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Credit Risk Management as a Determinant of Non-Performance Loan of Deposit Money Banks in Nigeria

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Abstract: This study examined this effect of credit risk management of non-performing loans of Deposit Money Banks in Nigeria. Credit risk management was measured with Capital adequacy, Loan and advance, Loan loss provision and Loan to total asset ratio while non-performing loan was measured with non-performing loan to total loan ratio. The study covered a period of 10 years spanning from 2013 to 2022 and all the 14 listed banks in Nigeria. As provided, the study used both cross sectional and time series data. Thus, the study adopted panel regression estimation techniques which comprises of OLS estimation, the Fixed effect model and Random Effect Model. It was discovered that CAA (Capital Adequacy Ratio) had a positive and significant effect on NPL/TLR (Non-Performing Loan to Total Loan Ratio). LLP (Loan Loss Provision) and LTAR (Loan to Total Asset Ratio) had a positive but insignificant effect on NPL/TLR. LA (Loan and Advances) had a negative and insignificant effect on NPL/TLR. From the analysis conducted it was concluded that that credit management components have the capacity to influence non-performing loan of commercial banks in Nigeria though at different significant levels. In-line with this, discovery, it was recommended that the management should consider different loan loss provisioning approaches for specific loan categories to minimize the adverse effect of loan loss provision.

Keywords: Credit Risk Management, Capital Adequacy, Loan and Advance, Non-Performing Loan, Non-Performing Loan

1. Introduction

Commercial banks in Nigeria are at the heart of economic activities. They transfer resources from the surplus to the deficit side of economy [7]. Their financial services improve their significance. The banking sector has faced numerous difficulties over the years and it seems that only banking firms with adequate knowledge of credit management are still in existence. Since the bulk of banks' profitability comes from the loans they issue to customers, having non-performing loans would decisively hamper their performance.

Credit management has been defined by [20] to be the implementation of tactics and strategies to ensure that a bank is exposed to credit risks which it can comfortably bear. This implies that there are credit risks which some banks are not supposed to undertake because it would be too much for them. One of the policies enforced by the apex bank on deposit money banks when it comes to credit management is the payment of a certain sum of money into the apex bank as collateral. Also, the central bank requires that banks should have a minimum capital of ₦25,000,000,000 at the national level, ₦10,000,000,000 at the regional level and ₦50,000,000,000 for international commercial banks [33]. The stipulation of these payments and many more makes the banking sector one of the most regulated sector in the Nigerian economy. By keeping these sums with the apex bank, when commercial banks are in distress, some amounts can easily be released to them in order for them to stay afloat.

According to [20] issuing loans to customers and clients is one of the ways commercial banks make profit, because those loans are given at an interest rate. However, in order to safeguard against unforeseen circumstances, banks sometimes make provisions for these loans in case they (the loans) would not be repaid. These loan loss provisions are simply one of the initiatives for credit management that commercial banks implement. Another common credit management initiative is loans and advances. In this scenario, security (collateral) is generated for the amount that is to be given to the borrowers. That is, the bank gets properties or items from the borrower in exchange for loans, which might have an equal value to the amount being borrowed.

Banks use loan to total assets ratio to know how many portions of the total asset can be used to cover up loans that have been given out [1]. This estimation would easily guide banks' management on when to issue loans and when not to issue loans to customers. It could also help them in estimating the amount of money that can be issued to clients. In essence, credit management cannot be completely separated from the strategies which a bank utilizes to get the ideal performance and wealth for their shareholders, because it encompasses capital adequacy, loan loss provision, loan and advances and loan to total asset ratio.

One of the primary obligations of commercial banks, aside from issuing credit and loan facilities to clients is to accept deposits from them. This basic responsibility automatically entrusts banks with the task of ensuring liquidity for their operations in the short and long term. To properly achieve the objectives of making profit and safeguarding customers' deposit, credit management must be understood by banks [24]. The risk of non-performing loans are higher when banks are unable to distinguish customers who are credible and who have tangible assets which can serve as collaterals for their loans and credit facilities.

