Effect of Credit Risk on the Financial Performance of Listed Deposit Money Banks in Nigeria

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Credit risk, Assets quality, Loan loss provision ratio, Loans and advances ratio and ROE.

A b s t r a c t

This study examined the effect of credit risk on the financial performance of listed deposit money banks in Nigeria, covering the period 2006-2020 with a focus on 13 listed deposit money banks (DMBs). The study adopts ex post facto research design. The population of this study comprises of all the thirteen (13) DMBs listed on the floor of the Nigerian stock Exchange (NSE) as at December 31, 2020. This study employs secondary data which were sourced from the audited annual financial statements and reports of the listed DMBs for a period of 15 years from 2006 to 2020. The independent variables employed include assets quality ratio, loan loss provisions ratio and loans and advances ratio. The study measured financial performance using return on equity (ROE) while multiple regression analysis was used to analyse the data with the aid of STATA Version 16. The result of the study shows that assets quality ratio and loans and advances ratio have significant effect on financial performance while loans loss provision ratio has insignificant effect on financial performance of quoted deposit money banks in Nigeria. Based on the findings, the study concluded that the combination of these variables does significantly influence the financial performance of deposit money banks in Nigeria. The study recommended that management of deposit money banks should develop rigorous and robust credit policies that will enable banks to effectively assess the creditworthiness of their customers, amongst others

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Background to the Study

Banks are germane to the economic development of a country through the financial intermediary services they provide. Their intermediation role can be said to be a catalyst for economic growth. The credit function of banks enhances the ability of investors to exploit desired profitable ventures. Credit creation is therefore the main income generating activity of banks (Kargi, 2011). This however, expose the banks to credit risk. The higher the exposure, the higher the tendency of the banks to experience financial crisis. Credit risk plays an important role on banks' profitability since a large chunk of banks' revenue accrues from loans from which interest is derived. Therefore, high or increment in interest rate increases the chances of loan default which may result in non-performing loan. Hence, credit risk and interest rate risk are intrinsically related to each other and not separable (Drehman et al., 2008).

Credit risk has been discovered to be one of the most important issues to contend with within the banking system due to the need for loans and advances as it forms the life wire of the system. Hence, the risk associated with such life wire becomes a major threat within the banking system (Ayodele et al., 2021). The credit risk of a bank also affects the book value of the bank. The more the credit of a particular bank is in risk, the more probability of a bank to be insolvent. Also, the status of depositors in the bank is at risk and hence, the probability of incurring loss from their deposits. Evidence from Nigerian banking sector shows that credit risk and non-performing loan have been the major challenges of the financial performance of banks. Unfortunately, non-performing loans is becoming cyclical in Nigeria as the DMBs recorded a N56.31 billion increase in non-performing loans from August 2013 to August 2014 (Ndubuisi and Amedu, 2018).

The problems of nonperforming loan ratio remain fundamental challenges of the deposit money banks in Nigeria. According to Ndubuisi and Amedu, (2018), non-performing loans increased from N344.26 billion in August, 2013, to N400.57 billion, as at August 2014, represents a 16.36% increase and gross loans by the banks increased by 21.03%, from N9.278 trillion in August, 2013 to N11.229 trillion as at August, 2014. However, there exists mixed results in literature on the effect of credit risk on the financial performance of DMBs in Nigeria which is the motivation for this study. This study will improve on previous studies by ensuring greater depth to establish the existence of a long run relationship between credit risk and the performance of listed DMBs in Nigeria from 2006 to 2020, using non-performing loans to total loans and advances ratio, loan-loss provisions to total loans and advances ratio and total loan and advances to total deposits ratio as proxies for credit risk and return on equity (ROE) as proxy for performance of listed deposit money banks in Nigeria (Ndubuisi and Amedu, 2018).

