theory and Theory of Interest.

2.2.1 Theory of Moral Hazard and Unobservable Behaviour

This theory was developed by Mirrless (1999). The theory refers to one party, providing incomplete information and deliberately taking part in an event that is risky since they know they are secure from the peril related with the event; and in case things go wrong, the other party to the event would bear the consequences or cost (Dembe and Boden, 2000). Thus the risk presents, since financial details provided by one party are false or hidden (Connelly, Zweig, Webster & Trougakos, 2012) meaning they lack good faith as they enter into the contract.

Moral hazard can be found in almost every aspect of human activity. Moral hazard is a change in economic agent behavior as a result of changing circumstances. Theoretical foundations of the moral hazard issue in economics date back to the 1970s. The first published studies on

moral hazard were by Pauly (Pauly 1968), Zeckhauser (Zeckhauser 1970), Arrow (Arrow 1968), and Mirrlees (Mirrlees 1999). The current state of the global economy (fall 2011) is largely the result of moral hazard by authorities such as governments, institutions, ranking agencies, banks, chief executive officers, politicians, and so on. Efforts to stabilize the Eurozone, government bailouts of banks, government purchases of toxic assets, rescue packages given to the banking sector and large corporations that are "too big to fail," rescue packages given to debtor nations, golden parachutes given to employees leaving companies are all manifestations of moral hazard in economic and political reality.

The situation of Moral hazard arises due to asymmetric information; the scenario has two parties and either party have more information and are secure from the risk (Rodoni and Yaman, 2018). Asymmetric information in relation to financial transactions between a borrower and a bank, makes it challenging to differentiate honest and dishonest borrowers; (Freeman, Wicks, Parmar, 2004), concluded that truth and business are connected. The state of asymmetric information through incomplete disclosures contributes to accumulation of NPLs since some borrower's attributes cannot be ascertained and banks rely on the information provided. NPLs are linked to moral hazard due to the principle and agent having different risk appetites and asymmetry in information causing one party to take greater risk since the other party will bear the consequences, (Cincinelli & Piatti, 2017). This theory is associated with NPL variable.

2.2.2 Asymmetric Information Theory

Stiglitz (1961), George Akerlof (1970), and Michael Spence (1971) developed Asymmetric Information Theory (1973). The theory, however, was formalized in 2001. Asymmetric information, according to the theory, is a problem in financial markets such as borrowing and

lending. In these markets, the borrower is more aware of his financial situation than the lender, resulting in market failure.

According to the theory, in a perfect market setting, with perfect and costless information available to both parties and no uncertainties about current and future trading conditions, the parties do not suffer from market failure of information and vice versa. However, information in the real world is neither perfect nor free, and the small business finance market is marked by risk and uncertainty about future conditions. Between the lender and the borrower, information is distributed asymmetrically. From the perspective of the lenders, it has insufficient information about the underlying quality of the project and the management of small businesses, resulting in the problem of adverse selection (Stiglitz & Weiss, 1981).

Furthermore, the management of a small firm may fail to perform to their full potential, creating a moral hazard problem. The later arises because it is too costly for lenders especially banks to effectively monitor small firms' projects, thereby resulting in equilibrium credit rationing and a shortfall in finance provision (Bester, 1987)). The general problem of information asymmetry can manifest itself in one of three ways: loan application acceptance but at a higher than risk-adjusted interest rate; loan application acceptance but with strict collateral requirements; or loan application rejection outright (Bester, 1987; Stiglitz, 1981).

Vehicle purchasers notice unique information as compared to sellers; this makes sellers to sell items whose quality is lower than the market (Akerlof, 1970). He used the term “lemons” in the study in reference to awful vehicles and postulates that consumers are unable to identify lemons apart from good vehicles effectively, thus these dealers cannot get prices that are above market average. Information asymmetry occurs when either party to a transaction has better facts leading to unequal knowledge between the parties (Auronen, 2003).

This theory suggests that inequity of information between customers and vendors can cause inefficiency in some markets. Lenders providing loans and advances to borrowers face improbability of loan repayment, since they are unable to discern the borrower's actions. This presents challenges in examining the borrowers credit worth (Dell'Ariccia, 1998). When financiers are unable to separate worthy from unscrupulous borrowers, they levy a standard interest fee to all debtors. In turn, the market pushes out those debtors who are considered good but cannot afford this fee; leaving banks to apply high interest rates to the remaining borrowers who are unqualified thus resulting in a surge in NPLs (Barron, Chong & Staten., 2008). This theory is associated with NPLs variable.

2.2.3 Theory of Agency

Proponent of the agency theory is Mitnick (1973). Agency is a relationship, which exists when one party, the agent acts for, as a representative of, or on behalf of another, the principal. An example is bank shareholders (principal) and management staff (agents); here the agents have power granted by principal to steer the bank business. The theory highlights issues that arise from the relationship of principals with their agents and it hypothesizes that organizations ought to ensure the actions of managers is in line with investor demands in place (Wajid, 2015).

The agency theory aims to globally explain organizational behaviours by putting an emphasis on the relationship between the manager as the company's "agent", and the shareholder as the "principal". Accounting (Baiman, 1990), law (Banfield, 1965), economics (Cooper, 1949 & 1951; Ross, 1973), finance (Jensen & Meckling, 1976), sociology (Shapiro, 1987), strategy (Barnard, 1938), and political science (Mitnick, 1982a, 1993) were among those who adopted the theory. This theoretical perspective is increasingly being used by researchers to examine leadership behavior in large private and public enterprises. The agency theory, like most

questions about organizations, focuses on working people and how they behave in the workplace. Given its economic roots, agency theory proposes that the actors who work in an organization have a utility maximization logic and seek what is best for them, even if it is not best for the organization (Eisenhardt, 1989). The agency theory focuses on the conflict between objectives created by various individuals who, while engaged in these organizations, seek what is in their best interest.

Achchuthan and Rajendran (2013) postulate that the role of the organization is to maximize owner's wealth. Issues arise when proprietors suppose that managers who are experts in managing the company, are working in their own personal interests as opposed to working in the proprietors best interest of profit maximization (Kiel & Nicholson, 2003).

These studies point to a linkage of NPLs to agency theory due to the principle and agent having distinct risk appetites and asymmetry in information; the agent accepts greater risk since the principal will bear the consequences. When the agent takes on a risky transaction, which he places in precedence over the principal's interests, this consequently develops an agency challenge. This theory is associated with NPLs variable.

2.2.4 The Interest Theory

Economist Irving Fisher originated the Fisher effect economic theory in 1930. This theory postulates that nominal interest rates rises together (same percentage point) with inflation; while real interest rates remain unchanged. This theory provides the foundation for real lending rates. According to Mishkin (2010), and as per the theory, a key reason for the change in rates of lending is due to inflation rates changes. A reduction of nominal rates of lending by rate of inflation provides the lending rates.

This theory is also applied on foreign transactions and is referred to as International Fisher Effect. It is modelled on exchange rates; and applied in international currencies trading and analysis to forecast spot currency price movements. Ahindo (2003) studied interest rates and exchange rates relationship in Kenya and found a negative relationship between these variables. The study confirmed the International Fisher Effect theory that foreign currency appreciates when foreign interest rate is lower than the home interest rate and vice versa.

The study titled "Fisher Effect and Commercial Banks lending rates" by Tuffour, Doe and Tuffour (2019) applied regression analysis and found that the effect of inflation on lending rates is insignificant though positive and this finding slightly supports the Fisher Effect. The implication of this finding was that the theory applies but was not crucial in determining the rates applied to lending by banks in Ghana. This theory is associated with Exchange rates, Interest rates and Inflation variables.

2.3 Empirical literature Review

2.3.1 Interest Rates and Non-Performing Loans

Louzis, Vouldis and Metaxas (2012) focused on the banking sector in Greece and studied determinants of NPLs per the following: loan types, namely business, consumer and mortgage loans. The studies were centered on the basis that loan quality is influenced by Bank-specific and macroeconomic variables and that these two have different effects between different loan categories. The study outcomes were that unemployment, GDP, management quality and interest rates explain NPLs presence in Greek banks.

Poudel & Poudel (2013) did a study on credit risk determinants in Nepal banking industry from 2001 to 2011. The study incorporated 29 of the 31 banks in the country. Findings indicate

interest rates affect debt burden and in turn creates credit risk; the researchers posit that credit risk is positively affected by interest rate; thus, a high rate of NPLs is because of debt burden increase due to rising interest rates. Efficiency of banking sector is affected by inflation; the findings indicate that the value of money undergoes depreciation due to inflation and this decreases the investments rate of return; during periods of high inflation, interest rates on loans are also high. As a result, borrowing cost increases borrowers' obligation thus more credit risk.

Castro (2013) studies, focused on macroeconomic determinants of the credit risk in the banking system in Greece, Ireland, Portugal, Spain and Italy from 1997 to 2011. The research studied how macroeconomic variables affect the risk associated with credit in this group of countries referred to as (GIPSI) which are considered as vulnerable as a result of unfavorable economic and financial conditions such as recession, unemployment, high levels of public deficits and debts and difficulties in borrowing money to finance their economies. The study found there was an increase in credit risk when GDP growth decreases; and credit risk rises when interest rate, rate of unemployment and growth in credit increase. The findings showed the relationship of long-term interest rate and credit risk is positive.

Koju, Koju, Wang (2017) focused on 30 banks in Nepal from 2003 to 2015 and using static and panel data estimation assessed impact of banking management and economic factors on NPLs. Results indicate main cause of high NPL as low economic growth. The researchers posit that banks with greater spread on interest have a likelihood of presenting high NPLs percentages; and that high interest rates applied to facilities leads to greater spread. This scenario results in greater costs on facilities advanced to customers translating to higher instalments for the loans advanced which increases their rate of default. The study suggests

that, to have a stable economy and financial system, there needs to be efficient management and effective financial policies.