In issuing credit to customers, different areas must be examined such as the character of the borrower, his/her collateral, cash, condition and capital [39]. If properly examined, these areas help in ensuring that non-performing loans of banks are reduced to the barest minimum. Unfortunately, not all loan officers in banks are properly oriented concerning lessons like this. In fact, it appears that some of them are not qualified, as they do not have a sound knowledge of credit management and how it influences the performance of banks. Thus, training and seminars should be undertaken occasionally to bridge the gaps in knowledge which workers might have when it comes to the area of credit management.

Over the years, various scholars have investigated the effect of capital adequacy on bank performance. Scholars like [41, 23, 43] disclosed that capital adequacy insignificantly influenced bank performance. On the contrary, the findings of [35, 38, 10, 19, 44, 25, 32] unveiled that a positive significant relationship existed between capital adequacy and bank performance in Nigeria. The discrepancies in these findings have prompted further investigation to be carried out, though, non-performing loans would be preferred as the dependent variable.

Loan loss provision has been made a predictor of banks' profitability by different academics. From the studies of [37, 47, 2], in Malaysia, [7, 22, 5], findings disclosed a positive and significant effect of loan loss provisions on the profitability of banks. The studies of [27, 31, 46, 20] revealed that loan loss provision was negatively related to profitability. Another stream of researchers, [29] in Kenya, and [21] in Nigeria showed that loan loss provision insignificantly influenced the profitability of banks. By utilizing loan loss provision alongside other proxies of credit management, this study hopes add to literature by disclosing a more current finding that would reflect recent events in the banking sector.

From the studies at the disposal of the researcher, loans and advances has been explored as a predictor of banks' performance. From the findings of [49, 19, 26, 6, 18, 3], loans and advances was found to have a positive significant effect on the performance of banks. Another line of authors, [17, 13] in Kenya, [12, 42], revealed that loans and advances has a negative effect on banks' performance, while the study of [9] showed that total loans to total deposits ratio had an insignificant positive relationship with banks' performance. These studies show mixed findings. Furthermore, there is a need to get more current findings, which is why this study would use data from 2013 to 2022.

Loans to total asset ratio is a common proxy of credit management. This has been recognized by various researchers and used in different works. The studies of [16, 30, 39, 14] in South Africa, [15, 34] showed that loans to total assets ratio had an inverse effect on financial performance of banks. A different finding was revealed by [8, 40, 36] that loan to total asset insignificantly influence the performance of banking firms. A diverse finding was also discovered by [29, 4, 48] that loan to total deposit ratio had a positive significant effect on bank financial performance. From these findings, it is clear that the variances serve as a motivation for further and more recent research to be undertaken. To bridge this gap, this study aims to examine the effect of credit management on non-performing loans in Nigerian commercial banks.

2. Conceptual Issue

2.1. Credit Management

Credit management can be defined as those processes and procedures which eliminate or reduce the risk associated with financial vulnerability in banks [23]. Aside the banking sector, the corporate world has shown over time that a deficit knowledge on credit management can bring down the financial viability of a firm. Evidence is found in firms like the Lehman Brothers, Enron, Worldcom and so on [13, 25]. These firms did not have enough money to sustain the operations of their business, which led them to bankruptcy. Proper credit management initiatives would have informed them of better decisions to take and those not to take.

Credit management has been defined by [20] to be the implementation of tactics and strategies to ensure that a bank is exposed to credit risks which it can comfortably bear. This implies that there are credit risks which some banks are not supposed to undertake because it would be too much for them. Banks' management should ensure that their loan officers have sound knowledge in credit management so that they would not expose the bank to credit risks that would overwhelm its financial strength. Perhaps, inadequate knowledge made banks to be exposed financially, which led to some firms in the banking sector.

Credit management has been taken up a notch in Nigeria through the central bank, who mandated firms in the banking sector to have a constant review of their credit risks to ensure that they do not exceed the benchmark recommended by their analysts [11]. Thus, credit management can be seen as those regulations and principles which lay the foundation for accepting or rejecting certain degrees of credit risks within a period by banks [6]. Even though emphasis is made in the banking sector, in relation to credit management, it is quite relevant in other sectors which deal with trading on credit, such as the manufacturing sector.

2.1.1. Capital Adequacy

Capital adequacy denotes the amount a bank would need to pay off their customers' demand for money, while simultaneously generating enough funds to raise the profitability of the firm through issuing of credit facilities [43]. Since issuing of credit is one of the profit-generating part of a bank, it is certain that banks always keep enough money in order to sustain this aspect of their operation. In Nigeria, firms in the banking sector are required to keep some capital with the Central Bank, which can be used to settle customers in case of liquidation or bankruptcy, which might stem from non-performing loans.