The hypothesis that would be tested in this study are stated in their null forms:

H0₁: Assets quality ratio has no significant effect on financial performance of listed deposit money banks in Nigeria

H0₂: Loan loss provisions ratio has no significant effect on financial performance of listed deposit money banks in Nigeria

H0₃: Loans and advances ratio has no significant effect on financial performance of listed deposit money banks in Nigeria

Literature Review
Concept of Credit Risk

Greuning and Bratanovic (2020), define credit risk as the chance that a debtor or issuer of a financial instrument, whether an individual, a company, or a country, will not repay principal and other investment related cash flows according to the terms specified in a credit agreement. Hence, credit risk occurs when an obligor fails to performs its obligations under a trading or loan contracts. Muriithi et al. (2016) sees credit risk as the possibility of losing the outstanding loan partially or totally, due to credit events. However, CBN (2014) stated that credit risk occurs when a debtor defaults on a loan or other line of credit. It may also arise from a change in the credit quality of a counterparty resulting from a market-base revaluation; perhaps following a rating agency downgrade, or from actual default. Credit risk is therefore, the potential that a bank borrower or counterparty will fail to meet its obligations in accordance with agreed terms.

Credit risk includes both the risk that an obligor or counterparty will fail to comply with their obligation to service debt (default risk) and the risk of a decline in the credit standing of the obligor or counterparty. While default triggers a total or partial loss of any amount lent to the obligor or counterparty, a deterioration of the credit standing leads to the increase of the possibility of default. In the market universe, a deterioration of credit standing of a borrower does materialise into a loss because it triggers an upward move of the required market yield to compensate the higher risk and triggers a value decline (Bessis, 2011). In this study, credit risk is measured by the ratios of non-performing loan, loan-loss provision and loan and advance (Kajola et al., 2018, Siriba, 2020).

Asset Quality (AQT): Nonperforming loans to total loans and advances ratio (NPR) measures the proportion of nonperforming loans as against the total loans and advances over a period. NPR represents how much of the bank loans and advances are becoming nonperforming, which measures the extent of credit default risk that the bank sustained. It measures the efficiency of the loan portfolio management for a given bank within a given period (Kolapo et al., 2012). If the ratio goes above 25%, is an indication that the bank is getting into the zone of weak credit risk control system. Deterioration in asset quality is much more serious problem of bank unless the mechanism exists to ensure the timely recognition of the problem. It is a common cause of bank failure. Poor asset quality leads to nonperforming loan that can seriously damage a banks' financial position and banks operation. It distresses the performance and survival of banks (Siriba, 2020).

Loan Loss Provisions Ratio (LPR): Loan loss provision is a noncash charge against operating income made to account for expected or unexpected loan losses. In principle, loan loss provisions allow banks to recognize in their profit and loss statements the estimated loss from a particular loan portfolio, even before the actual loss can be determined with accuracy and certainty as events unfold and are actually written off

(Dugan, 2009). Loan loss provisions ratio is the loan-loss provisions to total loans and advances. The objective of employing this ratio is to examine the ability of banks to build reserves for both expected and unexpected losses. A high ratio shows that banks have enough funds to cover loan losses. Hence, the higher this ratio, the lower the probability of a bank suffering problems because the bank will have enough funds to back up its losses. In this research, the LPR is used to identify the level of banks' managers' expectation about their asset quality in the Nigerian banking industry. When the amount of LPR increases, the quality of the asset will decrease and vice versa (Annor and Obeng, 2017).

Loans and Advances Ratio (LAR): The loans and advances to deposits ratio assesses the role of deposits in financing loans. LAR is used to measure banks liquidity. This ratio indicates the ability of banks to withstand deposit withdrawals and willingness of banks to meet loan demand by reducing their cash assets. The higher the loan-to-deposit ratio, the more increase in the level of lending risk and thus reduces the quality of loans or in other words increases the rates of non-performing loans. However, the more the bank can convert deposits into high quality loans, the higher the profit margin from lending interest. Therefore, deposits have a positive effect on the banks' profitability. When the banks are more liquid, they can reduce risk of insolvency. LAR is often used to calculate a lending institution's ability to cover withdrawals made by its customers. It is commonly used statistical tool for assessing a bank's liquidity (Samuel et al., 2012).

Concept of Financial Performance
Financial performance is used as a general measure of a firm's overall financial status over a given period of time. The financial performance is measured using accounting key performance indicators such as return on assets, earnings before interest and tax, economic value added (Crabtree and DeBusk, 2008). The advantage of these measurements is their general availability, since every profit-oriented organization produces these figures for their yearly financial statements (Chenhall and Langfield-Smith, 2007). This study adopted the use of return on equity (ROE) as an indication of a firm's overall financial health (Bodie et al., 2011).