2.3.2 Inflation and Non- Performing Loans

Laryea, Ntow-Gyamfi and Alu (2016) performed a study in Ghana aimed at investigating determinants of NPLs and how bank profitability is impacted by NPLs; 22 banks formed the study sample covering the period 2005 to 2010. The study found that factors associated with the banks as well as macroeconomic ones cause NPLs; NPLs are positively related to inflation though, inflation is not a significant determinant for occurrence of NPLs.

Skarica (2014) used NPLs data per country and sought to find out factors that determine NPLs in 7 countries within eastern and central Europe. The period was between the third quarters of 2007 and 2012. The findings indicated inflation, unemployment and economic slowdown are significant determinants that lead to NPLs. These three factors represent the economy hence economic slowdown was found as the primary cause of high NPL levels as seen from the significantly large coefficients on inflation rate, unemployment and GDP.

Nkusu (2011) analyzed the link between NPLs and macroeconomic performance in 26 advanced countries. Data was from 1998 to 2009. The study was in two parts: determinants of NPLs; and interactions between NPLs and economic performance. The findings were: NPLs are determined by financial guidelines and control. Differences in these two, affect banks' behavior and procedures for management of risk. This explains differences in NPL across the area under study. The macroeconomic setting impacts debtors' financial performance and their ability to pay amounts advanced. The study found positive correlation between inflation and NPLs and that shock to GDP growth leads to increase in NPLs.

Warue (2013) examined how NPLs and bank-specific and macroeconomic factors are connected and the occurrence level of NPLs in Kenyan banks as a result of these factors. The study period was 1995 to 2009. Data used was primary and secondary. A census of 44 banks in the Kenyan banking industry was done. The research design was causal-comparative. The study revealed that bank specific factors contribute at a higher magnitude to NPLs performance and also found a negative relation between NPLs and inflation.

2.3.3 Exchange Rate and Non-Performing Loans

Kjosevski, Petkovski and Naumovska (2019) studied macroeconomic and bank specific determinants of NPLs in Macedonia. The study covered two sectors of lending- Enterprise and household NPLs. Serbian banks experienced a deterioration of the credit portfolios on credit facilities for both households and enterprises due to dinar currency depreciation leading to increased NPLs. These findings established that there was an increase by 7.43% of NPLs when there is a 1% depreciation of the foreign exchange rate; the premise for this is that when the dinar currency depreciates, negative happenings such as drop in production; rise in unemployment affect loan repayment ability of enterprises.

The findings indicate: For enterprises, there is a positive effect on NPLs by the exchange rate whose impact is statistically significant thus exchange rate positively affected NPLs level and this impact was statistically significant. With respect to households, there is a negative effect on increase of NPLs by inflation and whose impact is statistically significant. Additionally, the findings indicate that the macroeconomic determinants solely affect NPLs whilst bank-specific determinants have statistically insignificant impact.

Beck et al., (2015) in the study Key Determinants of Non-performing Loans: New Evidence from a Global Sample studied the macroeconomic determinants of NPLs across 75 nations.

The study posited that NPLs percentage in banks books is an interpretation of Bank performance. A low percentage means banks' performance is high and vice versa. The findings indicate exchange rate variable affects NPL ratios significantly and the direction of influence is dependent on lending to borrowers who are unhedged; and this was mostly in countries with controlled exchange rates.

Otašević (2015) concentrated studies on the loan book of banks in countries within central, eastern and southeastern Europe. The study period was the third quarter of 2008 to second quarter of 2012. One key feature was that these banks had undergone a transformation in terms of ownership. These were now privately owned where decisions were driven by the market needs as opposed to previous dispensation where these were owned by the state and planning was centralized. New ownership of the banks in these countries was largely by banks in the Eurozone and this exposed them to macroeconomic pressures affecting EU; thus changes in exchange rates exposed these corporations to credit risk, which was reflected in financials. For this review period, exchange rate depreciation and declining business phase contributed towards worsening of loans quality. The study found there is a relation between credit risk and exchange rates.

Nkurunnah (2014) concentrated studies on Commercial Bank of Africa and area of study was factors that affect NPLs. The study focused on macroeconomic factors, Bank specific factors and remedies to NPLs. The study found that the macro-economic factors impact people's loan repayment behaviors and that bank-specific factors influence the NPLs more than macro-economic factors since these point to procedures and guidelines which are in the banks control. NPLs are thus reducible through active management and procedure application. The findings

indicated that exchange rates was among macroeconomic factors that determine NPLs and also had a strong impact.

2.3.4 GDP and Non-Performing Loans

Louzis, Vouldis and Metaxas (2012) used data from 9 banks in Greece categorized as big and studied the impact of macroeconomic and bank-specific determinants on NPLs. The study found that impact of GDP growth on all NPLs growth is negative. More income because of greater growth in real GDP enhances the debtors' capacity to service their debts. On the other side, with economic slowdown, there is likelihood of an increase in NPLs level due to rise in unemployment causing borrowers to face more difficulties in their debt repayment capabilities.

Khemraj, Tarron ,Pasha, Sukrishnalall (2009) studied determinants of NPLs in Guyana from 1994 to 2002. The study found NPLs are explainable by both bank specific factors and macroeconomic factors. The findings indicated growth of GDP is inversely related to NPLs. This suggests that if the real economy grows then there is low NPLs since the borrowers' income improves and they have ability to pay their debts but low GDP results in NPLs will increase as the borrowers income reduces.

Nir Klein (2013), studied NPLs in 10 of the largest banks in each of the 16 countries in the central, eastern and southeastern Europe and focused on NPLs determinants and impact on Macroeconomic Performance. Data used was from 1998-2011. The study used 3 types of variables: Bank level variables, Country specific variables, and Global variables and found NPLs respond to growth of GDP and NPLs level can be ascribed to both macroeconomic conditions and banks' specific factors-though these had a comparatively low explanation authority.

Mwangi and Gitundu (2017) performed a study on macroeconomic determinants of nonperforming loans in Kenya. The period was 1998-2015. The study incorporated linear regression. For the period under review, the significant variables were unemployment rate and remittances. Public debt, rate of inflation, GDP, exchange rate, interest rate, rate of growth were insignificant GDP was not a statistically significant determinant of NPLs.

2.4 Summary of gaps on Research and Literature

Table 2.1: Gaps on Research and Literature

Author (Year)	Title of the Study	Summary of Findings	Research Gap	How the study filled the Research Gap
Khemraj, Tarron and Pasha, Sukrishnalall (2009)	The determinants of NPLs: an econometric case study of Guyana; dataset covering the period 1994–2004	Relationship of exchange rate with NPLs was positive and strong. GDP growth rates and NPLs had a significant inverse relationship. Hence when the real economy performs strongly NPLs are low. In order for businesses to maintain their income the strategy of price transfer to customers was applied; thus inflation is considered unimportant as an NPL determinant. For bank specific variables-More bad loans were incurred in banks that assume greater risks and charge comparatively higher real interest rates.	Studied impact of macroeconomic and firm-level factors on NPLs in Guyana.	This study focused on macro-economic factors and NPLs in Kenya.
Mwanza Nkusu (2011)	Nonperforming loans and macrofinancial vulnerabilities in 26 advanced economies: data was from1998 to 2009.	Results indicated the following: increase in inflation and house price leads to increase in NPLs; shock to GDP growth leads to increase in NPLs.	It was a two part study-Initially used panel regression; Next a panel vector autoregressive model.	This study was in one format and applied different tests including regression.

Louzis, Vouldis and Metaxas (2012)	Macroeconomic and bank-specific determinants of non-performing loans in Greece. Study data spanned 2003-Q1 up to 2009-Q3 and this was from nine banks categorized as biggest.	The presence of NPLs was attributed to the following macroeconomic variables:-(Management quality, public debt, unemployment, GDP and interest rates) NPLs in the mortgages sector responded least to macroeconomic conditions changes. The study also found that NPLs growth is impacted negatively by GDP growth.	The studies were centered on the basis that loan quality is influenced by Bank-specific and macroeconomic variables and that these two have different effects between different loan categories. It put into consideration two distinct types of determinants- Macro-economic and bank-specific.	This study focused on macro-economic variables.
Nir Klein (2013)	Non-Performing Loans in CESEE: Determinants and Impact on Macroeconomic Performance. Data is from 1998-2011; covers 10 of the largest banks in each of the 16 countries in the central, eastern and southeastern Europe.	The study used 3 types of variables: Bank level variables, Country specific variables, and Global variables. The study demonstrated that banks with fewer NPLs make large profits; meaning these banks obtain interest income from most of the loans they book and this improves their total profit. The findings indicated NPLs respond to growth of GDP, inflation, unemployment.	The study did not include Interest rates in the macro economic variables.	This study showed how response of NPLs is to Interest rates. It covered all the 42 banks in Kenyan banking industry.

