



Bank Specific Determinants of Nonperforming Loans in Kenya

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Research Article

Abstract

Purpose: This paper aims to explore the bank-specific determinants of Nonperforming Loans in Kenya. To achieve this objective, the study considers four bank-specific variables that are expected to affect the magnitude of non-performing loans. These variables are bank size as measured by banks' total assets, loan-to-deposit ratio, capital adequacy ratio, and interest rates.

Methodology: The study used a causal research design. Aggregated data on all 43 Kenyan banks were collected from secondary sources. Time series regression was applied to the data.

Results: The study finds that there is a positive relationship between bank size and non-performing loans. It also observes that there is a negative relationship between loans-to-deposit ratio and non-performing loans. The study further observes that there is a negative correlation between capital adequacy ratio and non-performing loans in Kenya. Finally, the study establishes that there is a positive relationship between the interest rate and non-performing loans in Kenya.

Implications: The study recommends that banks should revise their interest rates downwards to enable borrowers to afford the loans and avert the cases of default. Banks should also invest in proper infrastructure for screening borrowers to avoid cases of loan default.

Keywords: Nonperforming Loans, bank size, loan-to-deposit ratio, capital adequacy ratio, Interest rates, Kenya

1. Introduction

Banking industries are of significant value to financial sectors within modern economies. Nonperforming loans (NPLs) prove vital in regards to banking industries' sustainability and profitability. Kithinji and Waweru (2007) opine that the banking predicaments that cause major bank failures within Kenya are attributable to NPLs. Management of NPLs is crucial in promoting the influence of financial firms and the financial area of the economy (McNulty et al., 2001). Due to the nature of the business that commercial banks engage in there is a high risk of default from borrowers. To cushion the banks from the risk of defaulting, financial institutions

need to engage in careful financial risk evaluation and the creation of enough provisions in negative debts (Prasanna, 2014).

As an indicator of financial stability, banks NPLs assume the highest level of significance because they compromise the investment quality, efficiency, and monetary risk within resources given to producing fields of the economy. The 2007-2008 global financial crisis best explains how NPLs can affect the financial system of any country. Muriithi (2013) describes that before the 2007-2008 global financial crisis, loan portfolios credit quality across various countries remained balanced. However, since its occurrence the loan portfolios credit quality across countries worldwide have been unstable, and as a result bank asset quality has largely deteriorated over years because of the 2009 global economic downturn.

The theory of financial instability points out the various types of borrowers that lead to non-performing loans. Minsky (1992) in the hypothesis described three types of borrowers and their direct connection to the different types of non-performing loans. They are the hedge, speculative, and Ponzi borrowers. Hedge borrowers service their loans, both the principal and interest using their revenue stream. The speculative borrower repays the interest but struggles to pay the principal and hence periodically rolls it over. Ponzi borrowers, on the other hand, are those that take credit with the optimism that their assets will appreciate in terms of value to afford them the opportunity of servicing the loans, and in most cases, it turns out not to be the case.

Siddaiah (2009) further described the four types of loans namely standard loans, substandard loans, doubtful loans, and loss assets. They described standard loans to be those assets that have a higher responsiveness to the term of the agreement relating to loan repayment. Substandard loans are those whose terms of the agreement have not been met for a period of 180 days. Doubtful loans are those loans whose terms of the agreement have not been honored for 360 days while loss assets are those that cannot be recovered. Siddaiah, (2009) links the hedge borrowers to standard loans, while speculative borrowers would lead to sub-standard loans that fit the category of NPLs. On the other hand, the Ponzi borrower contributes to doubtful and in some cases non-standard loans.

The link between the bank-specific factors that contribute to nonperforming loans was well articulated in the augmented information asymmetry theory by Ariccia (1998). The theory postulates that in the relationship between banks and their clients, one party contains information that the other party does not have. The observation by Arricia (1998) was that small banks have inadequate techniques to screen their customers and this makes it harder for them to ascertain their creditworthiness. For that reason, they set high-interest rates. This may turn away the customers who are creditworthy leaving behind non-credit worthy customers leading to high chances of default cases and non-performing loans.

2. Nonperforming Loans in Kenya

The Central Bank of Kenya regulates commercial banking in Kenya. The Banking Act Cap 488 provides guidelines on the licensing and regulation of commercial banks in Kenya. Kenya has a total of 44 banks with 43 being licensed commercial banks and 1 Mortgage Finance Institution.

40 of these are private banks with 27 which are owned by the locals and 13 owned by foreigners. 3 of the banks in Kenya are public financial institutions which means that their majority shareholders are the Government of Kenya and state corporations (CBK, 2018).

Credit risk is cited as a major concern by 95 percent of the banking institutions (CBK, 2018). NPLs to total loans for all banks within Kenya showed a decrease from 2009 towards the lowest levels within 2011 and 2012. Records were Ksh 58.3 billion and Ksh 57.5 billion in that order. Levels of NPLs however, have kept on rising since 2013 and as of June 2018, they increased by 30.3 percent from June 2017. According to the 2019 report by the Kenya Banker's Association (KBA) dubbed Lenders Financial report, the years 2018 and 2019 have witnessed a significant rise in NPLs. In the 1st and 2nd quarters of 2019, banks recorded a total of Ksh 67.8 billion in NPLs representing a 22 percent rise compared to the same period in 2018. The report further shows that banks in recent years have resorted to writing off the debts despite the existence of the Credit Reference Bureau. In the financial year ended June 2019, the banks had to write off a total of Ksh 343 billion irrecoverable debt (KBA, 2019).

