e-ISSN 3027-0537
p-ISSN 3027-0375

10.5281/zenodo.10929115 Vol. 07 Issue 03 March - 2024 Manuscript ID: #1301

CREDIT RISK MANAGEMENT AND FINANCIAL PERFORMANCE: A STUDY OFSELECTED DEPOSIT MONEY BANKS IN NIGERIA

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ABSTRACT:

The study on the credit risk management and financial performance of deposit money banks in Nigeria, 2004 – 2022, aimed to understand the relationship between non-performing loans, total loans, bank's capital as the independent variables and return on investments, return on equity as the dependent variables. Financial statement of five commercial banks in Nigeria were obtained between 2004 and 2022. Panel regression analysis was used to analyse the time series data. The analysis covered the descriptive analysis, unit root analysis, pooled regression analysis, random effect, fixed effects as well as hausman tests. The post estimation tests included serial correlation analysis and heteroskedasticity tests. The study found that non-performing loans, total loans have negative and significant relationship with ROE but positive and significant relationship with ROI. Bank capital was also found to have positive and significant relationship with financial performance of deposit money banks in Nigeria. The study recommended, amongst others, that deposit money banks must ensure that the loans they disburse perform and also, they should device efficient systems of monitoring their total loan disbursements.

KEYWORDS:

Credit Risk; Financial Performance; Non-performing Loans; Total Assets; Return on Assets

1. Introduction

The effectiveness of credit risk management in the Nigerian banking system depends on factors such as counterparty issues and borrower performance, as emphasized by previous research. When banks lend money to borrowers, there is always a risk of default. While banks expect borrowers to repay their loans, some inevitably default, leading to a reduction in the banks' income. To minimize this exposure, it is crucial to have an efficient credit risk management framework in place, as it enhances the likelihood of long-term survival and growth. Effective risk management practices aim to handle risks in a manner that prevents the conversion of one type of risk into another.

The performance of deposit money banks relies heavily on the effectiveness of their credit management systems, as they earn a significant portion of their income from the interest on loans provided to small and medium-sized entrepreneurs (Abiola &Olausi, 2014). Despite the establishment of risk management departments in all deposit money banks to manage various risks, including credit risk, records indicate that non-performing loans in Nigerian deposit banks reached a high of 35% between 1999 and 2009 (Ogbuagu et al, 2016). The high level of non-performing loans, along with issues such as poor loan processing and insufficient collateral, are associated with weak and ineffective credit risk management, which adversely affects the banks' performance (Ogbuagu et al, 2016).

To address the recurring problem of non-performing loans in Nigerian banks, the Federal Government established the Asset Management Corporation of Nigeria (AMCON) in July 2010. Additionally, the Central Bank of Nigeria (CBN) has implemented various measures to ensure the sound and efficient performance of financial institutions. These measures include the recapitalization policy of July 2004, the issuance of Prudential Guidelines, and the establishment of the Nigeria Deposit Insurance Corporation (NDIC) in 1988 to safeguard depositors' funds. Non-compliant management can incur fines, sanctions, and license withdrawals (Ogboi, and Unuafe, 2013).

Given the importance placed by policymakers and industry practitioners on credit risk management as a strategy for preventing financial distress, it is crucial to evaluate whether this optimism is justified. However, empirical studies examining the actual impact of credit risk management on the financial performance of banks in Nigeria have yielded mixed results, creating uncertainty among academics and policymakers. Some studies, such as Kimari, (2013) andMusyoki&Kadubo, (2012), suggest that credit risk management strategies do have an impact on banks' performance, but the magnitude and direction of these impacts remain uncertain and conflicting. As a result, the theoretical implications of credit risk management on banks' performance are considered ambiguous.

For example, researchers like Epure and Lafuente (2013), among others, have found evidence indicating that credit risk management does not positively affect banks' profitability. Conversely, studies by Ogbulu and Eze (2016) and Abiola and Olausi (2014) have identified significant effects of credit risk management indicators on the performance of deposit money banks.

Due to the lack of consensus in empirical evidence, this study aims to empirically investigate and determine the impact of credit risk management on the performance of deposit money banks in Nigeria from 2017 to 2022. By doing so, this research seeks to provide clarity and insight into the current relationship between credit risk management practices and banks' financial performance, thereby addressing the existing uncertainty and gap in the literature.

1.2 **Objectives of the study**

The major aim of the study is to investigate the impact of credit risk management on the financial performance of deposit money banks in Nigeria, 2017 – 2022. Specifically, the study intends:

i. To investigate the relationship between non-performing loans (NPL) and return on investment (ROI) of deposit money banks in Nigeria.
ii. To analyze the relationship between Total Loans (TL) and return on investment (ROI) of deposit money banks in Nigeria.
iii. To study the relationship between Bank's Capital (BC) and return on investment (ROI) of deposit money banks in Nigeria.
iv. To understand the relationship between non-performing loans (NPL) and return on equity (ROE) of deposit money banks in Nigeria.
v. To find out the relationship between total loans (TL) and return on equity (ROE) of deposit money banks in Nigeria.
vi. To analyze the relationship between bank's capital (BC) and return on equity (ROE) of deposit money banks in Nigeria.

2. Literature Review

2.1 Conceptual Framework

2.1.1 Credit Risk

Taking appropriate actions to minimize losses is a fundamental aspect of effective credit riskmanagement (Mengze& Wei, 2015). Effective Credit Risk Management (ECRM) practices aim to minimize risks rather than eliminate them entirely. Implementing and maintaining ECRM requires a firm commitment to improving the efficiency of business processes.