Vitor Castro (2013)	Macroeconomic Determinants of the Credit Risk in the Banking System: The Case of (Greece, Ireland, Portugal, Spain and Italy) also known as GIPSI; The study was from Q11997 to Q3 2011.	It studied how macroeconomic variables affect the risk associated with credit in this group of countries referred to as (GIPSI) which are considered as vulnerable. The study found there was an increase in credit risk when GDP growth decreases; and credit risk rises when interest rate, rate of unemployment and growth in credit increase. Credit risk is positively affected by an appreciation of real exchange rate long-term lending interest rate and credit risk have a positive association; which is in line with the premise that the debtors' obligation increases with high interest rates and consequently increasing credit risk of the bank.	Study was done in response to the deterioration of the economic environment in these countries which may increase the risk of credit default.	This study was done without a pre-condition in the economic environment; but rather looked at the NPL trend from 2009 to 2019 and macro-economic determinants on NPLs
Ravi Prakash Poudel and Sharma Poudel, (2013)	Titled "Macroeconomic Determinants of Credit Risk in Nepalese Banking Industry". This study was done from 2001 to 2011.	Results were as follows: inflation and foreign exchange fluctuation significantly negatively affected banking credit risk. Growth of GDP, supply of money and market interest rate had no influence in Nepalese banking industry.	Five variables were studied: namely GDP growth; Rate of Inflation; Exchange rate fluctuation; Broad Money supply; market interest rate. Studied 29 of the 31 banks in the country.	This study focused on 4 macro-economic determinants of NPLs namely Exchange rates, inflation, interest rates and GDP. This study was on the Kenyan banking industry that had 42 commercial banks.
Beatrice Njeru Warue(2013)	The Effects of Bank Specific and Macroeconomic	The study revealed that bank specific factors contribute at a higher magnitude to NPLs performance.	Dependent variable was nonperforming loans; independent	Macro economic variables are the

	Factors on Nonperforming Loans in Commercial Banks in Kenya: A Comparative Panel Data Analysis		variables included macroeconomic and bank specific factors Data was primary and secondary. A census of 44 banks in the Kenyan banking industry was done. The research design was causal-comparative.	only independent variables. Used secondary data Applied descriptive research design
Bruna Skarica, (2014)	Determinants of non-performing loans in 7 countries in Central and Eastern European countries. The study focused on the determinants of changes in NPL ratio. Data covered Q3:2007 and Q3:2012	These findings showed economic slowdown as the prime reason for high NPL levels as seen from the coefficients on inflation rate, unemployment and GDP that are statistically significant and economically large.	Data used was for Q3:2007 and Q3:2012; this is for seven European countries. The variables under study were: dependent-NPLs: total GLs ratio; for independent-real GDP growth; exchange rate; unemployment rate; consumer price index; prices of shares index;3 month interest rates on money market.	This study used data from 2009 to 2019 for Kenyan banking industry. It will focus on 4 independent variables namely exchange rates; inflation; GDP and interest rates and one dependent variable-NPL

Nasieku Nkurunnah (2014)	Factors affecting NPLs : A case study of Commercial Bank of Africa-CBA(Kenya)	Results indicated macroeconomic factors that affected NPLs were inflation, exchange rates, GDP, rate of unemployment, real interest rate, loan performance	The study was on one bank in Kenyan banking industry. Used a questionnaire to collect data.	This study was on the Kenyan banking industry that had 42 commercial banks. Used secondary data.
Roland Beck, Peter Jakubik and Anamaria Piloiu (2015)	Key Determinants of Non-performing Loans: New Evidence from a Global Sample. It studied the macroeconomic determinants of NPLs *across 75 nations.	NPLs percentage in banks books was an interpretation of Bank performance. A low percentage means banks' performance is high and vice versa. The findings indicate the lending interest rate, share prices, real GDP growth and the exchange rate variables affect NPL ratios significantly.	This study did not incorporate effect of inflation on NPLs.	This study examined inflation and NPLs
Dragiša Otašević (2015)	The study titled- The Influence of Macroeconomic Risks on Credit Risk in the Serbian Banks, concentrated studies on the loan book of banks in countries within (CESEE)-central, eastern and southeastern Europe.	One key feature was that these banks had undergone a transformation in terms of ownership. These were now privately owned where decisions were driven by the market needs as opposed to previous dispensation where these were owned by the state and planning was centralized. Ownership of the banks in these countries was largely by banks in the Eurozone and this exposed them to macroeconomic pressures affecting EU. The findings showed loans quality worsened due to declining business cycle and depreciation of exchange rate.	Three different panel procedures were performed independently for loans to enterprises and loans to households.	In this study, NPLs were studied as one. Hence one panel method.
Esther Laryea, Matthew Ntow-	NPLs and bank profitability:	The study found that NPLs are positively related to some factors, which include industry concentration	The study was based on firm-specific and	Focused on relationship of

Gyamfi and Angela Azumah Alu Laryea (2016)	evidence from an emerging market in Ghana. 22 banks formed the study sample covering the period 2005 to 2010.	and inflation though these, are insignificant in terms of causes for occurrence of NPLs.	the macroeconomic factors and NPLs effect on profitability of a bank.	macroeconomic variables and NPLs.
Mwangi and Gitundu (2017)	Macroeconomic determinants of Non Performing loans in Kenya: 1998-2015	For the period under review, the significant variables were unemployment rate and remittances. Public debt, rate of inflation, GDP, exchange rate, interest rate, rate of growth were insignificant.	The dependent variable was in form of a ratio- NPLs to total loans. Independent variables were: public debt, inflation rate, GDP, exchange rate, remittances, interest rate, rate of unemployment and rate of growth.	This study focused on NPLs as the dependent variable; for independent variables these were macroeconomic namely, inflation, interest rate, GDP and exchange rates
Laxmi Koju, Ram Koju and Shouyang Wang (2017)	Macroeconomic and Bank-Specific Determinants of Non-Performing Loans: Evidence from Nepalese Banking System	Results of the empirical study indicate low economic growth as the primary cause of high NPLs in Nepal and suggest that efficient management and effective financial policies are required for a stable financial system and economy. Findings indicate that banks with greater spread on interest have a likelihood of presenting high NPLs Percentages. It also states that high interest rates applied to facilities leads to greater spread, thus resulting in greater costs	The study covered 30 banks in Nepal; period of study 2003-2015; used both bank specific and macroeconomic variables.	The study focused on 42 banks in the Kenyan banking industry; period of study 2009 to 2019; The study focused on macroeconomic variables.

		on facilities advanced to customers. Shows a positive relation of NPLs and assets size, inefficiency, export: import ratio. A negative relation of NPL and GDP growth rate, capital adequacy, inflation rate.		
Jordan Kjosevski, Mihail Petkovski & Elena Naumovska (2019)	Bank-specific and macroeconomic determinants of non-performing loans in the Republic of Macedonia: Comparative analysis of enterprise and household NPLs.	For enterprises, there was a positive effect on NPLs by the exchange rate whose impact is statistically significant. With respect to households, there was a negative effect on increase of NPLs by inflation and whose impact is statistically significant. Additionally, the findings indicated that the macroeconomic determinants solely affect NPLs whilst bank-specific determinants have statistically insignificant impact.	Covered two sectors of lending-Enterprise and household NPLs in Macedonia. Used bank specific and macroeconomic variables.	This study focused on Kenyan banking Industry and provides data on NPLs in all the lending sectors. This study focused on macro economic variables.
Peterson Ozili, (2019)	Non-performing loans and Financial Development: New Evidence	From a global sample, it found that NPLs were positively associated with two financial developments- proxies and foreign bank presence. -An inverse relationship of the following variables and NPLs: efficiency of the bank; loan loss coverage ratio, competition and stability of the banking system - NPLs and banking crises & bank concentration was positive. NPLs to bank liquidity and regulatory capital in the regional analysis was negative.	Did not interrogate the specific macro-economic determinants that affect NPLs	This study examined macro-economic variables and effect on NPLs.

Source: Literature Review and Author (2022)

2.5 Conceptual Framework

It depicts the relation between two sides of a study. It is a diagram showing the connection between two or more variables classified as dependent or independent (Naomi & Nagib 2017). For my studies, NPLs represents dependent variable while the independent variable is Interest Rates, Inflation, Exchange Rates, and GDP. This conceptual framework is depicted below.

Independent variables **Dependent variable**

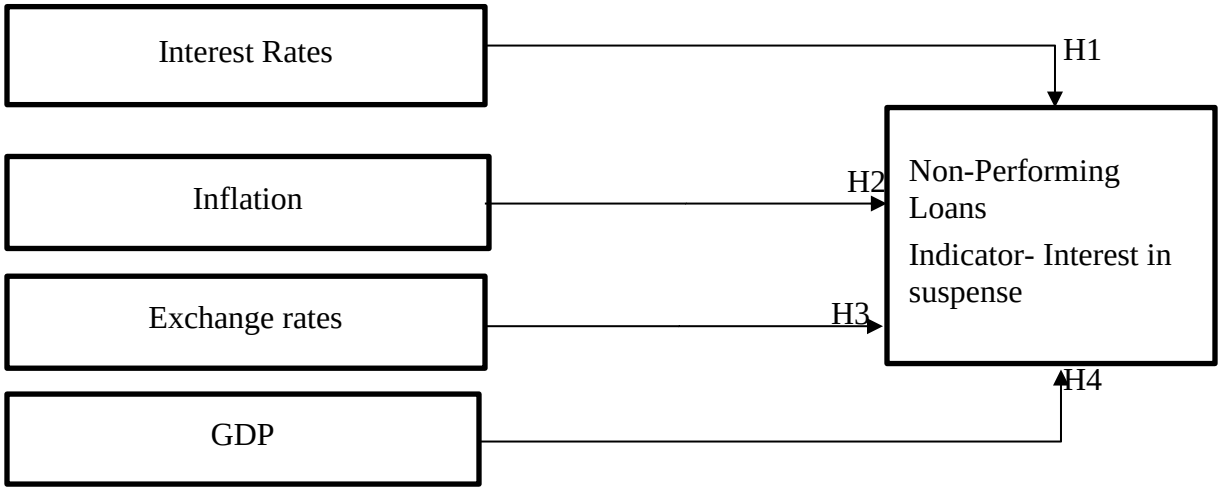

Figure 2.1: Conceptual Framework

Source: Author (2022)

CHAPTER THREE

RESEARCH METHODOLOGY

3.1 Introduction

This chapter covers research methodology used to examine the effect of macro-economic factors on non-performing loans in commercial banks in Kenya. The chapter contains research design, target population, sampling design and sample size; data collection instruments, procedure for data collection, operationalization and measurement of variables and data analysis techniques.