3. Research Problem

A 2019 report by Moody documented that the soaring NPLs in Kenya is a reflection of poor financial sector health in the country. The report indicated that, in March 2019, Kenya's NPL ratio to total loans stood at 12.4 percent up from 12.9 percent in April 2019. This makes Kenya the fourth country in Africa with high NPL to loans ratio the others being Angola at 24 percent, the Democratic Republic of Congo at 21 percent, and Ghana at 19 percent in the same month. The same situation makes Kenya be the country with the worst nonperforming loan performance in East Africa (Moody, 2019). The constant growth of NPLs is a matter of great concern. Therefore, figuring out the soundness of commercial banking industries is vital in the promotion of Kenya's financial stability. According to Cousin (2007), most bank shortfalls are due to non-performing loans. Loan portfolio constitutes the largest proportion of banks' assets and therefore when loans become non-performing, they negatively impact profitability along with overall financial activity by banks. High levels of NPLs indicate a vulnerable financial system since it influences the profitability of banks in reducing levels of interest income, whereas low standards of NPLs indicate the presence of a sound effective financial system. This is attributed to the bank-specific factors within the banks in operation. Therefore, understanding the influences of NPLs assists in securing effective banking policies able to support the economic increase. If NPLs continue to exist, resources are confined within unprofitable fields hence hindering economic spurt and also impairs economic efficacy.

According to the 2018 CBK's commercial bank credit officers' report, NPLs in Kenya has been on a rising trend and it keeps on growing. The reported NPL in 2018 was 63.8 billion, from 44.66 billion within 2017, representing a 30.3 percent increase. The constant growth of NPLs is a matter of great concern. Hence knowing the soundness of commercial banking is of great importance in order to promote financial stability in Kenya (CBK, 2018). The ratio of NPLs to the sum of loans in Kenya are quite high compared to its African counterparts, which stood at

34 percent as of June 2018. The ratio was lower in other economies such as Nigeria at 10 percent, Zambia at 8 percent, and South Africa at 3 percent (Kenya Bankers Association, 2018).

Luzis (2012) noted that for all loan portfolios, NPLs in the Greek banking structures were attributable to bigger economic variables such as GDP, management quality, lack of employment, levels of interest, and debts within the public. Beaton et al., (2016) noted that worsening in asset quality was as a result of both macroeconomic and bank-related determinants.

Analysis done by Waweru and Kalani (2009) posits that lack of aggressive loan reclaiming policies was considered the major bank-related determinant adding to NPLs. The study further revealed the global economic downturn to be an emerging issue at the time that influenced NPLs. Muriithi (2013) found NPLs in banks to be negatively related to real interest rates and increased levels within loans and positively correlated with inflation rates. Kiayi (2003) observed the different techniques employed by banks to encourage defaulting customers to improve loan repayments. They concluded there was no relationship between debt restructuring and levels of NPLs.

Other than studies having non-conclusive consensus about the variables that affect NPLs, there were also shortcomings on the empirical approaches that were used in their analysis. It is the approaches that were used that could explain the variations in their findings. The studies reviewed in the literature section either used cross-sectional or time-series data approaches. Cross-sectional data only focuses on studies on a particular year which makes it hard for the researcher to ascertain whether the variation of the dependent variable is explained by independent values or due to changes in seasonal variations that happened in that year (Greene, 2004). On the other hand, time-series studies have focused on individual banks over the different duration of times. The findings of a study that focuses on one entity or subject cannot be generalized to the entire industry or market (Woodridge, 2009). This study, therefore, sought to use an aggregated data approach which is appropriate in covering the individual and interactive effects of the subjects under study, while answering the question: what are the bank-specific factors that affect NPLs in Kenya?

4. Literature Review

The section provides a detailed review of theoretical and empirical literature around the area of the determinants of Non-Performing Loans.

4.1 Theoretical Literature

This segment highlights the theory that this study stems from, it provides a critical review and its applicability in the study

4.1.1 Asymmetric Information Theory

Asymmetric theory initially formulated by George Akerlof in 1970, postulates that buyers in every market base their buying decisions on some sort of market statistics and this helps in the analysis of the value of a specific category of products. The theory however opines that since the

buyers' analysis exclusively focuses on a class of goods or services, they can only establish the average quality or price of the entire market and not individual product. On the other hand, the sellers in this case, since they interact with these products on a daily basis, possess detailed knowledge of the specifics. Therefore, the seller is well versed with the products and contains information that the buyer lacks. Arkelof argues that it is this information gap that makes the seller sell products at a slightly higher price or lower quality to profit more from a transaction. The theory was first used in the motorcar industry but it has been subsequently developed by scholars and used in other industries as well.