ROE is commonly used to measure the profitability of banks. ROE represents the rate of return received from equity invested in banks. It is the amount of net income returned as a percentage of shareholders equity. ROE measures profitability by revealing how much profit a bank can generates with shareholders' investment. Thus, ROE measures how much the bank is earning on their equity investment. In general, financial analysts consider return on equity ratios in the 15 - 20% range as representing attractive levels of investment quality (Richard, 2015). ROE also hinges on the capital management activities. If the banks use capital more efficiently, they will have a better financial leverage and consequently a higher ROE. Because a higher financial leverage multiplier indicates that banks can leverage on a smaller base of stakeholder's fund and produce higher interest-bearing assets leading to the optimization of the earnings (Hosna, et al 2009).

The reasons for the growing popularity of ROE is, simply that it is not asset-dependent. ROE can be applied to any line of business or any product. This flexibility allows deposit money banks with differing asset structures to be compared to each other, or even for banks to be compared to other types of businesses. The asset-independency of ROE also allows a bank to compare internal product line performance to each other. Perhaps most importantly, this permit looking at the comparative profitability of lines of business like deposit services (Hosna et al., 2009).

Empirical Review

Samuel et al. (2012), Conducted a study on credit risk and profitability of selected banks in Ghana, using a panel data from six selected commercial banks covering a five (5) year period from 2005 to 2009 which was analysed within the fixed effects framework. Return on equity (ROE) was the performance variable while the credit risk proxies are measured with, net charge off to total loans and advances, non-performing loans to total loans and advances and pre-provision profit to total loans and advances. The researcher also controlled for the effects of bank size, bank growth rate and the choice of capital structure. The results revealed that, credit risk (non-performing loan rate, net charge-off rate, and the pre-provision profit as a percentage of net total loans and advances) has a positive and significant relationship with the bank's profitability.

Annor and Obeng (2017), Examined impact of credit risk management on the profitability of selected commercial banks listed on the Ghana Stock Exchange. Six (6) banks were purposively selected. Secondary data was gathered from the annual reports of the banks. The study adopted the random effect Model within the panel estimation technique framework. The study used return on equity (ROE) to measure profitability of bank, while non-performing loans, loan loss provisions ratio, loan to asset ratio and capital adequacy ratio as credit risk proxies. The findings showed that credit risk management have significant relationship with the profitability of commercial banks. While capital adequacy ratio had positive relationship with a bank's profitability; non-performing loans, loan loss provisions ratio and loan to asset ratio shows statistically significant negative relationship with the profitability of a bank.

Kajola et al. (2018), Studied the effect of credit risk management on financial performance of Nigerian listed deposit money banks. Their study consists of ten (10) listed deposit money banks in Nigeria for the period, 2005 to 2016. Credit risk was proxied by non-performing loan to total loan ratio (NPLLR); non-performing loan to total deposit ratio (NPLDR) and capital adequacy ratio (CAR). Return on equity (ROE) was used as proxies for financial performance. Using the random effects generalised least squares (GLS) regression as data estimation technique, the study revealed that all the three credit risk parameters have a significant relationship with ROE. Based on the findings, the study recommended that the management of deposit money banks should develop rigorous and robust credit policies that will enable banks to effectively assess the creditworthiness of their customers.

Nwude and Okeke (2018) conducted a study on impact of credit risk management on the performance of selected Nigerian banks. Ex-post facto research design was adopted using dataset for the period 2000 to 2014 collated from the annual reports and financial statement of the selected deposit money banks. Secondary data was obtained from the annual reports of five selected banks. The linear regression and ordinary least square was employed to analyse and estimate the relationship between the variables. The performance variables are ROE. The proxies for credit risk are non-performing loan ratio (NPLR) and natural log of total assets (NLTA). The findings reveal that credit risk management had a positive and significant impact on return on equity of the deposit money banks. The study recommended that bank managers need to put more efforts to control the non-performing loan by critically evaluating borrowers' ability to pay back. The regulator should strengthen its monitoring capacity in this regard.