According to Mengze& Wei (2015: 159-174), Efficient credit risk management (ECRM) offers several benefits, including:

1. Saving resources: ECRM helps save time, assets, income, property, and personnel by preventing losses and efficiently allocating resources.
2. Protection of reputation and public image: By effectively managing credit risk, organizations can safeguard their reputation and maintain a positive public image.
3. Prevention or reduction of legal liabilities: ECRM practices help identify and mitigate potential legal liabilities, reducing the likelihood of legal consequences.
4. Increasing operational stability and continuous improvement: Implementing ECRM enhances operational stability and fosters a culture of continuous improvement within the organization.
5. Protection of people and the environment: ECRM ensures the safety of individuals and the environment by identifying and mitigating risks associated with credit activities.
6. Compliance with regulations and legislation: ECRM helps organizations avoid fines and penalties resulting from non-compliance with regulations and legislation.
7. Preparedness for unforeseen circumstances: By effectively managing credit risk, organizations are better equipped to handle unexpected situations and mitigate their impact.
8. Enhanced competitive advantage: ECRM provides organizations with improved decision support and market intelligence based on accurate risk-adjusted management information, leading to a competitive advantage.

9. Improved shareholder value and confidence: Effective credit risk management enhances shareholder value and instills confidence, particularly during times of crisis when shareholder trust is crucial.
10. Clear definition of risk management techniques: ECRM assists in defining suitable risk management techniques, including identifying insurance needs.

In the banking sector, credit risk is a significant concern due to the perceived risks associated with clients and business conditions (Poudel, 2012). It is crucial to empirically examine these risks. While banks are expected to absorb losses from normal earnings, there may be unforeseen losses that cannot be absorbed in this manner.For banks, lending money is a core activity, and risk mitigation is an underlying principle in lending. Assessing credit risk is essential in determining a borrower's ability and willingness to repay the loan. Effective credit risk management is an ongoing process and inseparable from banking operations (Poudel, 2012;Mwangi, 2012).

To effectively manage credit risk, financial managers or risk managers must have a deep understanding of corporate financial risks and their interrelation with credit risk. This requires analysing the business environment in which the bank operates and assessing credit risk in terms of its likelihood and impact on the loan portfolio and profitability. This assessment provides important information for identifying, measuring, monitoring, and controlling credit risk, as well as ensuring adequate capital allocation and compensation for the risks incurred (Mwangi, 2012).

2.1.2 Non-performing Loans

Numerous studies have examined bank failures and have found that the quality of assets serves as an indicator of insolvency (Demirguc-Kunt, 2020). Banks often have a significant amount of impaired loans even before bankruptcy, and the presence of a large volume of bad loans in the banking system is generally a contributing factor to bank failures. Non-performing loans (NPL) is one of the primary causes of economic stagnation, as each troubled loan within the financial sector increases the likelihood of companies facing difficulties and becoming unprofitable.

Minimizing NPL is essential for fostering economic growth. When non-performing loans persist, they tie up resources in unprofitable areas, thereby impeding economic growth and reducing overall economic efficiency (Messai and Jouini, 2013). Shocks to the financial system can arise from company-specific factors (idiosyncratic shocks) or macroeconomic imbalances (systemic shocks). Generally, research conducted in developed economies has confirmed that macroeconomic conditions influence credit risk. This study aims to identify the factors that explain the quality of loans granted by banks, specifically focusing on bad debts. These factors may include macroeconomic variables as well as bank-specific variables.

2.1.3 Return on equity

Return on equity (ROE) is a financial metric that calculates the percentage of net income generated in relation to shareholders' equity. It is widely regarded as one of the most favoured and commonly used measures of corporate financial performance (Jufrizen et al., 2020), a notion also supported by Monteiro (2006).

Investors particularly appreciate ROE because it establishes a connection between the income statement (net profit/loss) and the balance sheet (shareholders' equity). Furthermore, the popularity of ROE stems from its role as the outcome of a structured financial ratio analysis known as Du Pont

analysis. This characteristic contributes to its appeal among analysts, financial managers, and shareholders alike (Stowe et al, 2002).

2.1.4 Return on Investment

Kousky et al (2019), argue that return on investment (ROI) is a conventional method employed in the private sector for assessing and contrasting projects and investments. Essentially, it involves dividing the net earnings from a project by its costs. In recent decades, the scope of ROI analysis has broadened beyond typical business applications in the private sector to encompass various public sector endeavours, including policies and programs related to conservation, poverty alleviation, healthcare, and education.

In the context of ROI, the returns refer to the quantified gains or benefits derived from a project (Kousky et al, 2019). In typical financial investments, these returns represent the earnings after deducting costs. ROI is closely interconnected with various other economic tools used for comparing the advantages and disadvantages of a project, such as cost-benefit analysis and cost-effectiveness analysis (Siddique et al., 2021:). Essentially, all these methodologies serve as systematic approaches to evaluate and compare the benefits and costs of a project, differing mainly in how they present the relationship between benefits and costs. The increasing adoption of ROI analysis can be attributed to the structured framework it offers for transparently comparing benefits and costs and making informed trade-offs. In essence, ROI can serve as a methodical way of setting priorities and conducting evaluations (Siddique et al., 2021).