In the banking industry, Ariccia (1998) asserts that bankers are faced with uncertainty about loan repayments whenever they advance loans to their customers. This is chiefly influenced by their inadequacy to establish the personal attributes and traits of their customers, as a result, they are not in a position to accurately ascertain the creditworthiness of their customers. Arricia (1998) observes that the case is more so rampant in small lending institutions that have limited capacity to scrutinize clients. In this case, it is the borrower who possesses much information than the lender and this may lead to moral hazard by the borrower, who might default on loan repayment. The inadequacy of the lender to distinguish between creditworthy and non-creditworthy borrowers leads the lender to impose a common interest rate on loans. Castro opines if the market rate is higher than creditworthy customers can afford, they would be pushed off the market leaving only credit non-worthy borrowers that are susceptible to loan defaults leading to NPLs. Alternatively, the high-interest rate will be expensive to creditworthy borrowers hence making them default.

The applicability of the theory in this study is that it provides a hypothesis that could explain what contributes to NPLs. From the theory, it can be pointed out that bank size and interest rates are among these factors. Therefore, the theory is useful in informing the choice of variables to be used.

4.1.2 Financial Instability Theory

Financial Instability theory, also simply referred to as the financial theory, was developed by Minsky in 1974, in an attempt to understand the circumstances that lead to a financial/credit crisis. The theory posits that there are a series of events occurring prior to the emergence of financial crises within the economy. The starting point of the economy is flourishing and booming, at this point, heavy business transactions are resulting in an increase in cash-flows far beyond what is required to offset debts. The result of this is an emergence of speculative euphoria in the market, lenders advance so much credit while investors keep on borrowing and investing.

The cycle continues up to the point where firms start experiencing diminishing rates of return. What follows after this is too much debt accumulation that exceeds what borrowers can afford to pay from their revenue stream, leading to a credit crunch. Accordingly, lenders including the central bank resort to measures that are geared towards tightening credit availability, thus contracting the economy.

The theory highlights three different types of borrowers leading to the growth of insolvent loans. They are the hedge, the speculative, and the Ponzi borrowers. Hedge borrowers service their loans, both the principal and interest using their revenue stream. The speculative borrower repays the interest however struggles to pay the principle and hence periodically roll it over. On the other hand, Ponzi borrowers are those that take credit with the optimism that their assets will appreciate in terms of value to afford them the opportunity of servicing the loans, and in most cases, it turns out not to be so.

Siddaiah, (2009) was among the major supporters of the theory and linked the theory to non-performing loans. They categorized loans into four major asset categories: standard, sub-standard, and doubtful and loss assets. They described standard loans to be those assets that have a higher responsiveness to the term of the agreement relating to loan repayment. Sub-standard loans are those whose terms of the agreement have not been met for a period of 180 days. Doubtful loans are those loans whose terms of the agreement have not been honored for 360 days while loss assets are those that cannot be recovered. Siddaiah, (2009) links the hedge borrowers to standard loans, while speculative borrowers would lead to substandard loans that fit the category of NPLs. On the other hand, the Ponzi borrower contributes to doubtful and in some cases non-standard loans.

The theory is applicable in the study as it highlights a series of events that lead to non-performing loans. The theory is crucial in assisting in the determination of the factors that led to non-performing loans. Among the factors identified is the interest rate, which will be used as one of the independent variables.

4.2 Empirical Studies

4.2.1 Global Studies

Keeton (1999) utilized information within 1982 and 1996 employing the concept of vector autoregression in examining the effect of bank monetary growth with loans inadequate in cases relating to American banks. Results showed confirmation of strong relations in impaired assets with credit growth. Specifically, fast credit increase linked to lower credit levels added to more loan losses within particular states in the US (Keeton, 1999). Overdue loans extending more than 90 days or not accruing interest were referred to as delinquency.

Hu et al. (2004) used panel data in their study covering periods between 1996 and 1999 to analyze relationships in ownership structure and NPLs within Taiwan commercial firms. Findings showed that the levels of NPLs were lower in banks that were largely owned by the government. Further, the findings showed bank sizes have a negative relationship with NPLs while diversification by sources of revenues may not serve as an effective measure in reducing the levels of NPLs.

Fofack (2005) examined a panel of sixteen countries between 1993 and 2002 to establish the determinants of non-performing loans in Sub-Saharan Africa. By using a pseudo panel and causality approach, the study established that the real interest rate, real exchange rate appreciation, inter-bank loans, economic growth, and interest in net margins are big

determinants of NPLs in African countries. Also, the study established that real GDP per capita had a negative effect on NPL an indication that an increase in GDP per capita would result in a decrease in NPL. The author notes a drastic increase in loans that are largely attributed to small economic shifts that mirror the risks within poor African economies that remain vulnerable to external and unprecedented shocks.

Espinoza and Prasad (2010) analyzed a panel of 80 banks in periods between 1995 and 2008 to ascertain the determinants of NPLs and how they impact on the GCC banking system. Inverse relations were exhibited by NPLs and economic growth. This meant a rise in the level of NPLs lowers economic growth. The research also confirmed the existence of negative relations in real GDP and NPLs. The findings imply macroeconomic factors as related to bank-specific issues influence the standards of NPLs. Saba et al (2012) utilizing the correlation and panel regression concept studied determinants of NPLs in the US financing sector within 1985 and 2010. Empirical results support the view that macroeconomic issues like rates of interest, inflation, and real GDP per capita show association with rates in NPLs.