2.1.2. Loan Loss Provision

Loan loss provision can be measured by the ratio of total loan provision to total non-performing loans [21]. In the corporate world, smart businesses set aside provisions for doubtful debts and provisions for bad debts as well. These two provisions mean different things, yet, are still similar. In the banking sector, these provisions for bad and doubtful debts are recognized as part of the initiatives of credit management which reduces credit risks. Practically, there is no way to correctly predict if a customer would pay the loan he/she borrowed. However, when a customer has begun to default in the agreed payment scheme, it is wise to place such loans under doubtful debt. For such loan to be placed under bad debts, it means that the bank has concluded that the customer would not pay off the loan.

2.1.3. Loan and Advance

One of the major differences between loan and advance is that any credible customer can walk into a bank and demand for loan, but only customers who have an account with a specific bank can request for advance for them [49]. Advance can be in the form of overdraft, where a customer is allowed to withdraw money which exceeds his current account balance, based on certain agreements between him and the bank. Since loan and advance are given only when collaterals have been collected and secured, it is believed that these initiatives reduce the possibility of non-performing liabilities incurred by banks.

2.1.4. Loan to Total Asset Ratio

Loan to total asset ratio if properly understood by banks, would ensure that they do not issue out more loans when the ratio is at a certain benchmark [14]. This benchmark differs for different banks. Loan is an item which normally falls under liabilities. It could be a long term liability as well as a short term liability. In this ratio, loan is represented as the total sum of the short-term loans and long-term loans. Thus, it would be unwise for the total loans of a bank to be up to half of its total assets. This is why loan to total asset ratio is calculated periodically, to ensure that banks would not use most of its asset to settle loan obligations in case of liquidation, at the expense of its working capital requirements.

2.1.5. Non-Performing Loans

Non-performing loans refer to those loans which might be deemed as doubtful debts or bad debts, because the debtor has not been able to fulfil his/her financial obligations as agreed [27]. Banks cannot predict with certainty the customers who would pay off their loans completely and those who cannot pay off their loans completely. Hence, they must always incur credit risk, which if not properly controlled and monitored would lead to non-performing loans. Non-performing loans always have a negative impact on the performance of banks, because those doubtful and bad debts would have been used to generate a profitable alternative for the banks.

Non-performing loans, according to [22] refer to those financial obligations which have been agreed between the bank and her customers, but are becoming unfulfilled on the part of the customers. Once a customer starts to default in repayment, then the possibility of non-performing loans have set in. Banks implement credit management in order to checkmate the occurrence of non-performing loans among other things. Credit management which starts from the assessment of a customer's manner of approach can aid banks in deciding to extend credits to a customer or not to do so.

2.1.6. Non-Performing Loan to Total Loan Ratio

Non-performing loan to total loan ratio represents the portion of total loan made up of non-performing loan [24]. Implicitly, if a bank's total loan portfolio is significantly made up of non-performing loan, then there is a heightened need for a reassessment of the methods the bank use to issue out credits to its customers. Thus, if the ratio above is low, it can be deduced that the credit risk the bank is exposed to is low, and if the ratio is high, it means that the credit risk the bank is exposed to is high. In the same vein, high non-performing loan to total loan ratio would increase the provision for doubt and doubtful debt made by the bank.

2.1.7. Bank Size

According to [38], bank size comprises the total assets of commercial banks. Both the physical and invisible assets are categorized to determine the sizes of commercial banks in the banking industry. [31] defined bank size as the ability a bank possesses, its varieties and extensions and the number of services offered, the quality of services offered and the multiplicity of services or businesses it can offer concomitantly to its customers. [43] described bank size as the indication of the immensity of a bank by determining its management group and the amount of assets it possesses compared to others in the same industry. Size is commonly measured by gross sales or gross value of assets, the logarithm of total assets, the number of employees and sales turnover.