3.2 Research philosophy

The researcher applied the positivist theory. The positivism philosophy is centered on facts obtained through observing. It also incorporates measurements and is reliable (Heidtman, Wysienska & Szmatka, 2000). The researcher's role was restricted to data collection and objective interpretation; hypotheses and deductions were key in the studies (Park, Y., Konge, L., & Artino, A. R., 2020).

3.3 Research Design

Research design is defined as the overall plan, procedures and methods that one chooses for data collection and analysis so as to answer the research problem (Leedy, 1997). It involves collecting, analyzing and interpreting the data then reporting. The design applied was descriptive research. It was suitable for this study as it is cost effective since it is compatible with secondary data. In addition, this design can use more than one research method to

investigate the variables under study, identify relationships between variables and to point out areas in need of future research.

3.4 Target population

Researchers posit that individuals with same characteristics that are observable is a population (Mugenda & Mugenda, 2003). This study targeted 42 commercial banks in Kenya. According to CBK (2019) financial industry report, there were 42 operational entities (appendix V).

3.5 Sampling Design

Sampling is choosing representative elements from a research population to form the sample frame (Kothari & Garg, 2014). In this study, due to the large population, sampling of the data selected was through random selection. The five variables from the year 2009 to June 2019 resulted in a total of 630 objects obtained by calculating as follows (10 years*12 months *5 variables) + (6 months *5 variables) that were collated and constituted the samples. To obtain the sample frame, this was done quarterly and the number of subjects (elements) in the frame resulted in 210 objects obtained by calculating as follows (4 quarters per year *10 years *5 variables)+(2 quarters up to June 2019 *5 variables). The sample frame is depicted in appendix IV. Control of the two types of errors (I and II) was by using a sample frame that covers a longer period.

3.6 Data collection instrument

The researcher used secondary data from various sources namely; CBK annual bank supervision reports and CBK website; banking surveys by KBA and KNBS. Data pertaining to the five variables were collated using data collection schedule designed in MS-excel;

(Appendix III). The MS-excel schedule was most appropriate for data collection due its compatibility with SPSS in terms of transferability of data for analysis.

3.7 Procedure for Collection of Data

The researcher received an authorization letter from Kenyatta University Graduate School and used this to obtain a research permit from the National Commission for Science, Technology, and Innovation (NACOSTI). Secondary data for the 5 variables was obtained from the CBK's website. Collection of this data took 1 month.

3.8 Operationalization and measurement of variables

Table 3.1 : Operationalization and measurement of variables

Variable	Calculation of the value	Variable type	Measurement scale
NPL Rate	NPL/Total Loans	Dependent	Ratio
REAL INTEREST RATE	Commercial banks average lending rate - Inflation	Independent	Ratio
INFLATION	Value as per CBK annual reports	Independent	Ratio
REAL GDP	[{GDP(QnYi)-GDP(QpYi)}/ GDP(QpYi)] Where Qn is next quarter of the year(Yi) and Qp is the previous quarter of the year(Yi)	Independent	Ratio
EXCHANGE RATES	Value as per CBK annual reports	Independent	Ratio

Source: Study data 2022

Table 3.1 shows how the variables were measured.

3.9 Normality and Stationarity tests

Normality and stationarity tests help to determine the applicable research model in terms of statistical tests to be applied for analysis. The researcher conducted a normality test to determine if the sample is from a normally distributed population and stationarity test to

determine if a variable's value remaining unchanged with variations in time. A non stationary series leads to a regression that is not credible and one that cannot be used in inferences or for forecasts.

3.9.1 Normality test

The normality test applied by the researcher was Shapiro Wilk test as per Field (2009). In this test, the null hypothesis (Ho) assumes the sample is from a normally distributed population; whilst the alternative hypothesis (Ha) premises that the sample is drawn from a population that is not normally distributed. The values obtained were interpreted as follows: data is normal if sig. value is greater than 0.05; the sample deviates from a normal distribution significantly if the sig value is below 0.05 (Gujarati & Porter, 2009).

3.9.2 Stationarity test

Augmented Dicker Fuller test was used. According to Gujarati and Porter (2009), stationarity refers to a variable's value remaining unchanged with variations in time. A non stationary series leads to a regression that is not credible and one that cannot be used in inferences or for forecasts. Presence of a unit root was the null hypothesis whilst stationarity was the alternative hypothesis. Presence of unit root at some level in the time series is depicted confidently by the more negative magnitude of the number. Rejection of the hypothesis depended on a negative statistic number that results after the test was performed.

3.10 Diagnostic tests

The researcher performed these tests to confirm data suitability as recommended by Mutandwa, Grala and Grebner (2016). A correlation test and multicollinearity test was done

using Karl Pearson coefficient of correlation. A test for autocorrelation was done using Durbin Watson test.

3.10.1 Correlation test and Multicollinearity test

Correlation depicts the strength and or direction of association between two variables. Cresswell (2002) defined correlation as a statistical test that checks variables' patterns. In order to determine correlation, the researcher performed the Karl Pearson's correlation coefficient test. The co-efficient values obtained (Cooper and Schindler, 2001) were interpreted as follows: a coefficient value of ± 1, indicates a perfect correlation: as one variable increases, the other variable tends to also increase (if positive) or decrease (if negative); a coefficient value between ± 0.50 and ± 1, indicates a strong correlation; a value between ± 0.30 and ± 0.49, indicates a medium correlation. When the value lies below + 0.29, indicates a small correlation. A value of 0 indicates no correlation.

Multicollinearity refers to a correlation between two or more independent variables and it is due to the variables sharing information that is similar; thus these variables forecast one another Laerd Statistics (2018). As per Theodros (2011), multicollinearity shows a linear association. In order to determine if multicollinearity exists, the Karl Pearson's correlation coefficient test was performed. The values obtained were interpreted as follows: +1 or -1 indicates perfect relationships; value 0 indicates no correlation; 0.5 indicates no multicollinearity; > 0.5 indicates some point of collinearity; >0.7 indicates multicollinearity; >0.8 indicates great multicollinearity (Bedru & Seid, 2005).

3.10.2 Autocorrelation test

Data collected on the same observational unit at multiple times is known as time series data; and for these type of data, autocorrelation is common. Autocorrelation refers to a correlation

between the values of an independent variable. The correlation concerns two values pertaining to the same variable at times Xi and Xi+k, Box & Jenkins (1976). The researcher performed the Durbin-Watson statistical test to check for autocorrelation. The results were interpreted as follows: values between 1 and 3 were considered to have relative normality. According to Field (2009) values <1 or >3 need further investigations.

3.11 Analysis and Presentation of Data

Analysis of data results in reduced organized data that produces a finding, which requires researcher interpretation. Descriptive statistics and inferential statistics make up data analysis. Descriptive statistics comprises of the mean which is a measure of central tendencies and standard deviation and variance which are measures of dispersion (Saunders, Thornhill & Lewis, 2011). Regression and analysis of variance fall under inferential statistics that measure dissimilarities and relationships among or between variables.

The researcher applied descriptive analysis, regression analysis and ANOVA. The data analysis was carried out using SPSS as guided by Laerd Statistics (2018); the sample data was collated in an excel template and imported to the statistical software. In order to answer the research objective, multiple linear regression analysis was applied. Regression analysis involved testing statistical significance of the independent variables. The test resulted in coefficients, which provided estimates of independent variables, their standard error and the t-ratios. The regression also resulted in a correlation coefficient and a coefficient of determination value. ANOVA test was done so as to ascertain how independent variables in combination affect the independent variable. This test incorporated two factors, independent variables and one dependent variable. According to Tiemann (2010) the ANOVA test from regression analysis,

tests overall significance of the models in forecasting connections at 95% confidence level among the two variables.

3.11.1 Descriptive statistics

Descriptive statistics comprises of the mean which is a measure of central tendencies and standard deviation and variance which are measures of dispersion. The descriptive analysis revealed the minimum and maximum value of the data collected; the mean which represents average value and standard deviation that demonstrated how widely some measurements were scattered.

3.11.2 Regression Analysis

The researcher applied panel data regression. The data for the variables under study was cross section since it was collected at the same point in time; the data was long panel due to time represented being greater than the number of variables. The coefficients and standard error were substituted to the regression equation to provide the NPL rate.

The Correlation co-efficient for multiple regression measures both the strength and direction of the linear relationship between the variables (Laerd statistics, 2018). The Coefficient of determination also known as “goodness of fit” or R-squared is the square of the correlation coefficient. This coefficient measures the proportion of variation in the dependent variable, predictable from the set of independent variables in the regression equation (Laerd statistics, 2018). The researcher chose values of the adjusted R square since the regression model had several variables thus making it a multiple regression model. The results were interpreted as follows: a value of 1.0 indicates a perfect fit since the model explains all of the variations observed hence a very reliable model for future forecasts. A value of 0, on the other hand, would indicate that the chosen model fails to accurately model the data at all.

3.11.2.1 Regression model

The researcher applied multiple regression (Laerd Statistics, 2018) to analyze the data. The regression equation below was used.

$Y = \alpha + \beta 1X1 + \beta 2X2 + \beta 3X3 + \beta 4X4 + e;$

Where α=Constant, e=Residual or deviation or error, β1=Inflation coefficient; β2=Real Interest Rate coefficient; β3=Real GDP coefficient; β4=Exchange Rate (USD, GBP, EURO and JPY) total coefficient; X1= Inflation; X2=Real Interest Rate; X3=Real GDP; X4=Exchange Rate

3.11.2.2 Analysis of Variances (ANOVA)

ANOVA test can be applied to data that is considered not completely normally distributed and the end results will be valid (Gujarati & Porter, 2009). The researcher applied this to test whether the independent variables had an effect on the dependent variable. The hypothesis used was Ho: There is no interaction between variables; Ha: There is a significant interaction between variables. The results were interpreted as follows: if the significance F value was smaller than α (level of significance), there was a significant interaction; thus reject the null hypothesis and accept the alternative hypothesis.