2.2 Theoretical Framework

For this research work, three key theories on credit risk management and financial performance of banks will be examined. These are:

2.2.1 Trade-off Theory

The trade-off theory posits that banks face a trade-off between risk and return. According to this theory, banks can optimize their performance by striking a balance between taking on credit risk to earn higher returns and maintaining sufficient capital buffers to absorb potential losses. The theory suggests that banks should carefully manage their credit risk exposure to maximize their profitability while maintaining a level of risk that aligns with their capital position (Campbell & Kelly, 1994).

2.2.2 Agency Theory

Agency theory focuses on the relationship between banks' shareholders (principals) and management (agents). According to this theory, there is a potential conflict of interest between these parties, as managers may engage in risky lending practices to pursue personal gains at the expense of shareholders' interests. The theory emphasizes the importance of effective corporate governance mechanisms, such as board oversight and performance incentives, to align the interests of shareholders and management and mitigate credit risk (Eisenhardt, 1989).

2.2.3 Information Asymmetry Theory

Information asymmetry theory suggests that credit risk arises from the asymmetry of information between lenders (banks) and borrowers. Borrowers typically have more information about their own creditworthiness, while banks rely on imperfect and limited information. This theory highlights the challenges banks face in accurately assessing borrowers' creditworthiness, leading to the potential for

adverse selection and moral hazard. Effective credit risk management involves gathering relevant information, using credit scoring models, and employing risk mitigation techniques to address information asymmetry (Dawson et al., 2010).

2.3 Empirical Review

A study by Al Zaidanin& Al Zaidanin, (2021) to assess the extent to which various independent factors, including the capital adequacy ratio, non-performing loans ratio, cost-income ratio, liquidity ratio, and loans-to-deposits ratio, affect the financial performance of sixteen commercial banks operating in the United Arab Emirates. Their study utilized panel data covering the period from 2013 to 2019. Secondary data collected from banks is analysed using standard descriptive statistics and the random effect model for hypothesis testing.The regression analysis results indicate that the non-performing loans ratio and the cost-income ratio have a significant negative impact on the profitability of commercial banks in the United Arab Emirates.

Mayowa& Ehi (2019) conducted a study focusing on the relationship between credit risk management and the performance of Deposit Money Banks (DMBs) in Nigeria. The research covered the period from 2006 to 2016. The study utilized the dynamic Generalized Method of Moments (GMM) and Granger causality techniques to analyze the data.The findings of the study revealed a direct and statistically significant relationship between credit risk management variables of DMBs, such as capital adequacy ratio, non-performing loan ratio, and loan loss provision ratio, and the performance of the banks, as measured by return on assets. This suggests that effective credit risk management practices positively impact the financial performance of DMBs in Nigeria.

In a study conducted by Serwadda (2018), the impact of credit risk management on the financial performance of commercial banks in Uganda was analyzed. The research covered a period of 2006 to 2015 and utilized panel data from a sample of 20 commercial banks. The study employed descriptive statistics, regression analysis, and correlation analysis to examine the relationship.The findings of the study revealed that credit risk management significantly influences the performance of commercial banks in Uganda.

Similarly, Kishori and Jeslin (2017) conducted research to identify the various factors related to credit risk management and their influence on the financial performance of selected banks in India. The study covered the period from 2001 to 2011. The findings of the study revealed a significant negative effect of credit risk management on the financial performance of the banks under investigation. This suggests that inadequate or ineffective credit risk management practices can have adverse consequences on the financial performance of banks.

Ogbuagu et al (2016) conducted a study examining the relationship between Loan Risk (LR), Loan Risk Management (LRM), and the profitability of deposit money banks in Nigeria. The researchers collected data from published annual financial statements of fifteen deposit money banks, as well as from the Central Bank of Nigeria statistical bulletin and the Nigerian Stock Exchange. They utilized standard econometric techniques of balanced panel regression for their analysis.The findings of the study indicated that there is a strong causal and significant relationship between loan risk, loan risk management, and the parameters of bank profitability. This suggests that the level of loan risk and the effectiveness of loan risk management practices play a crucial role in determining the profitability of Nigerian banks.

A study by Ogbulu& Eze (2016) to investigate the impact of credit risk management on the performance of deposit money banks inNigeria using the ECM and Granger causality techniques in addition to the IRF and VDC methodology found that selected credit risk management indicators under studysignificantly impact on the performance of deposit money banks measured as return on equity, return on total assets,and return on shareholders' fund respectively. However, the findings report no evidence of significant granger causalityrelationship between the various credit risk management indicators and the various measures of performance except fora uni-directional granger causality relationship from ROE to RNPD and from ROTA to RNPS respectively. The study recommended that given the observed significant relation between credit risk management andperformance, deposit money banks in Nigeria should always pay particular attention to their credit risk managementpolicies to significantly improve on the performance of these banks.

Abiola &Olausi (2014) conducted a study to explore the impact of credit risk management on the performance of deposit money banks in Nigeria. The researchers employed a panel regression analytical model to analyze the relationship. In their analysis, they used Return on Equity (ROE) and Return on Assets (ROA) as performance indicators, while Non-Performing Loans (NPL) and Capital Adequacy Ratio (CAR) were considered as credit risk management indicators.The findings of the study demonstrated that credit risk management plays a significant role in influencing the profitability of deposit money banks in Nigeria.