Danisman (2018) conducted a financial statement study of firms in Turkey and examined factors of NPLs. The author used yearly data from 27 non-commercial and listed Turkish financial firms for the years 2007-2015 utilizing dynamic panel data estimation technique using the GMM estimation concepts formed by Boyer and Arellano (1995) and Blundell and Bond (1998). The study identified bank-specific variables namely, bank size, profitability, and capital adequacy be having negative coefficients and thus had negative effects on NPL. The study concluded that the more profitable a bank is, the lesser is its chances of having high NPLs and vice versa.

Kingu et al., (2018) examined a data of 16 commercial firms for periods within 2007 and 2015 utilizing causality research design to ascertain the bank related factors of NPLs within financial firms in Tanzania. The analysis included descriptive statistics and multiple regression analysis. Asset growth, higher capital ratio, and loan to asset ratio had a negative relationship with NPLs while cost inefficiency was positively related to NPLs.

Manz (2019) used a systematic literature review to conduct a study on the determinants of NPL for the period spanning 1987 to 2017. The study reviewed NPL in the context of macroeconomic variables, bank financial performance indicators, and loan characteristics. The study found out that there are varied empirical findings on the determinants of NPL. It concludes that there is a need for a deeper understanding of NPLs and this should emanate for more empirical research.

4.2.2 Local Studies

A study by Warue (2012) focused on analyzing the effects of bank-specific and macroeconomic factors of non-performing loans on commercial banks in Kenya. He used a causal-comparative research design based on the structures of banks and covered the period 1995 to 2009. The study concluded that bank-specific factors largely contribute to the performance of NPLs as compared to the macro-economic factors.

Maina (2015) examined the factors that affect non-performing loans in Kenyan commercial banks. The study used a fixed-effect model on a panel of forty-three commercial banks to achieve for the period 2008 to 2012. The study obtained negative and significant coefficients of

the budget deficit and lost revenue. The study concluded that budget deficit and loan loss have a negative impact on NPLs. The study found other macroeconomic variables such as gross domestic product, and interest rate to be having an insignificant effect on NPL.

Ndede and Kavoya (2017) surveyed to investigate the role played by the market structure in the determination of NPL. The study used descriptive statistics techniques to achieve this objective. It was established that the growth of capital and access to credit impacted NPL positively. On the other hand, appetite to risk by bank manager had a positive effect on NPL. The study concluded that those banks that have managers who have a high attitude to risk would tend to subject the bank to risky situations such as granting huge amounts of loans for the sake of gaining greater returns. It is this factor that leads to high incidences of loan defaults and thus NPLs.

Atem (2017) conducted a case study on the factors that contribute to NPLs in Kenya. The study concentrated on Kenya Commercial Bank branches within Nairobi and its environs and focused on the bank-specific aspects and the demographic characteristic of borrowers. By use of ordinary least square multiple regression method, the study only found interest rate charged by banks to be having a positive NPL. On the other hand, the size of credit was found not to have a significant influence on NPL. Additionally, none of the demographic variables in the model, namely, gender and age of borrowers had a significant influence on NPL.

Wairimu and Gitundu (2017) analyzed the macroeconomic factors determining NPLs within Kenya by the use of time-series data covering 18 years, spanning between 1998 and 2015. The study had inflation rate, public debt, unemployment rate, GDP growth rate, remittance, and exchange rate as independent variables and measured them against NPL to total loan ratio. The study used multivariate ordinary least square technique to analyze the data. The finding of the study was that the inflation rate, public debt, exchange rate, and GDP growth rate had statistically insignificant coefficients whereas remittances and unemployment rates were found to be statistically significant.

5. Methodology

5.1 Research Design and Data Collection

This study used casual research design; a framework that explains causality between the variables (Mugenda & Mugenda, 2003). The research target population was 43 commercial banks operating in Kenya. The study used a census approach where all the 43 commercial banks were sampled and used in the study. The research relied on annual information gathered from secondary sources. Data for the bank-specific variables; bank size, the ratio in capital adequacy, extent of loan-to-deposit, and interest rates were sourced from banks' financial statements. The data collected covered 10 years spanning from 2009 to 2018.

5.2 Diagnostic Tests

Both Pre-estimation and after estimation diagnostic tests were conducted to check for validity and reliability of data. Data were tested for normality using kurtosis and skewness procedures.

Additionally, to check for stationarity of information unit root test was conducted, which assisted in checking for the validity of the data and therefore avoid cases of spurious regression. In this regard, the Augmented Dickey-fuller approach was used in the analysis of unit root. On the other hand, post-estimation tests were done so as to ensure that the data did not violate the Ordinary Least Square rules. Among the tests carried out included, the Lagrange Multiplier test for autocorrelation. This test enabled the researcher to establish whether there was a correlation of error terms in two successive periods. Breusch- Pagan Test for Heteroscedasticity was also carried out to help in identifying whether the error term had a constant mean and variance.