Akinselure and Akinola (2019), Examined impact of credit risk management on the profitability of selected deposit money banks in Nigeria. The secondary data for the study was obtained from the audited financial statement of the relevant deposit money banks. The study is based on ex-post facto research design. The study extracted data from thirteen (13) deposit money banks in Nigeria using purposive sampling techniques. The variables are loan loss ratio as a proxy for the independent variable and return on equity (ROE) as proxies for the dependent variable. These variables were analysed using multiple regression and SPSS statistical software. The result of the analysis shows that credit risk management has significant relationship with profitability of the deposit money banks. The study recommend that management of banks should develop a good strategy to ensure that the loan facilities are repaid as at when due, so as to reduce problem associated with delay in servicing loan which have a direct proportional effect on the profitability of these banks.

Kajirwa and Katherine (2019), Evaluated credit risk and financial performance of banks listed at the Nairobi Securities Exchange, Kenya. The study used Pearson product moment correlation analysis to assess the nature of relationship between the dependent variable (ROE) and the independent variable (credit risk). The ratio of nonperforming loan to total loan and advances (NPL/LA) was used as an indicator of credit risk. The study used a longitudinal research design. A target population of 11 Commercial banks listed at the Nairobi securities exchange was considered. The data was analysed using SPSS (version 20). The Karl Pearson correlation and regression results showed that there was a significant strong correlation between credit risk and financial performance. The study recommended that management of commercial banks should determine effective credit risk management strategies that could help in reduction of loan default rates by customers.

Akoto et al. (2020), Investigated the influence of credit risk on equity performance: An empirical assessment of banks listed on the Ghana Stock Exchange. The study adopts panel data which integrates both time series and cross sectional dimensions of 7 listed banks from 2006 to 2017. An unbalanced panel data within the period was used for the

study. They used return on equity (ROE) as a proxy for financial performance whiles the ratio of non-performing loans to total assets (NPLTL) and nonperforming loans (NPL) for the period represented banks credit risk. The empirical assessment was tested using the fixed and common constant effect regression, correlation and the Granger causality test. Secondary data were extracted from the audited annual reports of the listed banks. The result of the study indicated that credit risk measured by NPLTL was found to negatively and significantly influence ROE. They recommended that, banks should strengthen their credit risk management framework to help combat the credit risk exposures they face and that the Ghanaian central bank should improve their supervisory role to ensure banks comply with financial regulations.

Iyinomen et al. (2020), Evaluated credit risk management and profitability of deposit money banks in West African Countries. This study consists of two selected West African countries using a sample of 20 deposit money banks (DMBs) over 10-years period from 2009 to 2018. Ex-Post Facto research design was employed while collected secondary data were subjected to multiple regression and correlation analysis. The performance indicator is return on equity (ROE), while the credit risk proxies are; non-performing loans, capital adequacy, and loan loss provision ratio. The model was analysed using Pearson correlation analysis and panel regression analysis. Their result revealed that credit risk has negative and significant effect on performance of banks in both Ghana and Nigeria using Return on Equity (ROE) which was statistically significant. They recommended that banks in Nigeria and Ghana should enhance their capacity in credit analysis to reduce the risk of default in repayment.

Siriba (2020), Examined credit risk and financial performance of commercial banks in Kenya. The study span 5-years period from 2014 to 2018. Secondary data was obtained from the annual financial statements. Multiple regression method was used to examine the effect of credit risk on banks' performance. The dependent variable is return on equity (ROE). The independent variables are; non-performing loan, loan and advances and loan loss provision. The result revealed that, non-performing loans and loan loss provision had non-significant negative effects on the banks' profitability and that, loans and advances had a significant positive impact on commercial banks' profitability. It was recommended that, commercial banks should be keen on clients' appraisal and loan analysis to mitigate credit risks.