Interpretation for the p value was as follows: The p value for each term tests the null hypothesis that the coefficient is equal to zero hence has no effect. The p values indicate significance level of each independent variable and if <0.05 reject the null hypothesis. A low p value in a predictor variable means changes in this variable are related to changes in the response variable (NPLs). A large p value suggests changes in the predictor variable are not associated with changes in the response variable (NPLs).

3.11.3 Ethical consideration

Information and data used in the research is relevant and objective. The study used APA system of referencing as per the handbook of dissertation. The researcher also cited all authors from whose studies, information was obtained. The researcher received an authorization letter from Kenyatta University Graduate School and used this to obtain a research permit from the National Commission for Science, Technology, and Innovation (NACOSTI).

CHAPTER FOUR

DATA ANALYSIS, RESULTS AND DISCUSSIONS

4.1 Introduction

This chapter contains presentation of data analysis, results and discussion based on the research objectives and hypotheses.

4.2 Diagnostic Tests

4.2.1 Normality test

4.2.1.1 Shapiro Wilk test

The study applied Shapiro Wilk test to check for normality.

Table 4.1: Shapiro-Wilk test for normality results

Tests of Normality						
	Kolmogorov-Smirnov[a]			Shapiro-Wilk		
	Statistic	df	Sig.	Statistic	df	Sig.
NPLRATE	0.185	42	0.001	0.881	42	0.000
INFL	0.229	42	0.000	0.809	42	0.000
REALINTR	0.120	42	0.134	0.925	42	0.009
REALGDP	0.202	42	0.000	0.685	42	0.000
RATEUSD	0.219	42	0.000	0.888	42	0.001
RATEGBP	0.085	42	.200*	0.990	42	0.966
RATEEURO	0.100	42	.200*	0.981	42	0.692
RATEJPY	0.177	42	0.002	0.912	42	0.003

Source: Study data 2022

Table 4.1 portrays results of the Shapiro Wilk test. The results obtained indicated data normality only for GBP and EURO. This was contrary for NPLs, Inflation, Real Interest Rate, Real GDP, USD and JPY data. To support this finding, central limit theory dictates that when

sample size has 100 or more observations as is the case for this research, violation of normality is not a major issue Altman & Bland (1995); Ghasemi & Zahediasl (2012).

4.2.2 Autocorrelation

The researcher performed the Durbin-Watson test to determine presence of autocorrelation.

Table 4.2: Durbin Watson test for autocorrelation results

Model Summary[b]

Model	R	R Square	Adjusted R Square	Std. Error of the Estimate	Durbin-Watson
1	.744[a]	0.554	0.488	10.289	1.095
a. Predictors: (Constant), RATEJPY, REALGDP, RATEGBP, RATEUSD, REALINTR, RATEEURO, INFL					
b. Dependent Variable: NPLRATE					

Source: Study data 2022

Table 4.2 portrays results of the Durbin Watson test. The test statistic obtained was 1.095 and this is within acceptable limits for autocorrelation.

4.2.3 Correlation analysis

In order to determine the relationship strength and or direction of association between the variables, the researcher performed Karl Pearson's correlation coefficient test.

Table 4.3: Degree of correlation results

CORRELATIONS	NPL RATE		MONTHLY INFLATION RATE		EXCHANGE RATE		REAL INTEREST RATE	GDP
NPL RATE	1							
MONTHLY INFLATION RATE	-0.45		1					
EXCHANGE RATE	USD	0.83	USD	-0.45	1			
	GBP	0.04	GBP	-0.26				
	EURO	0.30	EURO	-0.28				
	JPY	-0.08	JPY	0.10				
REAL INTEREST RATE	0.1093		-0.8		USD	0.24	1	
					GBP	0.45		
					EURO	0.11		
					JPY	-0.14		
REAL GDP (ECONOMIC GROWTH)	0.16		0.32		USD	0.92	0.32	1
					GBP	0.35		
					EURO	0.40		
					JPY	-0.04		

Source: Study data (2022)

Table 4.3 depicts the degree of correlation results. The correlation value of NPL and Inflation was -0.446; this indicates a negative correlation; the relationship is linear; thus when inflation rate increases, NPLs level decreases and vice versa. During periods of inflation a borrower's value of payment obligations to credit institutions falls (Mazreku, Morina, Misiri, Spiteri and Grima, 2018).

NPL and exchange rate correlation value was as follows; 0.8355 for USD; 0.04307 for GBP; 0.3063 for EURO; -0.08135 for JPY. The correlation for USD, GBP, and EURO was positive and this shows that when these currencies strengthen, the NPLs increase due to weakening of the Kenya shillings. The correlation value was highest for USD indicating a high number of

loans denominated in USD. The correlation value for JPY was negative and insignificant indicating there could have been minimal loans denominated in JPY. These findings are in line with studies done by Beck et al.,(2015).

NPL and Real GDP correlation value was 0.16; this indicates a positive correlation; ideally this should be an inverse relationship as seen in prior studies done by Khemraj et al.,(2009). The research results were consistent with Murumba (2013). It might be that GDP growth was insufficient to have an effect on the NPLs.

NPL and Real Interest Rate correlation value was 0.1093; this indicates a positive correlation. As the real interest rate rises so does the NPL, Castro (2013). The rising cost of borrowing makes the payments difficult resulting in NPLs.

Multicollinearity was detected between independent variables as follows: Real GDP and USD rate had a co-efficient of >0.92 with a positive direction; thus both variables move in the same direction and any changes in USD rate will affect Real GDP (Mwangi & Gitundu 2017). A study by Pramanik, Subhajit (2021) on exchange rate and economic growth showed exchange rate influences GDP. Real interest rate and Inflation had a co-efficient of -0.8. This confirms fisher effect as per Mishkin (2010). The negative value depicts an inverse correlation and direction of movement is opposite (Theodros, 2011). The researcher was unable to drop these these four variables which represented the independent variables as the study was focused on their effects or prediction on NPLs.

4.2.4 Stationarity test

The study checked for stationarity using Augmented Dicker Fuller test.

Table 4.4: Augmented Dicker Fuller Test Results

Time Series Tests for Variable: NPLRATE		Time Series Tests for Variable: RATEUSD	
	Values		Values
Test(3)	Augmented Dickey-Fuller	Test(3)	Augmented Dickey-Fuller
Alternative Hypothesis(3)	Stationary	Alternative Hypothesis(3)	Stationary
P-Value(3)	0.25109	P-Value(3)	0.56678
Note(3)	None	Note(3)	None
Truncation Lag(3)	4	Truncation Lag(3)	4
Computations done by R package tseries		Computations done by R package tseries	
Time Series Tests for Variable: INFL		Time Series Tests for Variable: RATEGBP	
	Values		Values
Test(3)	Augmented Dickey-Fuller	Test(3)	Augmented Dickey-Fuller
Alternative Hypothesis(3)	Stationary	Alternative Hypothesis(3)	Stationary
P-Value(3)	0.05212	P-Value(3)	0.53763
Note(3)	None	Note(3)	None
Truncation Lag(3)	4	Truncation Lag(3)	4
Computations done by R package tseries		Computations done by R package tseries	
Time Series Tests for Variable: REALINTR		Time Series Tests for Variable: RATEEURO	
	Values		Values
Test(3)	Augmented Dickey-Fuller	Test(3)	Augmented Dickey-Fuller
Alternative Hypothesis(3)	Stationary	Alternative Hypothesis(3)	Stationary
P-Value(3)	0.57985	P-Value(3)	0.11576
Note(3)	None	Note(3)	None
Truncation Lag(3)	4	Truncation Lag(3)	4
Computations done by R package tseries		Computations done by R package tseries	

Time Series Tests for Variable: REALGDP		Time Series Tests for Variable: RATEJPY	
	Values		Values
Test(3)	Augmented Dickey-Fuller	Test(3)	Augmented Dickey-Fuller
Alternative Hypothesis(3)	Stationary	Alternative Hypothesis(3)	Stationary
P-Value(3)	0.16039	P-Value(3)	0.03689
Note(3)	None	Note(3)	None
Truncation Lag(3)	4	Truncation Lag(3)	4
Computations done by R package tseries		Computations done by R package tseries	

Source: Study data 2022

Table 4.4 portrays results of the Augmented Dicker Fuller test. The results obtained shown above, indicated the data as stationary.

4.3 Data Analysis

4.3.1 Descriptive statistics analysis

Table 4.5: Descriptive statistics

	N	MIN	MAX	MEAN	STD DEV
NPL RATE=NPL/TOTAL OUTSTANDING LOANS OR DISBURSED LOANS	42	0.04	0.1278	0.074	0.027
MONTHLY INFLATION	42	4.03	16.83	7.92	3.59
EXCHANGE RATE					
USD	42	75.14	103.52	91.32	9.53
GBP	42	114.26	159.61	135.33	9.98
EURO	42	100.50	131.4	113.44	6.7
JPY	42	76.86	121.38	92.11	10.09
REAL INT RATE	42	-2.06	12.39	7.64	3.2
REAL GDP	42	-48483	30310	13199.55	11793.95

Source: Study data 2022

Table 4.5 portrays results of the descriptive analysis for 2009 to June 2019. It shows 42 occurrences of the 5 variables. The average NPLs was 0.074 which is 7.4% of loans drawn that become NPLs. The maximum NPL was 0.1278 =12.78% and Minimum is 0.04=4.0%. The Standard Deviation was 0.027=2.7% meaning the variable can increase or decrease by this;

The average monthly inflation rate was 7.92. The maximum is 16.83 and Minimum is 4.03. The Standard Deviation was 3.59 meaning the variable can increase or decrease by this.