2.1.8. Conceptual Framework

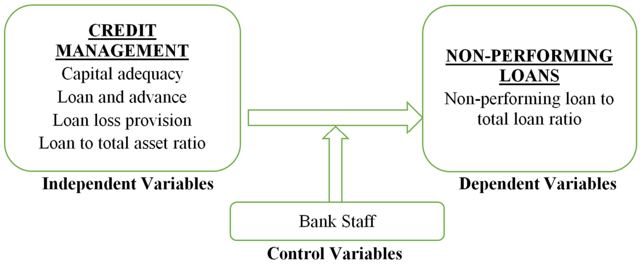

Figure 1. *Conceptual framework, showing the relationship between the variables in the study.*

The conceptual framework shows the relationship between the variables in the study, with the independent variable being credit management and the dependent variable being non-performing loans. Furthermore, it has been depicted that credit management would be explained with capital adequacy, loan and advance, loan loss provision and loan to total asset ratio, while the dependent variable, non-performing loans would be measured with non-performing loan to total loan ratio.

2.2. Theoretical Review

Credit Risk Theory: This theory was established by Melton in 1974 as cited in [13]. Credit risk denotes the risk that comes when banks lend money to customers, with an agreement that the sum borrowed would be refunded at an agreed time with an expressed interest rate. As earlier noted in the study, giving credit facilities is one of the responsibilities of commercial banks, and also a very prominent revenue-generating activity. As a result, firms in the banking sector need to ensure that the credit risk they are incurring is not more than what they can bear, so that they do not run on losses and become bankrupt.

Banks should understand the degree to which they can be exposed when it comes to credit risk. Issuing out credit facilities to customers without a strong legal binding agreement might cause banks to be at the losing end. Credit risk theory opines that there are five C's which a bank must examine when a customer come to ask for credit facilities. These five C's are capacity, capital, collateral, character and condition [33]. Capacity examines the cash inflow and outflow of the customer, in order to determine his ability to repay the loan at the appropriate time. Past and present documents of the debtor would be evaluated to ensure that he/she is credit worthy of the amount to be borrowed.

Credit risk theory is straightforward in its assumptions and quite relevant to the banking sector as a whole, and in particular, to this study. However, there have been criticisms concerning some of its assertions. Firstly, the five C's which the theory recommended should be examined by banks before issuing credits limit the initiatives of loan officers [39]. Also, those factors did not recognize the place of social relationship and family ties in issuing credit facilities to customers, which is what happens in some cases. The theory is also limited in its assertion because it did not properly explain how banks can know the extent to which they can expose themselves to credit risk.

This theory has some benefits and significance to this study. In terms of those factors (the 5 C's) which it recommended that banks can look into before issuing a customer credit, the theory is correct to an extent. These factors might not cover everything that needs to be known, but it places significant emphasis on things that really matter to the bank, and which can also reduce their credit risk. By taking these factors to heart, loan officers and bank management would be alert to customers whose profiles and credibility do not meet adequate standards by the bank.

2.3. Empirical Review

2.3.1. Effects of Capital Adequacy on Non-Performing Loan

The impact risk management has on the financial performance of 10 Nigerian deposit money banks was studied by [38]. Results from the panel regression showed a positive and significant relationship between capital adequacy and financial performance of the sampled banks. The exploration of the impact of credit risk management on the profitability of six selected commercial banks listed on the Ghana stock exchange was conducted by [10]. Using random effect model within the panel estimation technique, the findings showed capital adequacy ratio had a positive relationship with a bank's profitability.

Specifically [23] examined the influence of capital adequacy on the financial performance of banks in Nigeria using GMM and Vector Error correction model. The result unveiled that a positive but insignificant relationship exists between capital adequacy and the performance of Nigerian commercial banks. The effect of risk management on the financial performance of commercial banks in Nigeria was studied by [43]. The data set was a panel of annual observations from ten (10) Nigerian banks covering a time series of fourteen years from 2006 to 2019. The regression analysis revealed that there was an insignificant relationship between bank performance and capital adequacy.

Ho1: Capital Adequacy has no significant effect on non-performing Loan

2.3.2. Effects of Loan Loss Provision on Non-Performing Loan

In Kenya, [29] examined the impact of credit management on the financial performance of microfinance institutions in Nairobi central business district, Kenya. The study adopted the OLS analysis method and it was reported that loan loss provision insignificantly influences the profitability of microfinance institutions in Nairobi. In Ghana., [47] investigated the relationship that exists between credit risk management and the profitability of banks. Eight banks were sampled out of a population of twenty-nine (29) banks over a ten (10) year period from 2005 to 2014. A panel regression was adopted as the analysis method. The study established a positive and significant relationship between loan loss provision and the profitability of banks in Ghana.