Theoretical Framework
Credit Default Risk Theory
Credit default risk theory was introduced in 1974 by Robert Merton. It is the basic theory of credit risk. Robert proposed a model for assessing the credit risk of a company by characterizing the company's equity as a call option on its assets. There are two main methods of modelling credit risk which include the structural approach and the intensity based approach (also known as reduced form approach). Leveraging on Merton model, three important approaches to measuring credit risk was derived by Clifford V. Rossi. These include; the concept of credit spreads, credit portfolio management and loss

distribution generated through Monte Carlo simulation. To reduce the lenders risk, the lender may perform a credit check on the prospective borrower, may require the borrower to take appropriate insurance, such as mortgage insurance or seek security or guarantees of third parties. In general, the higher the risk, the higher will be the interest rate that the debtors will be asked to pay on the debt (Owojori et al. 2011). The credit default risk theory enables both the lender and the borrower to understand the indicators of potential loss in order to adopt best alternative option in managing the probability of counterparty default on credit-sensitive financial transactions such as loans, bonds, securities, and derivatives to avoid the occurrence of delinquency and insolvency. This is essential as the level of default risk can change due to a broader economic change or due to a change in a borrower's economic situation, such as increased competition or recession, which can affect the company's ability to set aside principal and interest payments on the loan.

The Anticipated Income Theory
The Anticipated Income Theory was developed by H.V. Prochnow in 1944 using the US commercial banks practice. According to this theory, regardless of the nature and character of a borrower's business, the bank should plan the liquidation of the term-loan (loan between one to five years) from the anticipated income of the borrower. This theory places emphasizes on the ability of the bank to advance loan base on the income that the borrower expects both in the short-term and long-term. The bank tries to link their loan, both medium and long term, on the borrowers expected income. Thus, a loan by the bank gets repaid out of the future income of the borrower in instalments, instead of in a lump sum at the maturity of the loan. The bank advances more loan when the expected incomes are regular and can be expected as at when due. This will in turn help the bank to manage its credit risk efficiently, since bank management can plan its credit base on expected income. It is also generally known as "cash flow approach" to lending. The anticipated income theory dominates the commercial loan theory and the shiftability theory as it satisfies the three major objectives of liquidity, safety and profitability to defray counterparty loan default risk. Properly understood, this theory was a rival only to the commercial loan theory. It focused attention on the types of loans appropriate for a bank to make but came to quite a different conclusion than that reached by the advocates of the commercial loan theory (Moti et al., 2012). Furthermore, the anticipated income theory ensures that lenders should only oblige loans on self-liquidating assets and investments in order to forestall against counterparty loan default of failing to meet a loan payment by a due date (delinquency) and a situation where assets are less than liabilities of the borrower (insolvency). The theory emphasised that the loan must be secured by the collateral. Hence under the anticipated income theory, for a secured self-liquidating loan, a credit default can only arise from the occurrence of both delinquency and insolvency.

Methodology
This study adopted the ex-post facto research design. The population of this study comprised of all the thirteen (13) DMBs listed on the floor of the Nigerian stock Exchange (NSE) as at December 31, 2020 (CBN, 2020). These thirteen (13) DMBs are currently

trading on the floors of the NSE. The data obtained covered the period of 15 years from 2006 to 2020 post consolidation period. Hence, the financial year observation is 195 (i.e., 13 x 15 = 195). This study employed secondary data which were sourced from the audited annual financial statement and reports of the listed DMBs and Nigerian Stock Exchange (NSE). The Panel data was employed because it helps to study the behaviour of each bank over time and across space (Gil-García and Puron-Cid, 2013). The balanced panel data collected was analysed quantitatively using regression equations. The specified static panel regression model is essentially estimated using the pooled regression method, fixed effects (FE) method or random effects (RE) method using the Hausman specification test to decide the appropriateness between fixed and random effects that best fits the panel regression data. The formulated model was then estimated using the ordinary least squares (OLS) method. The statistical tool for analysis was done using STATA Version 16 software. The functional form of the model for the study is presented below:

$$ROE = f(AQT, LPR, LAR) \tag{1}$$

Upon linearization and parametization the long run model was specified as:
$$ROE_{i,t} = \beta_0 + \beta_1 AQT_{it} + \beta_2 LPR_{it} + \beta_3 LAR_{it} + \varepsilon_{it} \tag{2}$$

Where; $ROE =_t$ represents the financial performance of bank i at time t, $AQT_{i,t}$ is the asset quality of bank i at time t, $LPR_{i,t}$ is the loan loss provision ratio of bank i at time t and $LAR_{i,t}$ is the loans and advances ratio of bank i at time t. β_0 stands for the model constant or intercept, $\beta_1 - \beta_3$ stands for the coefficients of the independent variables, ε_{it} is the error term.