In a study conducted by Kargi (2011), the impact of credit risk on the profitability of Nigerian banks was evaluated. The researcher collected financial ratios as measures of bank performance and credit risk from the annual reports and accounts of selected banks for the period from 2004 to 2008. The collected data were then analyzed using descriptive statistics, correlation analysis, and regression techniques.The findings of the study revealed that credit risk management significantly influences the profitability of Nigerian banks. Specifically, the results indicated that the levels of loans and advances, non-performing loans (NPLs), and deposits have a significant impact on banks' profitability. The study concluded that banks' profitability is inversely affected by these factors, which can expose them to increased risks of illiquidity and financial distress.

Similarly, Kithinji (2010) conducted a study in Kenya to explore the impact of credit risk management on the profitability of deposit money banks. The researcher utilized secondary data and collected information on variables such as credit amount, non-performing loans, and profits. The study covered the period from 2004 to 2008 and employed regression analysis for data analysis. Surprisingly, the results indicated that the level of credit and non-performing loans did not have a substantial influence on the profits of deposit money banks.

In a similar vein, Muthee (2010) undertook a study investigating the relationship between credit risk management and the profitability of deposit money banks in Nigeria. The researcher employed the regression analytical technique to examine the connection between non-performing loans (NPL) and return on investment (ROI). The study's findings indicated that credit risk management significantly impacts the profitability of all the selected deposit money banks included in the analysis.

Hosna et al., (2009) conducted a study in Sweden to examine the relationship between credit risk management and the profitability of deposit money banks. They employed multiple regression analysis and made noteworthy findings. Specifically, their research revealed a significant and negative association between non-performing loans and return on investment. However, the relationship between non-performing loans and return on equity was positive but statistically insignificant.

2.4 Literature Gap

The empirical literatures reviewed have shown that the studies such as Al Zaidanin& Al Zaidanin, (2021), Kargi (2011), Hosna et al., (2009), and Ogbuagu et al (2016) found a strong causal relationship between credit risk management and banks financial performance. For Ogbulu& Eze (2016), their study found no causal relationship between credit risk management and bank's profitability.

Due to the lack of consensus in empirical evidence, this study aims to empirically investigate and determine the impact of credit risk management on the performance of deposit money banks in Nigeria from 2017 to 2022. By doing so, this research seeks to provide clarity and insight into the current relationship between credit risk management practices and banks' financial performance, thereby addressing the existing uncertainty and gap in the literature.

2.5 Hypotheses

H_{01}: There is no significant relationship between the non-performing loans (NPL) and return on investment (ROI) of deposit money banks in Nigeria.

H_{02}: There is no significant relationship between total loans (TL) and return on investment (ROI) of deposit money banks in Nigeria.

H_{03}: There is no significant relationship between bank's capital (BC) and return on investment (ROI) of deposit money banks in Nigeria.

H_{04}: There is no significant relationship between non-performing loans (NPL) and return on equity (ROE) of deposit money banks in Nigeria.

H_{05}: There is no significant relationship between total loans (TL) and return on equity (ROE) of deposit money banks in Nigeria.

H_{06}: There is no significant relationship between bank's capital (BC) and return on equity (ROE) of deposit money banks in Nigeria.

3. Methodology

3.1 Research Design

According to Okolo (2009), research design is the plan and analysis so as to adequately answer the research questions. Since the data for this study was secondary time series in nature and involving dependent and independent variables, the quasi-experimental research design was used for the research study. The sample size chosen for the purpose of this study was five commercial banks listed on the floor of the Nigerian Stock Exchange. These banks are Access bank, First bank, Zenith bank, Fidelity bank, and United Bank for Africa (UBA). These banks were purposively chosen to represent the population of the study. The data used for this study were collected and collated from the annual reports of the sample banks between 2017 and 2022. The variables of focus were return on equity (ROE), return on investment (ROI), non-performing loans (NPL), total loans (TL), and bank's capital (BC).

3.2 Operational measures of the variables

3.2.1 Dependent variables

Returns on Investment (ROI): This is one of the variables used to measure of banks profitability. The ROI shows how much the management of an organization has been able to use its capital to generate profit over a period (Adekunle et al, 2015). The ROI is calculated by dividing net profit by cost of investment and then multiply the result by 100.

Returns on Equity (ROE): is another core variable used in measuring the profitability of a firm. It measures how much the management has been able to use the shareholders' funds to generate profit over a period (Adekunle et al, 2015). ROE = (Net Income / Shareholders' Equity) * 100

3.2.2 Independent variables

Bank'sCapital (BC):is the total amount of money available to the bank which enables it to withstand financial obligations and challenges. The more the bank capital, the more it is expected to withhold financial challenges (Adekunle et al, 2015). It is used in the models due to its importance in contributing to a bank's profitability.

Non-performing Loans (NPL): These are loans that have been in fault for an extended period. The borrowers have stopped servicing the loans and have defaulted over time. This is one of the credit risks banks undertake when issuing loans and advances (Ogbulu& Eze, 2016).

Total loans (TL): These are all the loans and advances issued to borrowers by the banks. These loans and advances are expected to be serviced by paying an interest on them, in addition to a portion of the capital, until the loan is offset (Ogbulu& Eze, 2016).