In Nigeria, the effect of credit risk management and corporate governance on bank performance covering a period of 12 years (2008 – 2019) was examined by [5]. The result obtained from fixed effect estimation revealed that loan loss provision has a positive relationship with bank performance. Also, [31] empirically examined the correlation between credit risk management and profitability of selected savings and loan companies in Ghana from 2005 to 2018. The study sampled some savings and loan companies in Ghana and adopted a panel regression model for the analysis. The outcome of the analysis showed that loan loss provision has a negative impact on the profitability of savings and loan companies in Ghana.

Credit risk management in Nordic commercial banks and its effect on profitability was investigated by [46]. Thirteen banks in total were investigated across the 16-year time frame from 2000-2015. The loan loss provision ratio is found to have a negative effect on the performance of banks. The study of [20] adopted a quantitative research approach to examine the nitty-gritty between the components of risk management and the performance of Nigerian commercial banks between 2009 to 2018. The study's simple regression analysis result showed that specifically loan loss provision negatively influences the return on assets of the sampled commercial banks within the period covered.

Ho2: Loan Loss Provision has no significant effect on non-performing Loan

2.3.3. Effects of Loan and Advances on Non-Performing Loan

The impact of credit risk management on the performance of deposit money banks in Nigeria using the over parameterized and parsimonious ECM and Granger causality was investigated by [19]. Data for the study were sourced from the CBN Statistical Bulletin, stock exchange fact book and World Development Indicators (WDI) for the period 1989 to 2014. The findings showed evidence of significant granger causality relationship between loan and advances and ROE. Furthermore, [17] investigated the relationship between bank performance and credit risk management focusing on emerging economies. It could be inferred from their findings that return on equity (ROE) and return on assets (ROA) both measuring profitability were inversely related to total loans and advances of financial institutions thereby leading to a decline in profitability.

In the study of the impact of risk management on banks' financial performance in Nigeria conducted by [42], data was gathered from the time of 2006-2016 across fourteen (14) banks traded in the stock exchange. The study applied the regression strategies to establish the relationship and it was found out that there is a negative and insignificant connection between loans and advances and the performance of banking firms. Also, [18] evaluated the effect of credit risk management on the financial performance of some listed Deposit Money Banks (DMBs) in Nigeria spanning the period 2015 - 2019. The study used the Ordinary Least square (OLS) regression estimation technique. The findings of the study discovered that loans and advances have a significant influence on Return on Assets. [3] evaluated the effect of credit management on the performance of Nigerian banks using panel research design and panel data from 2009 to 2018.

Ho3: Loan and Advance has no significant effect on non-performing Loan

2.3.4. Effects of Loan to Total Asset Ratio on Non-Performing Loan

The relationship between bank performance and credit risk management using panel data regression for the period 2000–2010 was conducted by [30]. It could be inferred from their findings that ROE and ROAs both measuring profitability were inversely related to the ratio of loans to the total asset of financial institutions thereby leading to a decline in profitability. In 2019, [39]. specifically investigated the independent effect of loan to total asset ratio on the financial performance of banks in Nigeria from 1985 to 2016 using ARDL analysis method. The regression results disclosed that loan to total asset ratio has a negative insignificant effect on performance of banks in Nigeria.

Similarly, [40] examined the influence of credit management practices on financial performance of Nigerian banks with specific reference to First bank Plc. The study adopted OLS regression analysis method. Specifically, it was reported that loan to total deposit has a positive but insignificant effect on the financial performance of Nigerian banks. The study conducted by [36] examined the nexus between credit management and profitability (ROA) of Deposit Money Banks (DMBs) in Nigeria context for the period of 2006 to 2020. Secondary data were sourced from Central Bank of Nigeria Statistical Bulletins and the Annual Reports of all the existing DMBs studied. The study employed multiple regression technique in analysing the data that gathered, the analysis was done using ordinary least square with E-View 9 Econometric tool. The study found that loans and advances, loan to total deposit and loan loss provision have positive and insignificant effect on profitability.