The average exchange rate of USD to Kes. was 91.32. The maximum was 103.52 and Minimum 75.14. The Standard deviation was 9.53 meaning the variable can increase or decrease by this;

The average exchange rate of GBP to Kes.was 135.33. The maximum was 159.61 and Minimum 114.26. The Standard deviation was 9.98 meaning the variable can increase or decrease by this.

The average exchange rate of EURO to Kes.was 113.44. The maximum was 131.4 and Minimum 100.50. The Standard deviation was 6.7 meaning the variable can increase or decrease by this. The average exchange rate of JPY to Kes.was 92.11. The maximum was 121.38 and Minimum 76.86. The Standard deviation was 10.09 meaning the variable can increase or decrease by this;

The average Real Interest Rate was 7.64. The maximum was 12.39 and Minimum -2.06. The

Standard deviation was 3.2 meaning the variable can increase or decrease by this;

The average Real GDP (Economic growth) was 13199.55. The maximum was 30310 and Minimum -48483. The standard deviation was 11793.95 meaning the variable can increase or decrease by this.

The descriptive analysis drawn from the sample data depicted the following trends: NPL was lowest in 2009 Q1 at 4%, Inflation was highest in 2009 Q1 at 16.8%, Real Interest Rate was lowest in Q1 2009 at -2%, Kenya Shillings was strongest in 2009 Q4 at 75.14. In the year 2019, NPL was highest at 13% in Q1 and Q2; Inflation at 4.67% which was almost at its lowest mark of 4% in 2010; Kenya Shillings was at 100.73 almost at its weakest mark of 103.52 in 2017 Q3. In the year 2013 Q2/Q3, Real Interest Rate was highest at 12.39%, NPL was at 5% which was almost at its lowest mark of 4%. In the year 2011 Q1, Real GDP was highest at 30B, NPL was at 5% which was almost at its lowest mark of 4%. Real GDP was lowest in Q1 2012 at -48B, NPL was at 4% which was its lowest.

From these comparative results of descriptive analysis and sample data the researcher made the following interpretations: There was a positive relationship of NPLs with Real interest Rate (Castro, 2013). High interest rates cause the debt burden to increase. There was a negative relation of NPLs with inflation (Koju et al.,(2017). Inflation is an indicator of price stability; during periods of inflation, the real value of payments that the borrower should pay falls. There was a positive relationship of NPLs and exchange rates (Khemraj et al.,(2009); when FCY rate to Kes is low, NPLs decrease; when FCY rate to Kes is high, NPLs rate increases. The relationship of Real GDP and NPL was insignificant. It may be argued that Growth in GDP was not sufficient to impact the NPLs (Murumba, 2013).

4.4 Regression Analysis

Table 4.6: Regression Analysis Results

SUMMARY OUTPUT

Regression Statistics	
Multiple R	0.887016391
R Square	0.786798078
Adjusted R Square	0.742903565
Standard Error	0.014245874
Observations	42

ANOVA

	df	*SS*	*MS*	*F*	*Significance F*
Regression	7	0.025464158	0.003637737	17.92474777	0.00000000101
Residual	34	0.006900128	0.000202945		
Total	41	0.032364286			

		Coefficients	*Std Error*	*t Stat*	*P-value*
	Intercept	0.081180097	0.047498940	1.709092814	0.096548149
Inflation	X Variable 1	-0.00230105	0.001816441	-1.26678836	0.213840420
Real interest rate	X Variable 2	-0.00246086	0.001853720	-1.32752545	0.193180009
GDP	X Variable 3	0.000000187	0.000000233	0.801350153	0.428493984
USD	X Variable 4	0.002156497	0.000317266	6.797125356	0.000000081
GBP	X Variable 5	-0.00174425	0.000427028	-4.08463681	0.000253895
EURO	X Variable 6	0.001104828	0.000566794	1.949257163	0.059553046
JPY	X Variable 7	-0.00064317	0.000297899	-2.15903364	0.037993611

Source: Study data 2022

Table 4.6 portrays regression results. The results in the table were substituted to the regression equation : $Y = \alpha + \beta 1X1 + \beta 2X2 + \beta 3X3 + \beta 4X4 + e$; where e=Residual or deviation or error, β1=Inflation coefficient; β2=Real Interest rate coefficient; β3=Real GDP coefficient; β4=Exchange rates (USD, GBP, EURO, and JPY) total coefficient.

Substitution:Y=0.0811+-0.00230X1+-0.00246X2+0.000000187X3+(0.002156497+-0.00174425 +0.001104828+-0.00064317)X4+0.014245874. Holding all factors at zero,

Y=0.0811+-0+-0+0+0+0.014245874=0.09535, this translated to 9.535% NPL rate; thus for every 100 loans advanced, 9.5 turn out as NPL. On the other hand, if all factors are held constant, the value of NPLs would be 0.0811 or 8.11%.

The p results obtained for exchange rates were as follows: 0.00 for USD, 0.00 for GBP and 0.04 for JPY; these were less than 0.05; and 0.05 for EURO. P results for inflation was 0.09; Real Interest was 0.190 and GDP was 0.43. This model shows changes in exchange rates are a major contributor to the response variable (NPLs) followed by Inflation, then Real Interest rate and lastly GDP.

4.4.1 Analysis of the Regression Results

4.4.1.1 Correlation Co-efficient

As depicted in table 4.6, the correlation co-efficient was a value of 0.887 and this shows the relationship is linear. The coefficient sign is a plus indicating the direction of the relationship between the variables. The positive value represents direct correlation.

4.4.1.2 Coefficient of Determination

Co-efficient of determination is also known as “goodness of fit” or "R-squared. Since the study had more than one independent variable, the researcher used the adjusted R square value of 0.7429 which translates to 74.29%. This indicates that Inflation, Real Interest Rate, Real GDP and Exchange Rates predicted 74.29% of NPLs. These results also suggest that 25.71% of NPLs were due to other factors. Thus the model is a good fit.

4.5 Analysis of Variances (ANOVA)

Table 4.7: Analysis of Variances

ANOVA

	df	*SS*	*MS*	*F*	*Significance F*
Regression	7	0.025464158	0.003637737	17.92474777	0.00000000101
Residual	34	0.006900128	0.000202945		
Total	41	0.032364286			

Source: Study data 2022

Table 4.7 portrays results of the ANOVA which reveals that at 5% significance level, there was a statistically significant interaction between the effects of independent variables on the dependent variable. The value of F critical translated to 2.29(7, 34); F was 17.92, which is greater than F critical and this confirms significance of the model. The significance F value obtained was 0.00000000101 and this is less than 5% significance level. This shows there is a significant interaction hence reject the null hypothesis; accept the alternative hypothesis.

CHAPTER FIVE

SUMMARY, CONCLUSION AND RECOMMENDATIONS

5.1 Introduction

The chapter sums up significant findings of the research and deductions which are anchored on the test results. It also provides suggestions for future research and goes on to provide recommendations for CBK and the government on policy enforcement in order to control three macroeconomic independent variables and to the commercial banks and KBA approaches to cut growth in NPLs.

5.2 Summary

This study aimed at finding how interest rates, inflation, exchange rates and GDP affect NPLs in Kenyan banking industry. It revealed how these add to the increasing NPLs. It targeted all the 42 operational Kenyan commercial banks as reported in CBK (2019) industry report. The research questions were four: Does interest rate offered on loans have a positive relation with NPLs? Does inflation rate have a positive relation with NPLs? Does exchange rate have both negative and positive relation with NPLs? Does GDP have a negative relation with NPLs? The research design was descriptive. The researcher used secondary data for the period 2009 to June 2019.

Preceding the data analysis, diagnostic tests for correlation and autocorrelation were done. Karl Pearson test resulted in a collinearity relationship of real GDP to USD rate and this indicates any changes in USD rate will affect Real GDP. Real Interest rate and Inflation have a collinearity relationship and this indicates any changes in inflation will affect real interest rate. The test also resulted in the following results with reference to correlation: Inflation to NPLs

is negative; Exchange rate to NPLs rate is both positive and negative; Real interest rate to NPLs rate is positive; Real GDP to NPLs is positive but almost at zero. Durbin Watson Test for autocorrelation resulted in a test statistic that indicates positive autocorrelation. This is common in time series data.

The Shapiro Wilk test was applied to check if data is from a normal distribution. The results were a mixed outcome. The Augmented Dicker Fuller stationarity test was applied to check if a variable's value remains unchanged with variations in time and this resulted in the data being stationary.

In order to answer the research objectives, data analysis was performed using descriptive analysis, regression analysis and analysis of variances (ANOVA). Descriptive analysis resulted in the following trend: when NPL was lowest; Inflation was highest, Real Interest Rate was lowest and Kenya shillings was strongest. When NPL was highest; Inflation was almost at its lowest; Kenya Shillings was almost at its weakest mark and Real Interest Rate was at its highest. This indicates a positive relationship of NPLs with Real interest Rate; a negative relation of NPLs with inflation; a positive relationship of NPLs and exchange rates. The relationship of Real GDP and NPL cannot be clearly ascertained from the observed trend since when real GDP is highest, NPL is almost at its lowest mark and when Real GDP is lowest, NPL is also at lowest.

The Regression analysis resulted in a value that indicates a tenth of loans advanced turnout as NPLs. The p values obtained showed the order in which the independent variables contribute to NPLs as follows: Exchange rates, followed by inflation, then Real interest rate and lastly GDP. The Correlation Co-efficient for multiple regression indicates a strong relationship between the variables. The direction is positive, representing a direct correlation. Coefficient

of determination indicates the model is a good fit meaning the dependent variable is predictable by the independent variables and that the NPLs are directly related to the 4 independent variables.

ANOVA test was done to examine the effect of real interest rate, real GDP, inflation, exchange rates on NPLs. It revealed there was a statistically significant interaction between the effects of independent variables on the dependent variable.