Table 1: Measurement of Variables

Variable	Proxy	Measurement	Source
Financial Performance	Return on equity (ROE)	$\dfrac{\text{Net income}}{\text{Total equity capital}}$	Iyinomen et al. (2020), Siriba (2020).
Assets Quality	Asset quality (AQT)	$\dfrac{\text{Non-performing loans}}{\text{Total loans and advances}}$	Kargi (2011), Kajola et al. (2018)
Loan-loss provision Ratio	Loan-loss provision ratio (LPR)	$\dfrac{\text{Loan-loss provision}}{\text{Total loan and advances}}$	Muriithi, (2016), Annor and Obeng (2017).
Loans and Advances Ratio	Loans and advances ratio (LAR)	$\dfrac{\text{Total loan and advance}}{\text{Total deposit}}$	Kolapo et al. (2012), Siriba (2020).

Source: Author's Compilation, 2021.

Results and Discussions
This section presents the results of the various statistical analyses carried out to achieve the purpose of this study. While descriptive statistics reveal mean, standard deviation, minimum and maximum values of all variables of the study, the correlation analysis and VIF seek to find the extent of multi-collinearity. The regression analyses depict the impact of each of the explanatory variables on DMBs' financial performance (Measured by return on assets ROE) in Nigeria.

Descriptive Statistics

Descriptive statistics is the term given to the analysis of data that helps describe, show or summarize data in a meaningful way such that, for example, patterns might emerge from the data. The result of the descriptive statistics for this study is presented below:

Table 2: Descriptive Statistics

Variable	Mean	Std. Dev.	Min.	Max.	Observations
ROE	0.0352	0.32001	-0.94	0.36	195
AQT	0.0761	0.1277	0.0171	0.9646	195
LPR	-3.55	7.56	-56.9	50.28	195
LAR	61.34	18.86	4	106	195

Source: STATA Output, 2021.

Table 2 gives the results of the descriptive statistics analysis of the variables employed for the purpose of this study. A minimum and maximum of -94% and 36% respectively were recorded for the response variable, return on equity (ROE) for the period under review. The mean ROE is 3.52% while the standard deviation is 32%. These imply that, the average ROE from 2006 to 2020 is 3.52% with a standard deviation of 32%. The higher standards deviation value and the wide variation in the minimum and maximum values show significant differences in financial performance (ROE) between the deposit money banks in this study. The First predictor variable asset quality showed a mean value of 0.0761and a standard deviation of 0.1277. The minimum percentage of asset quality is 0.0171 against a maximum value of 0.9646. The second predictor variable loan loss provision ratio showed a mean value of -3.55 and a standard deviation of 7.56. The minimum percentage of loan loss provision ratio is -56.9 against a maximum value of 50.28. The third and last predictor variable loan and advance ratio which is measured gave 4 and 106 as minimum and maximum respectively for the study period. The average loan and advance ratio for the study period is 61.34 with a standard deviation of 18.86.

Correlation Matrix

In statistics, correlation or dependence is any statistical relationship, whether causal or not, between two random variables or bivariate data. In the broadest sense correlation is any statistical association, though it commonly refers to the degree to which a pair of variables are linearly related.

Table 3: Correlation Matrix

Variable	ROE	AQR	LPR	LAR
ROE	1.000			
AQT	0.52	1.000		
LPR	0.15	0.29	1.000	
LAR	0.21	-0.51	0.49	1.000

Source: STATA Output, 2021.