Ho4: Loan to Total Deposit has no significant effect on non-performing Loan

2.4. Gaps in Literature

Many scholars [37, 29, 47, 2, 27, 31, 46, 20] acknowledged the fact that capital adequacy, loan and advance, loan loss provision and loan to total asset ratio are components of credit management. However, there is a conflict as regards its impact or effect on the banking industry. Some scholars [21, 37, 29, 47, 2];[7] reported a positive effect while some [27, 31, 46, 20] reported a negative impact. This made the findings inconclusive and call for more research work on the subject matter. Also, many of the reviewed studies captured non-performing loans as a component of credit management. On the contrary, this study will focus on non-performing loans of Deposit Money banks in Nigeria as the outcome variable of the study. In conclusion, none of the reviewed studies takes into consideration the recent changes in the components of credit management in the banking industry. Methodologically, few of the Nigerian studies adopted panel regression model to justify the call for cross sectional and time series data adopted in their study. To bridge these gaps, this study is established to examine credit management and non-performing loans of commercial banks in Nigeria for the period of 2013 to 2022.

3. Methodology

As a result of the availability of well audited financial reports of the DMBs in Nigeria which contains the numerical representation of the specific variables of the study, this study adopted expo facto design. Correspondingly, this study adopted a positivist and deductive research approach. This is due to the availability of a well-structured hypotheses to be tested. In adherence to the research approach adopted, a quantitative research approach was adopted since the study used a time series data spanning from 2013 to 2022. Purposively, the study covered all the Listed Deposit Money Banks in Nigeria to aid generalization of the findings made as regards the banking sector. As provided, the study used both cross sectional and time series data. Thus, the study adopted panel regression estimation techniques which comprises of OLS estimation, the Fixed effect model and Random Effect Model. The model used by [21] was adopted in this model. However, to achieve the specific purpose of this study, the outcome variable was replaced with non-performing loan captured with non-performing loan to total loan ratio. Also, in this model, the risk management was captured with capital adequacy, loan and advance, loan loss provision and loan to total asset ratio and controlled by bank size. Mathematically, the model is presented as follows:

$$NPL/TLR_{it} = f(CAA_{it}, LLP_{it}, LA_{it,} LTAR_{it} BS_{it)} \quad (1)$$

$$NPL/TLR_{it} = \delta_0 + \delta_1 CAA_{it} + \delta_2 LLP_{it} + \delta_3 LA_{it} + \delta_4 LTAR_{it} + \delta_5 BS_{it} + \varepsilon_{1t} \quad (2)$$

Where: NPL/CRR is Non-Performing Loan to Cash Reserve Ratio, NPL/TLR is Non-Performing Loan to Total Loan Ratio, LLP is Loan Loss Provision, LA is Loans and Advances, CAA is Capital Adequacy, LTAR is Loan to Total Asset Ratio, BS is Banks Size, "it" represents the combination of time and individuality.

4. Result and Discussion

4.1. Descriptive Statistical Analysis

The mean of NPL/TLR value of 12.8817 indicates that the banks under considerations are generated a positive ratio indicating that non-performing loan has no adverse impact on the total loan provided to customers for the time covered. The reported standard deviation (9.2288) which is lower to the mean value indicates that there is disparity among the data set. Also, the average value of Capital Adequacy (9.588) indicates that the banks under consideration are growing their minimum requirement of capital to promote credit facilities. The standard deviation which stood at 4.7816 shows that there is lower risk involved in providing loans to customer considering the capital available to the firm. For the LLP, mean value of 6.265 and standard deviation value of 1.2073 indicated that there is disparity in the dataset of firms under consideration for the period covered. The mean value of LA is 1851.37 with a standard deviation of 2594.66. The reported minimum and maximum values are 98.73 and 12696. The positive mean value shows that, averagely, loan and advance is positive, which suggests that loan and advances made available to customers are judiciously maximized. The mean value of LTAR stood at 0.4085, standard deviation at 0.1997, minimum value at 0.0746 and maximum value at 1.8698. The mean value indicted that LTAR maintain a positive influence across the sampled firms for the period covered.