3.3 Model Specification

The functional models for the study are specified as follows:

ROI = f(NPL, BC, TL) - - - - ---- -- - - - - - - - - - - -- - - - - - equ(1)

ROE = f(NPL, BC, TL) - - - - ---- -- - - - - - - - - - - -- - - - - - equ(2)

The mathematical and econometric models are stated as follows:

$ROI = \alpha_0 + BC\beta_1 – TL\beta_2 – NPL\beta_3 + \mu$ ……. Equ(3)

$ROE = \alpha_0 + BC\beta_1 – TL\beta_2 – NPL\beta_3 + \mu$ ……. Equ(4)

Aprior expectations:

$\beta_1 > 0$, $\beta_2, \beta_3 < 0$

3.4 Data Analysis

Regression analysis of panel data is a data structure which is panel data. Generally, parameterestimation in the regression analysis with cross section data is done by estimating the least squares method called Ordinary Least Square (OLS). Regression Method Data Panel will give the result of estimation which is Best Linear Unbiased Estimation (BLUE).

Data Panel Regression is a combination of cross section data and time series, where the same unit cross section is measured at different times. So, in other words, panel data is data from some of the same individuals observed in a certain period of time. If we have T time periods (t = 1,2, ..., T) and N the number of individuals (i = 1,2, ..., N), then with panel data we will have total observation units of N x T. Stages of the panel regression analysis include:

3.4.1 Unit root tests

The unit root test is the acceptable method to check the stationarity status of time series variable in a model. This study uses the Augmented Dicky fuller (ADF) test to determine the stationarity of the variables under investigation (Sulaiman et al., 2022). A stationary unit root shows that the variable can be relied upon for further analysis (Al Zaidanin et al., 2022). However, when a unit root is not stationary, it shows that any estimation from using the variable will lead to unreliable and misleading regression results. According to Fattahi et al. (2017), care must be taken when dealing with unit root tests.

3.4.2 Pooled Regression Analysis

Pooled regression analysis, also known as pooled OLS (Ordinary Least Squares), is a statistical method used to estimate the relationship between a dependent variable and one or more independent variables. It is commonly used in econometrics and social sciences when dealing with panel data or cross-sectional data (Bliese et al., 2020).

Pooled regression analysis combines data from multiple cross-sectional units (such as individuals, firms, or countries) observed over time into a single dataset. This pooling of data allows for a larger sample size, which can lead to more reliable and precise estimates of the regression coefficients (Bliese et al., 2020).

In pooled regression analysis, the dependent variable is regressed on the independent variables using the ordinary least squares method. The goal is to find the best-fitting linear relationship that explains the variation in the dependent variable based on the independent variables (Sulaiman et al., 2022).

According to Kelilume(2016), the pooled regression model can be represented as:

$Y = \beta 0 + \beta_1 X_1 + \beta_2 X_2 + ... + \beta n Xn + \varepsilon$……..equ(5)

Where:

Y is the dependent variable.

X_1, X_2, ..., Xn are the independent variables.

β_0, β_1, β_2, ..., βn are the regression coefficients that represent the effect of each independent variable on the dependent variable.

ε is the error term, which captures the unexplained variation in the dependent variable.

By estimating the regression coefficients, the pooled regression analysis allows us to quantify the direction and magnitude of the relationship between the dependent variable and the independent variables (Fattahi et al., 2017).

3.4.3 Fixed Effects

Fixed effects in panel regression analysis, refer to individual-specific effects or characteristics that are constant over time but vary across individuals in the panel dataset (Hill et al., 2020). Fixed effects are included in the regression model to account for the heterogeneity across individuals and control for unobserved factors that are specific to everyone (Hill et al., 2020).

The inclusion of fixed effects involves adding dummy variables or indicators for each individual in the regression equation. These fixed effects capture the average differences between individuals that are not explained by the observed independent variables. The fixed effects essentially capture the individual-specific intercepts or intercept adjustments, allowing for within-individual comparisons and controlling for time-invariant individual-specific effects (Imai et al., 2021).

The fixed effects approach can be mathematically represented as follows:

$Yit = \beta_0 + \beta_1 Xit + \alpha i + \varepsilon it$

where:

Yit represents the dependent variable for individual i at time t.

Xit represents the independent variable(s) for individual i at time t.

αi represents the fixed effect for individual i.

β_0 and β_1 are the regression coefficients to be estimated.

εit represents the error term.

By including the fixed effects, the model estimates the average effect of the independent variable(s) across individuals, while accounting for the individual-specific effects. The fixed effects capture the time-invariant differences between individuals that may affect the dependent variable, such as individual-specific abilities, preferences, or unobserved characteristics (Imai et al., 2021).

The fixed effects estimator controls for individual-specific heterogeneity by differentiating the individuals based on their unique fixed effects. It removes the individual-specific effects from the error term, which helps mitigate endogeneity concerns and improve the consistency of the estimated coefficients. Fixed effects models are particularly useful when there are omitted variables that are constant over time but vary across individuals (Timoneda, 2021).

Interpreting the coefficients in fixed effects models focuses on within-individual comparisons. The estimated coefficients represent the relationship between the independent variable(s) and the dependent variable within each individual, capturing the variations and changes over time within each individual (Timoneda, 2021).

3.4.4 Hausman Test

The Hausman test is commonly employed in the context of panel data analysis, particularly when deciding between fixed effect (FE) and random effect (RE) models. The test evaluates whether the random effect assumption, which assumes that the individual-specific effects are uncorrelated with the

independent variables, is violated. If the random effect assumption is violated, the fixed effect model is preferred (Hill et al., 2020).