5.3 Data Analysis

To achieve the objectives of the research, one model was developed. The model that analyzed the effects of bank-specific factors on NPLs in Kenya, is represented by equation 3.1.

$$NPL_t = \beta_{0t} + \beta_1 SIZE_t + \beta_2 LDR_t + \beta_3 CAR_t + \beta_4 INTR_t + \varepsilon_t \dots \dots \dots 3.1$$

Where:

t= years in study, which is 10 years

$\beta_1, \beta_2, \text{ and } \beta_3$, are partial slope coefficients

NPL=Non-performing loan (Measured by the banks' total nonperforming loans)

SIZE= size of the bank (measured using the total assets owned by the commercial banks)

LDR=Loans to deposit ratio (it is measured by the total loans advanced to the total amount of deposits)

CAR= Capital adequacy ratio (measured using the ratio of capital to total risk-weighted assets)

INTR=Interest rate (Measured by the average annual interest rate of all the banks)

ε_{it} = Error Term

5.4 Justification of Variables

Brownbridge (1998) asserts that most bank failures result from non-performing loans. The levels of NPLs in Kenya commercial banks are attributed to factors that are considered to be either bank-specific and or macroeconomic in nature. The bank-specific factors are as discussed below.

5.4.1 Bank Size

A report by Salas and Saurina (2002) showed bank size has a negative association with NPL. The findings show sizeable banks tend to track loans more frequently and show good risk management patterns including high chances of diversification. Hu et al (2004) further note that big banks accept managers' appraisal of loans and devote more resources to ensure that the loan does not become non-performing. This, therefore, means that bigger banks experience less presence of NPLs due to their great ability to control and manage NPLs. The study drives toward good influence in the size of NPLs. The expectations of the study were that there is indeed a negative relationship between bank size and NPL.

5.4.2 Loan to Deposit Ratio

Ratios of loan to deposit are indicators that reflect a banks' liquidity situation. Jameel and Kiran (2014) established negative relationships between loan to deposit ratios and NPLs. A high ratio of loans to deposit would lead to low NPL levels while a low ratio of loan to deposit translates of high NPLs. When the ratio is high, it means that deposits are mobilized in order to generate revenues hence increasing profitability which in return promotes investments in sectors that are less risky and therefore preventing bad debts. However, when the ratio is low, inefficiency in the allocation of resources is exhibited hence the profits decline.

5.4.3 Capital Adequacy Ratio

Capital adequacy ratio or bank capitalization ratio is the ratio of equity as related to total assets. It evaluates solvency in a bank's ability to regulate risks. Berger and DeYoung (1997) in their study established a negative relationship between capital adequacy ratio and NPLs. Similarly, Louzis et al. (2012) established a negative link between capital adequacy ratio and NPLs. They concluded that banks with high capital adequacy ratios can afford to put effective measures in place to mitigate the default risks leading to reduced NPLs levels.

5.4.4 Interest Rate

Crowley (2007) shows interest rates as prices for which lenders charge to a borrower for money lend. Rates in Interest have a positive influence on NPLs. When interest rates are high, the rate at which borrowers' default is expected to increase and hence lead to an increasing rate of NPLs. Manz (2019) points out that, interest rates make the loans very expensive, and in many cases, borrowers choose to increase the loan period in order to afford to make lower periodic repayments. Manz (2019) asserts that the period sometimes becomes so long that the borrower becomes incapable of repaying it in full and defaults at some point in the course of the stipulated period. This study expects a positive coefficient on this variable.

6. Results and Discussion

The chapter presents pre-estimation diagnostic tests such as unit root test and co-integration test, the regression model, and as well as the post-estimation diagnostic tests.

6.1 Unit Root Test

In order to avoid the problems of spurious regression, it is vital to carry out a unit root test. This study adopted the Augmented Dickey-Fuller approach to conduct unit root testing. The Augmented Dickey-Fuller test was used to conduct the unit root test. The null hypothesis for the augmented dickey fuller states that the variable contains unit root while the alternative hypothesis states that the variable does not contain a unit root. The test statistics for the non-performing loan was -7.360 meaning that we reject the null hypothesis and conclude that non-performing loan does not contain a unit root. Bank size had a test statistic of -7.290, loans to deposit ratio had a test statistic of -7.169, and capital adequacy ratio had 6.390 while interest rate had 6.932. All these variables are significant at 1 percent as shown by the P-value of 0.000,

meaning that we reject the null hypothesis and conclude that all the series in the model are integrated of order zero. The results are displayed in Table 1

Table 1: Results of Augmented Dickey-Fuller

Variables	ADF Test Z(t)		Verdict
	At level	P-Value	
NPL	-7.360	0.0000	Stationary
SIZE	-7.290	0.0000	Stationary
LDR	-7.169	0.0000	Stationary
CAR	-6.390	0.0000	Stationary
INTR	-6.932	0.0000	Stationary

6.2 Regression Analysis

Since all the series were stationary in levels the study used the variable in levels to conduct a linear regression. Table 2 shows the model summary for the regression model. The model has an F statistic of 27.81 with a P-value of 0.0013 this shows that the model is fit and its coefficient can be used to explain the population parameter.