Table 1. *Descriptive Statistical Report.*

	Outcome Variable	Predictors				Cont. Var.
	NPL/CRR	**CAA**	**LLP**	**LA**	**LTAR**	**BS**
Means	7.967	9.588	6.265	1851.37	0.4085	4681.87
Obs	140	140	140	140	140	140
Stan. Dev.	6.647	4.7816	1.2073	2594.66	0.1997	6101.38
Min	0.18	4.191	1.4	98.73	0.0746	330.86
Max	52.46	36.78	8.18	12696	1.8698	29004

Source: Researcher's Compilation, 2023.

4.2. Pearson Correlation Analysis

A low correlation was found between NPL/TLR and CAA, NPL/TLR and LLP (Loan Loss Provision), CAA and LLP, CAA and LA (Loan and Advances), CAA and BS (Bank Size), LLP and LA, LLP and BS, LA and LTAR (Loan to Total Asset Ratio). However, a high positive correlation was observed between LA and BS, indicating that these variables with a positive relationship moved together across the considered banks during the study period. However, a high negative correlation exists between NPL/TLR, LA, LTAR, and BS, indicating that an increase in LA, LTAR, and BS could lead to a greater failure in NPL/TLR, potentially exposing the banks to higher risk. Negative correlations were also observed between CAA and LTAR, LLP and LTAR, and LTAR and BS, albeit at different levels. In summary, the negative correlations imply that the variables involved moved in different directions across the selected banks during the study period.

Table 2. *Pearson Correlation Analysis.*

	NPL/TLR	CAA	LLP	LA	LTAR	BS
NPL/TLR	1.0000					
CAA	0.25**	1.0000				
LLP	0.05	0.07	1.0000			
LA	-0.30**	0.05	0.21**	1.0000		
LTAR	-0.28**	-0.26**	-0.36***	0.20**	1.0000	
BS	-0.18**	0.1307	0.297***	0.94***	-0.0613	1.0000

Source: Reseacher's Compilation, 2023.

4.3. Regression Analysis

Similar to the first model, diagnostic tests were conducted to assess the adherence of the second model to the assumptions of linear regression. However, these tests, including Pesaran CD Test, Breusch-Pagan LM Test, Modified Wald Test for Heteroskedasticity, and Wooldridge Test for Autocorrelation, indicated that the model did not meet the assumptions of linear regression. The estimation results of this model were invalidated as a result. To address the issues of autocorrelation and heteroskedasticity, a feasible general least square (FGLS) estimation was conducted.

Table 3. *Results of Regression Estimate and Diagnostic Tests of model two.*

Dependent Variable: NPL/TLR

Variables	Ordinary Least Square OLS	Fixed Effect Estimation FE	Random Effect Estimation RE	Feasible General Least Square FGLS
CAA	.3941**	.2003	.2644	.1427***
	(0.011)	(0.321)	(0.141)	(0.007)
LLP	.4065	-.669	.0064	.237
	(0.534)	(0.625)	(0.995)	(0.742)
LA	-.0046***	-.2231**	-.0034**	-.00087
	(0.001)	(0.024)	(0.006)	(0.438)
LTAR	5.4981	8.885**	8.3316	.6097
	0.355	(0.002)	(0.106)	(0.882)
BS	.00153**	.04099***	.00103**	-.1101**
	(0.006)	(0.000)	(0.033)	(0.034)
Constant	5.7183	12.67602	8.3635	10.826*
	(0.310)	(0.176)	(0.270)	(0.054)
Observations	140	140	140	140
R-squared	0.2309	0.6395	0.4949	
Adj. R-Squared	0.2022	0.5031	0.4162	
F-Stat	F(5,134) = 8.04 Prob > F = 0.000	F(5,121) = 51.60 Prob > F = 0.000	Wald $chi^2(5)$ = 12.03 Prob>chi^2 = 0.0343	Wald $chi^2(5)$ = 33.43 Prob>chi^2 = 0.0007
Pesaran CD Test	-	0.402 {1.9371}	-	-
Hausman Test	-	Chi2(1) = 8.48 Prob>chi^2 = 0.0107	-	-
Breusch-Pagan LM Test	-	-	$chi^2_{(01)}$ = 10.48 Prob>chi^2 = 0.0007	-
Modified Wald Test for Heteroskedasticity	-	$chi^2(14)$= 839.15 Prob>chi^2 = 0.0000	-	-
Woodridge Test for Autocorrelation	-	$F_{(1,13)}$ = 21.741 Prob > F= 0.0004	-	AR (1) = 0.6171