The general steps involved in conducting the Hausman test are as follows:

1. Estimate the coefficients using both the fixed effect model and the random effect model.
2. Obtain the covariance matrix or standard errors of the coefficient estimates from each model.
3. Calculate the test statistic, which is typically denoted as the Hausman statistic (H). The formula for the Hausman statistic is as follows:

$$H = (\beta_{FE} - \beta_{RE})' [Var(\beta_{FE}) - Var(\beta_{RE})]^{(-1)} (\beta_{FE} - \beta_{RE})$$

where:

β_{FE} represents the coefficient estimates from the fixed effect model.

β_{RE} represents the coefficient estimates from the random effect model.

$Var(\beta_{FE})$ represents the covariance matrix of the fixed effect estimates.

$Var(\beta_{RE})$ represents the covariance matrix of the random effect estimates.

4. Determine the critical value for the Hausman test based on the desired level of significance (e.g., 5% or 1%). The critical value is typically obtained from a chi-squared distribution with degrees of freedom equal to the difference in the number of parameters between the two models.
5. Compare the calculated Hausman statistic to the critical value. If the calculated Hausman statistic exceeds the critical value, it suggests that the coefficients in the two models are significantly different from each other. In such cases, the fixed effect model is preferred. If the calculated Hausman statistic is below the critical value, there is no significant difference between the coefficients, indicating that the random effect model is appropriate.

The Hausman test helps in model selection by providing statistical evidence on whether the random effect assumption holds and whether there is correlation between the individual-specific effects and the independent variables. It helps researchers determine which model is more suitable for their data and research question, considering factors such as endogeneity, efficiency, and consistency (Imai et al., 2021). The selection between the FE and RE will determine the model for statistical interpretations.

3.4.5 Software used

The software used for the data analysis is E-views version 10. The choice of E-view is for its robust data and results presentations.

4. Results and Discussion

4.1 Descriptive Analysis

Table 4.1: Descriptive Statistics

	LOGROI	LOGNPL	LOGROE	LOGNP	LOGTL
Mean	17.71189	-1.865370	17.71685	15.58355	1.433648
Median	16.66722	-1.994544	15.20871	14.24593	1.564527
Maximum	22.67450	0.007560	23.14235	19.75290	2.958575
Minimum	13.42016	-4.110306	14.35976	12.69179	-0.700581
Std. Dev.	3.230544	1.142274	3.641327	2.504743	1.033942
Skewness	0.267806	0.009525	0.484998	0.447887	-0.199433
Kurtosis	1.519519	2.542892	1.428302	1.535938	1.997207
Jarque-Bera	2.375425	0.209311	3.411126	2.823143	1.116159
Probability	0.304918	0.900635	0.181670	0.243760	0.572307
Sum	407.3735	-44.76887	425.2043	358.4216	32.97391
Sum Sq. Dev.	229.6011	30.01015	304.9631	138.0222	23.51880
Observations	23	24	24	23	23

Descriptive statistics are essential in data analysis because of the crucial insights it provides into the nature of the variables used. These insights include the dataset's characteristics, patterns or trends (Lawless et al., 2010).

The descriptive analysis above shows that all variables have a normal distribution based on Jarque-bera's (J.B.) probabilities results. The J.B. probabilities are more than 0.05. The normality of the dataset distribution shows that the dataset can be used for further analysis. The std dev. reveals how much the data has shifted from the true mean. The closer the std dev is to zero, the closer the data is to its proper standard.

4.2 Unit Root Tests

The unit root test reveals whether the data used are stationary or not. Stationarity helps improve the dataset's forecasting ability (Pesaran, 2007). Non-stationary time-series data will result in spurious results and poor forecasting power (Pesaran, 2007).

Coefficient	At Levels (Prob.)	First Difference (Prob.)	Stationarity
LogROI	0.0019	0.0400	I(0)
LogROE	0.0548	0.1965	I(0)
LogNPL	0.0019	0.0890	I(0)
LogBC	0.0588	0.2204	I(0)
LogTL	0.0019	0.3405	I(0)

Source: Author's computation using Eviews 12.

The above tests for unit root of the variables at levels and first difference. The results reveal that the data are stationary at levels. This makes the results suitable for further analysis. According to Pesaran (2007), care must be taken when interpreting time-series data exhibiting trends as they present misleading information.

4.3 Regression Analysis

The research analyses the data using pooled, fixed, and random effects. The choice of analysis between the fixed and random effects was made using the Hausman tests' results.

4.3.1 Pooled Regression Results

Model I

Dependent Variable: LOGROI
Method: Panel Least Squares
Date: 06/14/23 Time: 14:55
Sample: 2017 2022
Periods included: 6
Cross-sections included: 6
Total panel (unbalanced) observations: 16

Variable	Coefficient	Std. Error	t-Statistic	Prob.
LOGNPL	0.683884	0.192444	3.553682	0.0052
LOGBC	-0.219088	0.193084	-1.134679	0.2830
LOGTL	0.472558	0.270490	1.747044	0.1112
C	5.602448	1.393560	4.020241	0.0024

R-squared	0.853903	Mean dependent var	1.561685
Adjusted R-squared	0.780854	S.D. dependent var	1.075410
S.E. of regression	0.503431	Akaike info criterion	1.745258
Sum squared resid	2.534431	Schwarz criterion	2.034978
Log-likelihood	-7.962061	Hannan-Quinn criter.	1.760094
F-statistic	11.68953	Durbin-Watson stat	1.078222
Prob(F-statistic)	0.000643		

Source: Author's computation (2023)