5.3 Conclusion

The relationship between real interest rate and NPLs was found to be positive; as real interest rate rises, the level of NPLs rises and vice versa. High interest rates cause the debt burden to increase. Results from the analysis led the researcher to accept the hypothesis: Lending Interest rate is positively related with NPLs.

The relationship between inflation and NPLs was found to be negative; as it rises, NPLs drop. Inflation is an indicator of price stability; during periods of inflation, the real value of payments that the borrower should pay falls. Results from the analysis led the researcher to accept the hypothesis: high inflation rate is positively related with NPLs.

The relationship between exchange rate and NPLs was found to be both a positive and negative relationship; for the following three currencies USD, GBP, and EURO this is positive; for JPY this is negative. A notable trend was seen: when FCY rate to Kes is low, NPLs decrease; when FCY rate to Kes is high, NPLs rate increases. Results from the analysis led the researcher to accept the hypothesis: Exchange Rate can be both negatively and positively related with NPLs.

The effect of real GDP cannot significantly affect NPLs. It may be argued that the growth in GDP was not sufficient to impact the NPLs. Results from the analysis led the researcher to reject the hypothesis: Gross Domestic Product Growth is negatively related with NPLs.

5.4 Recommendations

In order to reduce and stop the rise of NPLs, the study proposes measures in twofold; measures to CBK and the Government of Kenya and measures to commercial banks and KBA. The combined effect of these two will result in fewer NPLs. Measures recommended to CBK and Government of Kenya are policy based and these are as follows:

The study recommends CBK to stabilize exchange market through striving to maintain desirable and stable exchange rates by intervening in instances of high volatility i.e. taking part in foreign exchange transactions through adding or reducing liquidity from the banking system. Secondly, CBK and the government to control inflation since levels that are high, hinders economic growth and this results in loss of value of the Kenya shilling in comparison to foreign currencies. Here they should employ fiscal policy by using both contractionary model and expansionary model at appropriate intervals.

Thirdly, CBK to manage interest rates and money in circulation by application of monetary policy appropriately. Through this when money supply goes down, demand for goods reduces hence prices fall and interest rate falls.

Measures recommended for commercial banks and KBA are as follows: Banks and KBA to form a centrally managed platform for banks to exchange information on borrowers' creditworthiness. This management model would guarantee data integrity and information provided by banks could be updated monthly. The platform will be different from the current Credit Reference Bureau in that it will have additional customer details such as how long they have banked, how many bounced cheques per month and reasons for the non-payment. This information will provide a brief of the customers' behavior in terms of payment discipline or indiscipline.

Banks need to shift their focus from concentrating on how to increase assets (loans) to early detection of NPLs. They could have a specific department with staff that are trained on how to monitor transactions in customers' accounts to identify problematic loans early enough. This can be achieved by checking on leading indicators such growing need for cash and bounced cheques. Once this is identified, the staff can engage the concerned customers or work on ways to assist the customers such as refinancing companies that are struggling so that they stay afloat and continue servicing the loans.

Banks and KBA to change consumer behavior by introducing risk-based pricing rule that will be dependent on a customer's borrowing, loan repayment discipline and credit worthiness supported by internal data held by the bank. This will reduce lending to high-risk entities.

Offer struggling customers a loan restructure option as guided by CBK during Covid 19 period. Here the loan term is increased to lower loan payment instalments. However, this requires written consent from the customer.

Banks to increase lending in secure loans so as to reduce losses due to NPLs. The CBK (2018) annual report shows the personal/household sector that qualifies for unsecured loans as contributors to NPLs.

Lastly, KBA to arrange quarterly meetings between banks with high NPLs and banks that have low NPLs to allow for the banks holding high NPLs to learn measures that these banks have implemented in order to achieve a low NPL.

5.4.1 Suggestion for Further Research

This study focused on four macro-economic factors namely exchange rates, inflation, real GDP real Interest rates and NPLs. The researcher suggests further studies to determine which of

these independent macroeconomic factors contributes in a major way to loans becoming NPLs and then develop a control mechanism to reduce their impact. In addition, the researcher recommends studies to determine how new developments such as introduction in 2018 of IFRS 9 loss impairment model in reporting standards has affected NPLs numbers reported by commercial banks.

5.4.2 Contribution to Knowledge

The study established that macroeconomic factors namely, real interest rate and GDP have a positive relationship with non-performing loans while inflation has a negative relationship with non-performing loans. Finally, the study showed that exchange rate has both positive and negative relationship with non-performing loans.

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APPENDICES

Appendix I: Lending and deposit rates, Rates spread and Interest income reported by the Banking Sector

YEAR	LENDING RATES %	RATE ON DEPOSITS %	THE SPREAD= DIFFERENCE IN LENDING & DEPOSIT RATES IN %	INTEREST INCOME
2006	13.7	4.1	9.6	46.7 B
2007	13.3	4.3	9.0	55.1B
2008	14.4	4.84	9.96	73.148B
2009	14.67 -15.09	3.6	11.28	88.007 B
2010	13.87	3.59	10.28	101.874B
2011	20.04	6.99	13.05	139.125B
2012	18.1	6.8	11.3	212.518B
2013	16.99	6.65	10.34	206.503B
2014	15.99	6.81	9.18	241.356B
2015	17.45	7.92	9.53	272.106B
2016	16.59	7.1	9.49	290.301B
2017	13.67	7.52	6.15	257.980B
2018	13.06	7.91	5.15	260.707B

Appendix II: Illustration of GLs, GNPLs, Interest Income and Interest held in Suspense from 2009 to 2018 for the Kenyan Banking Sector

YEAR	2018	2017	2016	2015	2014	2013	2012	2011	2010	2009
AMOUNT IN KSHS(B)										
GLs	10034.85	9583.10	9100.00	8690.00	7350.00	5950.00	5210.00	4470.00	3421.70	2627.30
GNPLs	264.00	256.00	208.00	147.00	108.00	82.00	62.00	53.00	58.00	61.00
INTEREST INCOME	46.70	55.10	73.14	88.00	101.87	139.12	212.52	206.50	241.36	272.11
INTEREST HELD IN SUSPENSE	43.00	42.00	34.00	23.00	18.00	14.00	12.00	10.00	10.00	10.00

Appendix III: Data collection sheet

PER QUARTER	GROSS LOANS AND ADVANCES (GLA)	NPL BALANCE	NPL RATE= NPL/GLA	INFLATION	12 MONTH INFLATION	EXCHANGE RATE (USD)	EXCHANGE RATE (GBP)	EXCHANGE RATE (EURO)	EXCHANGE RATE (JPY)	ECONOMIC GROWTH (GDP)	CENTRAL BANK RATE	COMMERCIAL BANKS AVERAGE LENDING INTEREST RATE	DEPOSIT RATE	REAL INT RATE= COMMERCIAL BANKS AVERAGE LENDING INTEREST RATE MINUS INFLATION	REAL GDP
Q1	549,500,000,000	22,700,000,000	0.04	16.83	14.17	79.58	114.26	103.85	85.28	702,855	8.42	14.77	5.17	-2.06	0
Q2	600,000,000,000	46,800,000,000	0.08	15.92	10.21	78.45	121.41	106.78	80.67	711,723	8.08	14.88	5.12	-1.04	8,868
Q3	720,000,000,000	57,600,000,000	0.08	13.4	7.5	76.24	125.16	108.96	81.5	722,388	7.75	14.76	5.05	1.36	10,665
Q4	757,800,000,000	60,740,000,000	0.08	10.3	5.65	75.14	122.76	111.07	83.77	726,699	7.25	14.8	4.98	4.5	4,311