Standard errors in parentheses *** p<0.01, ** p<0.05, * p<0.1

The FGLS estimation results for the second model are as follows:

i. CAA (Capital Adequacy Ratio) had a positive and significant effect on NPL/TLR (Non-Performing Loan to Total Loan Ratio).
ii. LLP (Loan Loss Provision) and LTAR (Loan to Total Asset Ratio) had a positive but insignificant effect on NPL/TLR.
iii. LA (Loan and Advances) had a negative and insignificant effect on NPL/TLR.

4.4. Discussion of Findings

This study examined the impact of credit management on non-performing loans in Nigerian commercial banks. The findings showed that capital adequacy had a positive and significant effect on non-performing loan to total loan ratio indicating that a 1% increase in capital adequacy resulted in a 14% increase in non-performing loan to total loan ratio. The significance of the effect was observed for non-performing loan to total loan ratio but not for non-performing loan to cash reserve ratio. This suggests that credit facilitators in commercial banks may have been negligent in ensuring loan repayments and adherence to requirements, leading to a significant effect on non-performing loan to total loan ratio. This finding aligns with the assumptions of credit risk theory, which emphasizes the importance of factors such as capacity, capital, collateral, character, and condition when granting credit facilities. This finding agreed with the discovery of [44, 25], that a positive and significant relationship between capital adequacy and the financial performance of banks.

Also, it was unveiled that loan loss provision had a positive but insignificant effect on non-performing loan to total loan ratio. A 1% increase in loan loss provision was associated with a 24% increase in non-performing loan to total loan ratio, although this effect was not statistically significant. This suggests that loan loss provision has the potential to contribute to a higher proportion of non-performing loans relative to total loans, but mismanagement of loan loss provisions by credit facilitators may have limited its impact. These findings align with the studies conducted by [21, 37, 29, 47, 2, 7], which reported a positive relationship between loan loss provision and bank performance. However, studies by [27, 31, 46, 20] indicated a negative relationship.

In addition, it was disclosed that loan and advances had a negative but insignificant effect on non-performing loan to total loan ratio indicating that a 1% increase in loan and advances resulted in a 0.001 decrease in non-performing loan to total loan ratio. This finding failed to agree with the a-prior expectation which suggested that a lower ratio of loan and advances to total loans leads to higher non-performing loan ratios. This finding is in line with the conclusions of [13], who reported a negative effect of loans and advances on bank performance.

Lastly, a positive but insignificant effect was found between loan to total asset ratio and non-performing loan to total loan ratio in Nigerian commercial banks. A 1% increase in loan to total asset ratio indicated a potential increase in non-performing loans, albeit at an insignificant level. This finding aligns with the expectations that a higher loan to total asset ratio reflects increased lending to customers, which increases the likelihood of non-performing loans. This finding is consistent with the studies by [34, 48], which reported a positive and significant relationship between loan to total deposit ratio and bank performance.

5. Conclusion and Recommendation

In issuing credit to customers, different areas must be examined such as the character of the borrower, his/her collateral, cash, condition and capital. If properly examined, these areas help in ensuring that non-performing loans of banks are reduced to the barest minimum. Unfortunately, not all loan officers in banks are properly oriented concerning lessons like this. In fact, it appears that some of them are not qualified, as they do not have a sound knowledge of credit management and how it influences the performance of banks. Thus, this study is established to examine the nitty-gritty between credit risk management and non-performing loan of banks in Nigeria. From the analysis conducted it was concluded that that credit management components have the capacity to influence non-performing loan of commercial banks in Nigeria though at different significant levels. In-line with this discovery, the following recommendations are made:

i. To maintain the positive effect of capital adequacy, the management of DMBs should promote adequate capital reserves to effectively manage non-performing loans.
ii. The management should consider different loan loss provisioning approaches for specific loan categories to minimize the adverse effect of loan loss provision.
iii. There should be regular evaluation of the composition of their loan's portfolios in relation to total asset to provide adequate insights into potential risks associated with asset quality.
iv. Implementing robust credit risk assessment frameworks and ensuring prudent lending standards can help minimize the occurrence of non-performing loans.

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