Model II

Dependent Variable: LOGROE
Method: Panel Least Squares
Date: 06/14/23 Time: 14:59
Sample: 2017 2022
Periods included: 6
Cross-sections included: 6
Total panel (unbalanced) observations: 16

Variable	Coefficient	Std. Error	t-Statistic	Prob.
LOGNPL	0.862134	0.532144	3.553682	0.0052
LOGBC	-0.769088	0.763184	-1.007736	0.3130
LOGTL	0.892518	0.321290	2.777920	0.0002
C	3.612238	1.611260	2.241871	0.0024

R-squared	0.743213	Mean dependent var	1.568125
Adjusted R-squared	0.653824	S.D. dependent var	1.241230
S.E. of regression	0.201221	Akaike info criterion	1.097338
Sum squared resid	2.587311	Schwarz criterion	2.219028
Log-likelihood	-7.190011	Hannan-Quinn criter.	1.983234
F-statistic	17.63123	Durbin-Watson stat	1.045622
Prob(F-statistic)	0.000643		

The pooled regression results show that some of the independent variables are related to the dependent variables in model I and model II. The result reveals that NPL is statistically significant in model I while model II shows that NPL, TL are statistically significant.

4.3.2 Fixed Effects Regression Results

Model I

Dependent Variable: LOGROE
Method: Panel Least Squares
Date: 06/14/23 Time: 14:56
Sample: 2017 2022
Periods included: 6
Cross-sections included: 6
Total panel (unbalanced) observations: 16

Variable	Coefficient	Std. Error	t-Statistic	Prob.
LOGBC	0.994321	0.005138	193.5107	0.0000
LOGTL	-0.382175	0.032313	-11.82732	0.0071
LOGNPL	-0.136331	0.014042	-9.708951	0.0104
C	5.552757	0.636872	8.718799	0.0129

Source: Author's computation using Eviews

Model II

Dependent Variable: LOGROI
Method: Panel Least Squares
Date: 06/14/23 Time: 14:56
Sample: 2017 2022
Periods included: 6
Cross-sections included: 6
Total panel (unbalanced) observations: 16

Variable	Coefficient	Std. Error	t-Statistic	Prob.
LOGBC	23.31002	4.121206	5.656116	0.0000
LOGTL	7.164959	2.162502	3.313275	0.0005
LOGNPL	2.909833	1.084958	2.681977	0.0000
C	0.619157	0.110932	5.581410	0.0000

Source: Authors computation using Eviews (2023)

In this result, individual-specific effects of unobserved factors constant over time, although different across the individual companies, are controlled. The exclusion of fixed effects for each company in the regression model, the fixed effects capture as well as controls for these unique individual effects (Mummolo& Peterson, 2018). This is important because the unobserved variables with a direct correlation with the independent and dependent variables are adequately handled for more accurate and unbiased estimates (Mummolo& Peterson, 2018).

The results in the two models reveal that all the variables are statistically significant, giving a high and unbiased estimate of the variables used.

4.3.3 Random Effects

Model I

Dependent Variable: LOGROI
Method: Panel EGLS (Cross-section random effects)
Date: 06/14/23 Time: 14:57
Sample: 2017 2022
Periods included: 6
Cross-sections included: 6
Total panel (unbalanced) observations: 22
Swamy and Arora estimator of component variances

Variable	Coefficient	Std. Error	t-Statistic	Prob.
C	3.451295	0.285766	12.07735	0.0000
LOGNPL	0.751604	0.056187	13.37678	0.0000
LOGBC	-0.233188	0.048883	-4.770309	0.0002
LOGTL	0.283092	0.040714	6.953150	0.0000

Source: Author's computation (2023)

Model II

Dependent Variable: LOGROE
Method: Panel EGLS (Two-way random effects)
Date: 06/27/23 Time: 10:26
Sample: 2017 2022
Periods included: 6
Cross-sections included: 3
Total panel (balanced) observations: 22
Swamy and Arora estimator of component variances

Variable	Coefficient	Std. Error	t-Statistic	Prob.
C	123.3002	65.26128	1.889331	0.0832
LOGNPL	-23.64959	12.84854	-1.840644	0.0905
LOGTL	1.012333	1.195313	0.846918	0.1073
LOGBC	1.909833	1.104167	1.729660	0.1093

Source: Authors computation using Eviews (2023)

Borenstein et al. (2010) opine that random effect combines within-individual and between-individual variations, enabling it to take advantage of panel data structure. Random effects produce more accurate estimates than pooled analysis or fixed effects, primarily when no correlation exists between unique individual effects and independent variables (Borenstein et al., 2010). Combining the time-invariant and individual-specific variations, random effect presents better parameter estimates with more reliable statistical inference (Borenstein et al., 2010).

4.3.4 Hausman Test

Model I

Correlated Random Effects - Hausman Test
Equation: Untitled
Test cross-section random effects

Test Summary	Chi-Sq. Statistic	Chi-Sq. d.f.	Prob.
Cross-section random	306.119843	4	0.0000

** WARNING: estimated cross-section random effects variance is zero.

Source: Author's computation

Model II

Correlated Random Effects - Hausman Test
Equation: Untitled
Test cross-section random effects

Test Summary	Chi-Sq. Statistic	Chi-Sq. d.f.	Prob.
Cross-section random	391.873990	2	0.0000

Source: Author's computation

The Hausman test results help choose between fixed and random effects result from analysis, which will be used for hypothesis testing (Amini et al., 2012). For the above analysis, the Hausman test results reveal a statistically significant chi-square for random effects using the p-value (0.0000) for models I and II. This implies that individual-specific effects may be correlated with the independent variables. Therefore, the fixed effect is more appropriate for hypothesis testing.