Table 2: Model Summary

Source	SS	df	MS	F	P-value
Model	4.7364e+10	4	1.1841e+10	F(4,5) = 27.81	0.0013
Residual	2.1292e+09	5	425842260		
Total	4.9494e+10	9	5.4993e+09		

Table 3 below shows the regression results. The coefficient for determination is 0.9570. These results mean that 95.70 percent of the variation in non-performing loans is explained by the bank-specific factors, namely, bank size, loans to deposit ratio, capital adequacy ratio, and interest rate. The results from the Table can be fitted in equation 4.1 below.

$$NPL_t = 2461844 + 0.05217SIZE_t - 1840.42LDR_t - 18222.19CAR_t + 134312.5INTR_t + \epsilon_t \dots \dots \dots 4.1$$

Table 3: Regression Model

Variables	Coefficients	Standard Errors	T-statistic	P-value
Constant	2461844	1024986	2.40	0.061
SIZE	.0521744	.01374	3.80	0.013
LDR	-1840.42	326.89	5.63	0.000
CAR	-18222.19	8021.89	-2.27	0.072
INTR	134312.5	19493.75	6.89	0.000
R-squared		0.9570		
Adj-R-squared		0.9226		
Root MMSE		20636		

On the fitted regression model above, the constant=2461844 meaning that if the selected independent variables namely, bank size, loans to deposit ratio, capital adequacy ratio, and interest rate are assigned the value of zero, banks’ non-performing loans would be Ksh 2461844 million. A unit increase in bank size would lead to a Ksh 0.05 million in non-performing loans.

A unit increase in loans to deposit ratio would lead to a decrease in non-performing loans by Ksh 1840.4 million, a unit increase in capital adequacy ratio would lead to a decrease in non-performing loans by Ksh 18222.19 million. Finally, a unit increase in interest rate would result in an increase in non-performing loans by Ksh 134312 million.

6.3 Post-estimation Tests

Post estimation tests were conducted, these were, Breusch-Godfrey Lagrange multiplier test for autocorrelation, and Breusch-Pagan/Cook-Weisberg test for heteroscedasticity to ensure that the model was robust.

Among the tests conducted was Breusch-Pagan/Cook-Weisberg test for heteroscedasticity. The null hypothesis for the test states that the variance of the error term is constant while the alternative hypothesis states that the variance of the error term is not constant. The Chi-square coefficient obtained for the test is 0.37 while the P-value is 0.5421 meaning that we accept the null hypothesis and conclude that the variance of the error term in the model is constant. This model, therefore, does not violate the Ordinary Least Square assumption of constant variance.

On the other hand, the study conducted the Breusch-Godfrey LM test for autocorrelation. The null hypothesis for this test states that there is no serial correlation while the alternative hypothesis states that there is serial correlation in the error term. Form the findings, the Chi-square coefficient is 1.707 and the P-value is 0.1913, meaning that it is not significant at any statistical level. We, therefore, accept the null hypothesis of no serial correlation and conclude that the model does not violate the OLS assumption of autocorrelation.

Table 3: Post Estimation Tests

Test	Coefficient
Breusch-Pagan / Cook-Weisberg test for heteroskedasticity	Chi ² = 0.37 Prob > chi2= 0.5421
Breusch-Godfrey LM test for Autocorrelation	Chi ² = 1.707 Prob > chi2= 0.1913

6.4 Interpretation and Discussion of Results

The correlation coefficient for the relationship between bank size and non-performing loans was 0.9123 and statistically significant at 1 percent. This means that there is s strong and positive relationship between bank size and non-performing loans. Similarly, the partial slope coefficient from the regression analysis was 0.0521 and statistically significant at 5 percent, meaning that when a bank increases its size in terms of assets, non-performing loans will increase by Ksh 0.0521 million. These results are however not consistent with empirical findings and theoretical findings. Asymmetric information theory postulates that the size of the bank determines the level of non-performing loans and that larger banks are expected to have lower values of non-performing loans because they can afford the machinery required in screen non-credit worthy borrowers leading to reduced levels of non-performing loans.

The correlation coefficient relating to the loan to deposit ratio and Non-performing loans is - 0.3476 and it is statistically significant at 1 percent. These results indicate the there is a weak

correlation between deposit to asset ratio and non-performing loans in Kenya. When the ratio of loan to deposit ratio increases, non-performing loans are expected to decrease also but to a smaller magnitude. On the other hand, the partial slope coefficient for the loan-to-deposit ratio is -1840.42, meaning that when the loan to deposit ratio increases by 1-unit, non-performing loan decreases by Ksh 1840.42 million. These results are consistent with the works of Jameel and Kiran (2014) who established a negative relationship between the two variables. High loan to deposit ratio is an indication that the deposits are mobilized in order to generate revenues hence increasing profitability which in return promotes investments in sectors that are less risky and therefore preventing bad debts. On the other hand, when the ratio is low, inefficiency in the allocation of resources is exhibited hence the profits decline.