Appendix IV-Sample frame

YEAR	PER QUARTER	GROSS LOANS AND ADVANCES (GLA)	NPL BALANCE	NPL RATE=NPL /GLA	INFLATION	12 MONTH INFLATION	EXCHANGE RATE (USD)	EXCHANGE RATE (GBP)	EXCHANGE RATE (EURO)	EXCHANGE RATE (JPY)	ECONOMIC GROWTH (GDP)	CENTRAL BANK RATE	COMMERCIAL BANKS AVERAGE LENDING INTEREST RATE	DEPOSIT RATE	REAL INT RATE= COMMERCIAL BANKS AVERAGE LENDING INTEREST RATE MINUS INFLATION	REAL GDP
2009	Q1	549,500,000,000	22,700,000,000	0.04	16.83	14.17	79.58	114.26	103.85	85.28	702,855	8.42	14.77	5.17	-2.06	0
2009	Q2	600,000,000,000	46,800,000,000	0.08	15.92	10.21	78.45	121.41	106.78	80.67	711,723	8.08	14.88	5.12	-1.04	8,868
2009	Q3	720,000,000,000	57,600,000,000	0.08	13.4	7.5	76.24	125.16	108.96	81.5	722,388	7.75	14.76	5.05	1.36	10,665
2009	Q4	757,800,000,000	60,740,000,000	0.08	10.3	5.65	75.14	122.76	111.07	83.77	726,699	7.25	14.8	4.98	4.5	4,311
2010	Q1	800,000,000,000	60,500,000,000	0.08	7.85	5.03	76.49	119.47	105.94	84.41	739,896	6.92	14.92	4.88	7.07	13,197
2010	Q2	828,900,000,000	61,500,000,000	0.07	5.87	3.68	78.94	117.78	100.5	85.73	761,606	6.75	14.48	4.51	8.61	21,710
2010	Q3	878,800,000,000	61,200,000,000	0.07	4.71	3.33	80.93	125.4	104.43	94.28	790,837	6	14.15	3.71	9.44	29,231
2010	Q4	914,000,000,000	57,582,000,000	0.06	4.03	3.84	80.58	127.39	109.61	97.68	809,998	6	13.89	3.57	9.86	19,161
2011	Q1	980,000,000,000	51,940,000,000	0.05	4.16	7.05	82.24	131.75	112.44	99.92	840,308	5.83	13.96	3.44	9.8	30,310
2011	Q2	1,100,000,000,000	58,300,000,000	0.05	6.01	13.2	86.12	140.36	123.9	105.5	850,185	6.08	13.9	3.55	7.89	9,877
2011	Q3	1,200,000,000,000	57,700,000,000	0.05	9.02	16.5	93.01	149.68	131.4	119.7	869,176	6.5	14.42	4.04	5.4	18,991
2011	Q4	1,190,000,000,000	53,000,000,000	0.04	12.8	19.2	93.87	147.56	126.67	121.38	893,293	15.12	17.92	5.86	5.12	24,117
2012	Q1	1,240,000,000,000	53,700,000,000	0.04	15.8	16.9	84.14	132.18	110.34	106.31	844,810	18	20.05	7.89	4.25	-48,483
2012	Q2	1,290,000,000,000	57,500,000,000	0.04	16.3	11.8	84.12	133.16	108.02	105	848,021	18	20.21	8.45	3.91	3,211
2012	Q3	1,320,000,000,000	60,700,000,000	0.05	14.3	6.38	84.28	133.19	105.53	107.23	862,288	15.33	20	7.83	5.7	14,267
2012	Q4	1,360,000,000,000	61,600,000,000	0.05	10.7	3.53	85.56	137.45	111.01	105.48	885,777	11.67	18.32	7.46	7.62	23,489
2013	Q1	1,400,000,000,000	70,300,000,000	0.05	7.26	4.08	86.72	134.59	114.54	94.04	899,423	9.5	17.9	6.45	10.64	13,646
2013	Q2	1,450,000,000,000	77,300,000,000	0.05	5.04	4.37	84.61	129.98	110.55	85.75	908,648	8.83	17.43	6.52	12.39	9,225
2013	Q3	1,520,000,000,000	79,700,000,000	0.05	4.56	7	87.26	135.32	115.61	88.26	919,529	8.5	16.95	6.5	12.39	10,881
2013	Q4	1,580,000,000,000	81,900,000,000	0.05	5.39	7.42	85.91	139.1	116.91	85.65	927,229	8.5	16.96	6.56	11.57	7,700
2014	Q1	1,690,000,000,000	95,100,000,000	0.06	6.2	6.78	86.33	142.85	118.3	84	939,434	8.5	17	6.58	10.8	12,205
2014	Q2	1,780,000,000,000	101,700,000,000	0.06	6.83	7.03	87.23	146.84	119.68	85.43	958,984	8.5	16.68	6.49	9.85	19,550
2014	Q3	1,910,000,000,000	103,700,000,000	0.05	7.24	7.54	88.24	147.41	117.02	84.95	970,391	8.5	16.4	6.58	9.16	11,407
2014	Q4	1,970,000,000,000	107,100,000,000	0.05	6.98	6.18	89.88	142.39	112.34	78.65	977,161	8.5	15.98	6.72	9	6,770
2015	Q1	2,040,000,000,000	117,200,000,000	0.06	6.67	5.82	91.52	138.74	103.22	76.86	996,800	8.5	15.62	6.65	8.95	19,639
2015	Q2	2,170,000,000,000	123,900,000,000	0.06	6.66	7	95.84	146.96	105.99	79.02	1,008,995	9	15.57	6.6	8.91	12,195
2015	Q3	2,320,000,000,000	124,800,000,000	0.05	6.39	6.14	102.97	159.61	114.56	84.23	1,028,345	11.5	16.08	6.83	9.69	19,350
2015	Q4	2,160,000,000,000	146,880,000,000	0.07	6.44	7.35	102.38	155.39	112.06	84.31	1,036,837	11.5	17.35	7.65	10.91	8,492
2016	Q1	2,220,000,000,000	170,940,000,000	0.08	6.84	7.02	101.91	145.88	112.25	88.32	1,050,653	11.5	17.93	7.41	11.09	13,816
2016	Q2	2,270,000,000,000	190,680,000,000	0.08	6.59	5.36	101.04	145.12	114.16	93.57	1,069,434	10.83	18.15	6.7	11.56	18,781
2016	Q3	2,280,000,000,000	207,480,000,000	0.09	6.47	6.33	101.34	133.16	113.08	98.94	1,081,790	10.17	16.54	6.67	10.07	12,356
2016	Q4	2,330,000,000,000	212,030,000,000	0.09	6.4	6.5	101.73	126.48	109.85	93.39	1,096,625	10	13.69	7.6	7.29	14,835
2017	Q1	2,380,000,000,000	226,100,000,000	0.10	6.48	8.77	103.41	128.11	110.13	90.96	1,106,413	10	13.65	7.32	7.17	9,788
2017	Q2	2,360,000,000,000	233,876,000,000	0.10	7.72	10.8	103.36	132.12	113.64	93.04	1,116,581	10	13.66	7.06	5.94	10,168
2017	Q3	2,390,430,000,000	249,560,000,000	0.10	8.32	7.52	103.52	135.4	121.5	93.28	1,129,637	10	13.68	7.59	5.36	13,056
2017	Q4	2,452,670,000,000	259,001,000,000	0.11	8.15	4.98	103.35	137.15	121.66	91.6	1,154,496	10	13.68	8.1	5.53	24,859
2018	Q1	2,432,160,000,000	287,238,000,000	0.12	7.36	4.49	101.83	141.64	125.11	93.97	1,177,035	9.83	13.61	8.22	6.25	22,539
2018	Q2	2,492,690,000,000	298,374,000,000	0.12	5.68	3.99	100.76	137.26	120.2	92.4	1,189,430	9.5	13.24	8.1	7.56	12,395
2018	Q3	2,540,000,000,000	318,000,000,000	0.13	4.7	4.7	100.71	131.3	117.17	90.4	1,203,943	9	12.85	7.85	8.15	14,513
2018	Q4	2,570,000,000,000	309,171,000,000	0.12	4.6	5.6	101.91	131.14	116.33	90.31	1,222,573	9	12.56	7.48	7.96	18,630
2019	Q1	2,580,000,000,000	329,724,000,000	0.13	4.67	4.4	100.73	131.11	114.42	91.44	1,241,726	9	12.5	7.28	7.83	19,153
2019	Q2	2,653,000,000,000	335,900,000,000	0.13	5.04	5.59	101.3	130.22	113.82	92.21	1,257,236	9	12.48	7.19	7.44	15,510

Appendix V-List of Banks – Year 2019

	2019 CENTRAL BANK OF KENYA
	DIRECTORY OF LICENCED COMMERCIAL BANKS, MORTGAGE FINANCE INSTITUTIONS
1	ABSA Bank Kenya Plc
2	African Banking Corporation Limited
3	Bank of Africa Kenya Limited
4	Bank of Baroda (K) Limited
5	Bank of India
6	Charterhouse Bank Limited UNDER - STATUTORY MANAGEMENT
7	Chase Bank (K) Limited IN RECEIVERSHIP
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	Guardian Bank Limited
22	Habib Bank A.G Zurich
23	I & M Bank Limited
24	Imperial Bank Limited IN RECEIVERSHIP
25	Jamii Bora Bank Limited
26	KCB Bank Kenya Limited
27	Mayfair Bank Limited
28	Middle East Bank (K) Limited
29	M-Oriental Bank Limited
30	National Bank of Kenya Limited
31	NCBA Bank Kenya PLC
32	Paramount Bank Limited
33	Prime Bank Limited
34	SBM Bank Kenya Limited
35	Sidian Bank Limited
36	Spire Bank Ltd
37	Stanbic Bank Kenya Limited
38	Standard Chartered Bank Kenya Limited
39	Trans-national Bank Limited
40	UBA Kenya Bank Limited
41	Victoria Commercial Bank Limited
42	HFC Limited-LICENCED MORTGAGE FINANCE INSTITUTIONS

Source: CBK (2019)

Appendix VI:Research authorisation

KENYATTA UNIVERSITY
GRADUATE SCHOOL

E-mail: dean-graduate@ku.ac.ke

Website: www.ku.ac.ke

P.O. Box 43844, 00100
NAIROBI, KENYA
Tel. 8710901 Ext. 57530

Our Ref: D53/OL/CTY/27109/2015

DATE: **15th September, 2022**

Director General,
National Commission for Science, Technology
and Innovation
P.O. Box 30623-00100
NAIROBI

Dear Sir/Madam,

RE: RESEARCH AUTHORIZATION FOR JACQUELINE NYONGI KIGAMWA – REG. NO. D53/OL/CTY/27109/2015.

I write to introduce Jacqueline Nyongi Kigamwa who is a Postgraduate Student of this University. The student is registered for M.B.A degree programme in the Department of Accounting and Finance.

Jacqueline intends to conduct research for a M.B.A Project Proposal entitled, **"Macro Economic Factors and Non-Performing Loans in the Kenyan Banking Industry"**.

Any assistance given will be highly appreciated.

Yours faithfully,

PROF. ELISHIBA KIMANI
DEAN, GRADUATE SCHOOL

AM/lnn

Appendix VII: Research permit

REPUBLIC OF KENYA

NATIONAL COMMISSION FOR SCIENCE,TECHNOLOGY & INNOVATION

Ref No: **191700**

Date of Issue: **23/September/2022**

RESEARCH LICENSE

This is to Certify that Ms.. JACQUELINE NYONGI KIGAMWA of Kenyatta University, has been licensed to conduct research in Nairobi on the topic: MACRO ECONOMIC FACTORS AND NON-PERFORMING LOANS IN THE KENYAN BANKING INDUSTRY for the period ending : 23/September/2023.

License No: **NACOSTI/P/22/20492**

191700

Applicant Identification Number

Director General
NATIONAL COMMISSION FOR SCIENCE,TECHNOLOGY & INNOVATION

Verification QR Code

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