4.4 Hypothesis Testing

Model I

Using the fixed effect regression analysis, the results revealed that the coefficient of determination, R-Square, is 0.999 indicating that the changes in the independent variables cause 99.9 percent of the changes in the dependent variable. Again, the results show no serial autocorrelation based on the Durbin-Watson result of 2.

H_{01}: There is no significant influence of non-performing loans (NPL) on ROE.

The result reveals a negative relationship between non-performing loans and ROE. The result shows that as NPL increases by 1 per cent, ROE decreases by 13.6% and vice versa. The result shows that NPL is statistically significant using the t-value probability (0.0104). We will therefore accept the alternative hypothesis, reject the null and conclude that there is a meaningful relationship between NPL and return on equity.

H_{02}: There is no significant impact of bank capital on ROE.

Results show that bank capital is positively related to ROE. The result reveals that as BC increases by 1%, ROE increases by 99% and vice versa. BC is statistically significant at a 5% confidence interval (prob =0.0000). The result shows that we will accept the alternative hypothesis, reject the null hypothesis and conclude that there is a significant relationship between bank capital and return on equity of the listed companies.

H_{03}: There is no significant influence of TL on ROE.

Again, the results show a negative and significant relationship between TL and ROE. The result indicates that as TL increases by 1 percent, ROE decreases by 38% and vice versa. TL is also shown to be statistically significant using the t-value probability of 0.0071. We will accept the alternative hypothesis, reject the null and conclude that there is a significant relationship between total loan and return on equity of the companies listed on the Nigerian Stock Exchange.

Model II

H_{04}: There is no significant influence of BC on ROI.

Results reveal that bank capital has a positive and significant relationship with return on investments. Results show that as BC increases by 1 unit, ROI increases by 23.3 units and vice versa. BC is also statistically significant at a 5% significance level based on the t-value prob (0.0000). We will reject the null hypothesis, accept the alternative and conclude that there is a significant relationship between BC and ROI.

H_{05}: There is no significant influence of TL on ROI.

Further, the result reveals that total loan positively affects the companies' return on investments. As TL increases by a unit, ROI increases by 7.2 and vice versa. TL is also statistically significant at a 5% level using the t-value prob (0.0005). We will reject the null, accept the alternative and conclude that there is a substantial relationship between TL and ROI of the listed companies.

H_{06}: There is no significant influence of NPL on ROI.

Finally, the result reveals that non-performing loans positively affects the companies' return on investments. As NPL increases by a unit, ROI increases by 2.9 units and vice versa. NPL is also statistically significant at a 5% level using the t-value prob (0.0000). We will reject the null, accept the alternative and conclude that there is a substantial relationship between NPL and ROI of the listed companies.

4.5 Discussion of Findings

Findings from the study have shown that the free cashflow variables significantly influence the financial performance of the listed companies. While non-performing loans and total loans disbursed during the period negatively affect the return on equity. In the same analysis shows bank capital to positively affect ROE. This is expected apriori as more loans taken and more non-performing loans will negatively affect the financial performance of the listed companies. With rising total loans and non-performing loans, the banks will be burdened with the task of writing off bad debts, increasing

cost of debt recovery (Ogbulu& Eze, 2016). These will have negative effect on their financial performance over an extended period of time. The findings of this study agree with the findings of Ali et al. (2018), who found that net profit significantly influences listed firms' cashflow.

A further analysis reveals that bank capital positively influences return on investments. This is also expected apriori as increase in capital increases ROI and vice versa. With the banks' increases in capital, their expected returns on investments will increase as they will have more funds to invest in diverse sectors and economies and hedge against economic fluctuations. Akomeah et al (2020) and Alshatti, (2015) findings also agree with this finding on the importance of capital to financial performance of listed companies.

However, non-performing loans and total loans were found to have positive relationship with ROI. This is not expected apriori as increases in non-performing loans and total loans will decrease the capital available for investments. This disagrees with the findings of Poudel (2012) and Adekunle et al (2015) who found that NPL and TL are negatively related to returns on investments.

5. Conclusion and Recommendations

5.1 Conclusion

This research study found that non-performing loans and total loans have negative and significant relationship with returns on equity. However, non-performing loans and total loans were found to have positive and significant relationship with returns on investment over the same period. The study showed that bank capital (BC) has positive and significant relationship with the financial performance of the deposit money banks listed on the Nigerian stock exchange. Therefore, this indicates that deposit money banks should focus more on the performance of their loans while watching their total loan disbursements.

5.2 Recommendations

The study recommends the following:

1. Deposit money banks must focus on ensuring that the loans they disburse perform. One way to ensure this is to effectively profile their loan clients, their businesses, and most importantly, have one officer stationed in the client's office. All these is to ensure that the borrowed funds are not mismanaged. This will reduce the incidences non-performing loans.
2. The deposit money banks must also device efficient mechanisms to monitor their total loans disbursements. Although the apex banks already have some measures against this, each deposit money banks must also build on the existing measures of the apex bank to solidify their loan disbursement processes and ensure that only performing loans are disbursed.
3. Finally, and with an efficient management at the top, banks can increase their capital when they are able to reduce the incidences of non-performing loans, total loans. The reduction in these variables will directly and indirectly increase the financial performances of deposit money banks.

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