The correlation coefficient relating the capital adequacy ratio and non-performing loans is -0.875 and is statistically significant at 1 percent. These results indicate that there is a very strong negative relationship between capital adequacy ratio and non-performing loans in Kenya. When the capital adequacy ratio increases, non-performing loans decrease, and vice-versa. On the other hand, from the regression analysis, a partial slope coefficient of -1822.49 was obtained. This means that when the capital adequacy ratio increases by one-unit, non-performing loan reduces by Ksh 1822.49 Million and vice-versa. These findings are in line with the study by Louzis et al. (2012) who established a negative link between capital adequacy ratio and NPLs. Banks with high capital adequacy ratios can afford to put effective measures in place to mitigate the default risks leading to reduced NPLs levels.

Finally, the correlation coefficient relating to interest rate and non-performing loans is 0.6261 and is statistically significant at 1 percent. There is a moderately strong correlation between the interest rate and non-performing loans. These results indicate that as interest rate rises non-performing loans are expected to rise and vice-versa. The partial slope coefficient for the interest rate is 134312.5. This means that when interest rate increases by one-unit, non-performing loans will increase by Ksh 13431 million and vice-versa. These results agree with the theory of information asymmetry that posits that high-level interest rates make borrowers default on their debts. The justification for this is that interest rates make loans expensive and thus unaffordable.

7. Conclusions

The study concludes that there is a positive relationship between bank size and non-performing loans. This, however, differs with expectations of the study from the theories and empirical studies, an explanation for this could be that some banks may not be making sufficient provisions thus recording high NPL levels in their financial statements. The study also concludes that there is a negative relationship between loans to deposit ratio and non-performing loans. High loan to deposit ratio is an indication that the deposits are mobilized in order to generate revenues hence increasing profitability which in return promotes investments in sectors that are less risky and therefore preventing bad debts. On the other hand, when the ratio is low, inefficiency in the allocation of resources is exhibited hence the profits decline. The study further observes that there is a negative correlation between capital adequacy ratio and

non-performing loans in Kenya. Banks with high capital adequacy ratios can afford to avail effective measures in place to mitigate the default risks leading to reduced NPLs levels. Finally, the study concludes that there is a positive relationship between the interest rate and non-performing loans in Kenya. Interest rates make loans expensive thus making borrowers default their loans or fail to service it.

8. Recommendations

The study recommends that large banks initiate necessary measures to screen their borrowers. Failure to have proper screening measures would mean that they will continue getting more defaulters thus leading to increased non-performing loan levels. The study recommends that banks should strive to maintain high levels of capital adequacy ratios and loan to deposit ratios as these are key factors that can help mitigate the problems of non-performing loans among the banks in Kenya. Finally, banks should constantly review the interest rates on loans since loan delinquencies are higher for banks which increases their real interest rates.

9. Limitations and Suggestions for Future Studies

The study was confined to Kenya only. But now, the Kenyan banks are expanding their operations to foreign markets in the East and Central Africa. The study recommends that the study be replicated and extended to east and central African countries as well. The study also limits itself to financial ratios and factors as the variables for the study. Future studies should incorporate the aspects of corporate governance and the regulatory environment as the variables. The study included a period of 10 years only. Future studies should extend the period and cover longer periods in order to capture the long-run and short-run effects. The study examined the causes of non-performing loans in Kenya Commercial Banks. In Kenya, the financial industry is however comprised of various other financial institutions that differ in their way of management and have different settings. This justifies the need for more studies to examining the causes of NPLs in Kenya's financial institutions.

Conflicts of Interest: The authors declare no conflict of interest.

Authors Contribution: Kevin Wanjala conceived the study, performed the statistical analysis, and drafted the manuscript. Jane Njeri Gachanja designed the contents of the study, collected data, and participated in the sequence alignment of the manuscript.

REFERENCES

- Akerlof, G. A. (1970). *The market for "lemons": Quality uncertainty and the market and Implications for Prudential Policy*, UNCTAD/OSG/DP/132.
- Ariccia, G. (1998), *Asymmetric Information and the Market Structure of the Banking Industry* IMF Working Paper No 98/92, Washington, D.C.
- Atem, M. N. (2017). *Factors Affecting Non-Performing Loans: A Case Study of KCB Bank Kenya, Nairobi Region*. (Master's Thesis). The Catholic University of East Africa.