Table 3 shows the correlation between the dependent variable, ROE and the independent variables, assets quality, loan loss provision ratio and loan and advance ratio on one hand, and among the independent variables themselves on the other hand. Generally, high correlation is expected between dependent and independent variables while low correlation is expected among independent variables. According to Gujarati (2015), a correlation coefficient between two independent variables of 0.80 is considered excessive and thus certain measures are required to correct that anomaly in the data. From Table 3, it can be seen that all the correlation coefficients among the independent variables are below 0.80. This points to the absence of possible Multicollinearity, though the variance inflation factor (VIF) and tolerance value (TV) test is still required to confirm the assumption.

Multicollinearity
Multicollinearity is the occurrence of high intercorrelations among two or more independent variables in a multiple regression model. Multicollinearity can lead to skewed or misleading results when a researcher or analyst attempts to determine how well each independent variable can be used most effectively to predict or understand the dependent variable in a statistical model. The multicollinearity for the variables was tested using Variance Inflation Factor (VIF).

Table 4: Tolerance and VIF Statistics

MODEL	VIF	1/VIF
Assets Quality (AQT)	1.05	0.954148
Loan Loss Provisions Ratio (LPR)	1.19	0.840549
Loans and Advances Ratio (LAR)	1.23	0.804589
MEAN VIF	1.15	

Source: STATA Output, 2021.

To confirm the reality of the multi-collinearity of those that are used together in a model, a further test of multi-collinearity, VIF, is conducted. To assess multicollinearity the Tolerance level should not be less than 0.10 and mean Variance Inflation Factor (VIF) in the regression model must not be more than ten (10). When such arise, that means there is a multicollinearity problem. From the result, the mean VIF is less than ten (10) and the tolerance values greater than 10% for all variables which indicates that they are all within acceptable limits.

Table 5: Heteroskedasticity
Heteroskedasticity Test: Breusch-Pagan-Godfrey

F-statistic	0.236784	Prob. $F_{(4,124)}$	0.1220
Obs*R-squared	8.484123	Prob. Chi-Square(4)	0.1223
Scaled explained SS	15.02818	Prob. Chi-Square(4)	0.0046

Source: STATA Output, 2021

In addition, the Breusch-Pagan or Cook-Weisberg test was used to test for the existence of heteroskedasticity after the OLS result shows chi^2 of 0.23 and p-value 0.1220. The null hypothesis in this test assumes that the variance of the residuals is constant. If the p-value is significant at 5%, then there is substantial evidence to reject the null hypothesis indicating the presence of heteroskedasticity.

Table 6: Hausman Specification Test

Correlated Random Effects - Hausman Test
Equation: Untitled
Test period random effects

Test Summary	Chi-Sq. Statistic	Chi-Sq. d.f.	Prob.
Period random	1.20417	4	0.9440

Breusch and Pagan Lagrangian Multiplier Test for Random Effects

```
        Estimated results:
            |    Var     sd = sqrt(Var)
      ---------+----------------------------
        rem |  .003586      .0598832
          e |  .0033622     .0579841
          u |  .0003235     .017987


          Test:   Var (u) = 0
        chibar2(01) =  0.10
        Prob > chibar2 =   0.0720
```

The Hausman Specification test was conducted to ascertain between the fixed and random effect models which is more appropriate for interpretation. The result of the Hausman Test revealed that the value of chi^2 is 1.20 and a corresponding prob>chi 0.944. The significant value as reported by the probability of chi^2 favours the random effect model. However, since the hypotheses for study are stated in null form and make a comparison between the regression and the random effect models the study went further to conduct the Lagrangian Multiplier Test (LMT). The Breusch and Pagan Lagrangian multiplier test for random effects shows a chi^2 of 0.10 and a corresponding probability of 0.0720 which indicates that the pooled OLS is appropriate for the study.

Regression Analysis
This study attempts to examine the effect of credit risk on financial performance of listed deposit money banks in Nigeria. To achieve this, the study predicts financial performance

of deposit money banks in Nigeria proxied by ROE using the predictor variables: Assets quality (AQT), loan loss provision ratio (LPR) and loans and advances ratio (LAR) from 2006 to 2020.

Test of Hypotheses
Test of hypothesis is achieved through evaluating the t-statistic with its significant value. Table 8 summarize the regression result of the model.