- Beaton, K., Myrvoda, A., & Thompson, S. (2016). *Non-Performing Loans in the ECCU; Determinants and Macroeconomic Impact* IMF Working Paper 16/229. Washington, D.C.
- Berger, A. & DeYoung, R. (1997). *Problem loans and cost efficiency in commercial banks*, Finance and Economics Discussion Series 1997-8, Board of Governors of the Federal Reserve System (US).
- Brownbridge, M. (1998). The causes of Financial Distress in Local Banks in Africa Causes and Remedies. *African Journal of Accounting, Economics, Finance, and Banking Research*, 5, (2), 12-33.
- Central Bank of Kenya (2018) *Bank Supervision Annual Report*, Central Bank of Kenya
- Central Bank of Kenya (2018). *Central Bank of Kenya Commercial Banks' Credit Officer Survey*, Central Bank of Kenya.
- Cooper, D. R., & Schindler, P.S. (2006). *Business Research Methods*, 9th Edition, McGraw-Hill
- Danisaman, G. (2018). Determinants of Bank Stability: A Financial Statement Analysis of Turkish Banks. *Sosyoekonomi*, 26(38), 87-103.
- Espinoza R., & Prasad A. ., (2010). *Non-Performing Loans in the GCC Banking System and their macroeconomic Effect*. IMF Working Paper No. 10/224
- Fofack, H. L. (2005). *Nonperforming loans in Sub-Saharan Africa: Causal Analysis and Macroeconomic Implications*. Policy, Research working paper; No. WPS 3769. Washington, DC: World Bank.
- Greene, W. W. H. (2012). *Econometric Analysis* 7th Ed. In Prentice Hall.
- Siddaiah, T. (2009). *Financial Services*. Pearson Education India.
- Hu, Yang, L. & Yung-Ho, C. (2004). Ownership and non-performing loans. Evidence from Taiwan's Banks. *Developing Economics Journal* 42(3) 405-42.
- International Monetary Fund. (2009). *World Economic Outlook*. Washington, D.C.
- Jameel, L. & Kiran, M. (2014). Crucial factors of non-performing loans: Evidence from the Pakistani banking sector. *International Journal of Scientific Engineering Research*, 5(7), 704-710. *Journal*, 39(1), 59-70.
- Keeton, William R. (1999). *Does Faster Loan Growth Lead to Higher Loan Losses?* Federal Reserve Bank of Kansas City, Economic Review, Second Quarter 1999.
- Kenya Bankers Association (2018). *Kenya Banker's Economic Bulletin*, KBA.
- Kenya Bankers Association (2019). *Lender's Financial Report*, KBA.
- Kiayai, T, K. (2003). *Bad Debts Restructuring Techniques and Non-performing Loans of commercial banks in Kenya*. (Unpublished MBA Project), University of Nairobi.
- Kingu, M., Salvio M. & Gwahula, R. (2018). Determinants of Non-Performing Loans: Evidence from Commercial Banks in Tanzania. *The International Journal of Business and Management*, 5(12) 18-28
- Kithinji, A & Waweru, N. (2007). Merger and Restructuring and Financial Performance of Commercial Banks in Kenya, *Economic, management and financial market journal*. 2 (4), 9-39.
- Kothari, C. (2004). *Research methodology: methods and techniques*. In *New Age International*.
- Levin, A., Lin, C., & Chu, J. (2002). Unit Root Test in Panel Data: Asymptotic and Finite Sample Properties. *Journal of Econometrics*, 108 (5), 1-24.
- Louzis, D. & Angelo, V. & Vasilios, M. (2012). Macroeconomic and Bank-Specific Determinants of Non-Performing Loans in Greece: A Comparative Study of Mortgage, Business, and Consumer Loan Portfolios. *Journal of Banking & Finance* 36(4), 1012-1027
- Maina, E. I. (2015). *Determinants of Non-performing loans on Commercial Banks in Kenya*. (Unpublished Master's Thesis). Strathmore University
- Manz, F. (2019). Determinants of Non-performing Loans: What do we know? A systematic review and avenues for future research. *Management Quarterly Review*, vol. 69, issue 4, No 1.
- McNulty, J., Akhigbe, A. & Verbrugge, J. (2001). Small Bank loan quality in a Deregulated Environment: The Information Advantage Hypothesis. *Journal of Economics and Business*, 53, 325-39.
- Minsky, H. P. (1974). The Financial Instability Hypothesis. *SSRN Electronic Journal*. 4 (3), 132-14.
- Moody Investor Services (2019). *Default Trends and Rating Transitions in Africa*. Moody Investor Services, June 2019.
- Mugenda, O., & Mugenda, A. G. (2003). Research Methods – Quantitative & Qualitative Approaches. *African Centre for Technology Studies, Nairobi, Kenya*.

- Muriithi M.W. (2013). *The Causes of Non-Performing Loans in Kenya Commercial Banks*. (Unpublished MBA thesis). The University of Nairobi.
- Ndende, F. W. & Kavoya, J.S. (2017). The Effect of Market Structure on the Level of Non-performing Loans among Commercial Banks in Kenya. *International Journal of Scientific Research and Innovative Technology* 4 (9), 112-126.
- Prasanna, R., (2014). Challenges in Banking: A Nepalese Diaspora. *Socio-Economic Development Panorama*, 1(2), 9 - 22.
- Sala, V. & Saurina, J. (2002), Credit Risk in Two Institutional regimes: Spanish Commercial and Savings banks. *Journal of Financial Services Research*, 22(4), 134-145.
- Wairimu, M. M., & Gitundu, E. W. (2017). Macroeconomic Determinants of Non-Performing Loans in Kenya 1998-2015. *Research Journal of Finance and Accounting*. 8(4), 97-105.
- Warue, N.B., (2012). Factors Affecting Loan Delinquency in Microfinance Institutions in Kenya. *International Journal of Management Sciences and Business Research*, 1(12), 27-48
- Waweru, N.M., and Kalani, V.M. (2009). *Commercial Banking Crises in Kenya: Causes and Remedies*. Canada: York University Press
- Woodridge, J. M. (2009). *Introductory Econometrics: A Modern Approach. Economic Analysis*. 5th Edition, South-Western Cengage Learning, Mason.
- Crowley, J., (2007). Interest Rate Spreads in English-Speaking Africa. IMF Working Paper. April 2007, 123-45



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