Table 7: Test of Hypotheses

Model	B	T	Sig	Remark
1 (Constant)	0.7297	2.3	0.025	
AQT (H_{01})	0.1111	-2.22	0.030	Rejected
LPR (H_{02})	-0.1761	-0.093	0.076	Accepted
LAR (H_{03})	-0.0355	-2.04	0.045	Rejected
R-Squared	0.792	Durbin Watson	2.322	
Adjusted R-Squared	0.674	Std Error	4.58175	

Source: STATA Output, 2021.

Based on the individual explanatory variables, the result shows that $\beta = 0.1111$, t = -2.22, ρ = 0.030 (ρ = 0.030 < 0.05), for assets quality which indicates a significant predictor of financial performance of DMBs in Nigeria. It can also be seen from the result that assets quality ratio has a positive and statistically significant effect on financial performance for the period under review. The null hypothesis is rejected according to the result of the regression analysis. This result agrees with the findings of Kajola et al. (2018) and Kajirwa and Katherine (2019).

The result, β = -0.176, t = -0.093, ρ = 0.076 (ρ = 0.076 > 0.05), indicates that loan loss provision has insignificant effect on financial performance. This means that loan loss provision ratio has statistically insignificant negative effect on financial performance of quoted deposit money banks. Based on the result of the regression analysis the null hypothesis is accepted. This result agrees with Siriba (2020).

The regression result shows that β = -0.0355, t = -2.04, ρ = 0.045 (ρ = 0.045 < 0.05), loans and advances ratio have a significant effect on financial performance of DMBs in Nigeria. Though as shown in the result the loans to total assets ratio have negative effect on assets quality but has a statistically significant effect on financial performance in the study. Therefore, the hypothesis is rejected. This result is in agreement with Annor and Obeng (2017) Iyinomen et al. (2020)

The model summary on Table 7 above shows the predictive power or ability of the regression model as confirmed by the F-value, which explains the variation in the response variable measured as return on assets (ROE). This is measured using the R^2 statistics showing the explanatory variables explaining 79% of the variation in the

response variable (return on equity) while the adjusted R^2 is 0.674, which shows 67% of variance is indication of the inclusion of irrelevant variables in the study. This indicates that, the predictive power of the model is adequate. The remaining 20.8% are explained by other factors not captured in the model. The Durbin Watson (DW) statistic is a test for autocorrelation in the residuals from a statistical regression analysis. The Durbin-Watson statistic will always have a value between 0 and 4. Values from 0 to less than 2 indicate positive autocorrelation and values from 2 to 4 indicate negative autocorrelation. From the result it can be seen that the variables are not highly auto correlated.

Conclusion and Recommendations
Apparently, one of the factors that affect banks performance is the credit risk factor. Numerous credit risk factors can influence the financial performance of deposit money banks in Nigeria, but this study employs only three factors; assets quality ratio, loan loss provisions ratio and loans and advances ratio and investigate their impact on financial performance of banks. The three specific credit risk factors were selected because quantified data of these variables are easily available from secondary sources and historically, these variables have been analysed, hence the cumulative studies would help in getting a clearer picture. Based on the findings, the study concluded that there is a significant relationship between return on equity (ROE) and assets quality (AQT), loans and advances ratio (LAR) except for loan loss provision ratio (LPR) where insignificant relationship was recorded. Therefore, it is concluded that credit risk significantly impacts on the performance of DMBs in Nigeria. The implication of these findings is that the changes in the risk factors outlook are reflected in the financial performance of DMBs in Nigeria in the study period.

Recommendations
Since the findings of this study show that credit variables observed does significantly predict the performance of DMBs. It is recommended that:

1. It is recommended that banks improve their assets quality by diversifying their loan portfolio and ensure that their assets are more of performing rather than non-performing assets by lending to the productive sector of the economy.
2. Furthermore, the management of Nigerian DMBs should also match their loan assets to the nature of their deposit liabilities. Hence savings deposit should be used for short term investment or loan while time (fixed) term deposit is matched with long-term bonds while careful and detailed appraisal process should be followed in extending loans and advances to customers; and credit to individuals should be short-term or medium term at most.
3. Based on the findings, the study recommended that the management of deposit money banks should develop rigorous and robust credit policies that will enable banks to effectively assess the creditworthiness of their customers.

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