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

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Abstract
The study examined the effect of credit risk on the performance of listed deposit money banks in Nigeria using panel data collected from the audited annual financial statements of thirteen listed DMBs in Nigeria for a period of 2012-2018 using Ex-post facto research design and thirteen listed DMBs in Nigeria form the sample size. Furthermore, the study employed Generalized Least Squares (GLS) method of Panel Regression, Fixed and Random Effects in its estimations with the aid of STATA Software Version 14. The study found that all the measures of credit risk (NPL, LLPR, LAR, and CAR) have significant negative effect on profitability of DMBs in Nigeria measured by ROA and ROE respectively. Based on the findings of the study, the study recommends that Listed DMBs should have comprehensive credit risk management procedures that will cover the formulation of an overall credit strategy for managing problem credits, and a credit risk management framework which will serve as a tool for monitoring and controlling risk inherent in individual credit as well as banks credit portfolios.

Keywords: Bank Size, Bank Age, Credit Risk, Gdp, Inflation
JEL Classification: E51, P24

1. Introduction

The performance of deposit money banks is critical to economic growth, and the strength of most industries is dependent on the availability of finance within the economy provided by banks to facilitate transactions. Deposit Money Banks (DMBs) serve as financial intermediaries by channeling funds from the economy's surplus units to its deficit units through deposit taking and lending. This function ensures that limited resources are distributed as efficiently as possible among various users. A strong and well-developed financial system, according to Aurangzeb (2012), allows an economy to absorb shocks caused by a decline in external capital inflow. As a result, bank performance is critical to the stability of the financial system as well as economic growth and development (Ongore & Kusa, 2013). Furthermore, bank performance, to a great extent, facilitates economic growth by providing effective risk diversification instruments and improving deposit money banks' liquidity position (Levine, 2005).

However, lending represents the heart of the banking industry and loans and advances are the dominant assets as they generate the largest share of banks operating income. As banks generate income largely through credit creation, it may results in huge risks to the lender and the borrower. Hence, the smooth functioning of the bank can be greatly jeopardized by a failure of the trading partner to fulfill their contractual obligation in due date. A bank with a high credit risk has high bankruptcy risk that may put the depositors in danger. The credit risk profile of DMBs reveals that total non-performing loans increased by 14.59% between 2016 and 2017, rising from $2,084.92 billion to $2,389.11 billion (CBN, 2017). As a result, the top 50 and 100 obligors' exposure was 5,461.51 billion (34.33%) and 7,111.53 billion (44.7%) of the total industry exposure of 15,908.08 billion, indicating a high concentration of risk. As a result, credit risk increases as the industry-wide NPLs ratio increased from 12.8% to 15.02% in 2017, a 2.22% point increase over the previous period (CBN, 2017).Furthermore, CBN (2018) recently reported that DMBs' non-performing loans (NPLs) increased by N400 billion or 21% to N2.3 trillion in the third quarter of 2018 from N1.9 trillion in the second quarter of 2018, despite a 4% decline compared to N2.4 trillion in the same period of 2017. To strengthen these claims, a recent report published in 2018 by global rating agency Moody revealed that, bad loan losses in Nigeria's banking industry remain high (Komolafe, 2018). This is a worrisome development for an industry that has been struggling for many years, suffering massive losses as a result of bad loans.

Also, the methodology of most of the previous studies on the effect of credit risk on the performance of DMBs is fragmented. For instance, studies by Adesugba and Bambale (2016) and Maxwell and Peter (2016), Yimka, Taofeek, Abimbola and Olusegun (2015), Abiola and Olausi (2014), incorporated two measures of credit risk in their models instead of four measures of credit risk used by Annor and Obeng (2017) in Ghana, Isanzu (2017) in China and Muriithi (2016) in Kenya who incorporated four measures of credit risks in their study, leaving a gap that the current study will fill by incorporating four important measures of credit risk.

In view of this, the study examines the effect of credit risk on the performance of listed Deposit Money Banks in Nigeria. The theory that underpins this study is Finance Distress Theory. According to Baldwin and Scott (1983), when a firm's business declines to the state where it cannot meet its financial obligation, the firm is said to be in a state of financial distress. The first signal of financial distress is violations of debt payments and failure or reduction of dividend payouts. Whitaker (1999) defines entry in financial distress as the first year in which cash flows are less than current maturities' long-term debt. The firm has enough to pay its creditors as long as the cash flows exceed the current debt obligations. Firms go into financial distress as a result of economic distress, declines in their performance and poor management especially on risks (Wruck, 1990). Therefore, credit risk arises when the banks have non-performing loans resulting from borrowers delay in settling their debts. Therefore, banks should be cautious of their credit risks to avoid being plunged into financial distress. According to Whitaker (1999), corrective actions by banks management to improve upon their financial

performance are activated by financial distress. The finance distress theory therefore, is relevant to the study on the relationship between financial risk and financial performance as it identifies liquidity and credit risks as forecasters of financial distress (Wamalwa&Mukanzi, 2018).

2. Literature Review

Concept of Credit Risk

According to Luy (2010), credit risk exists if a lender is vulnerable to loss from a borrower, counterparty, or an obligor who refuses to honour their debt obligation as they have contracted. Credit risk is the risk that a financial institution incurred losses because the financial position of a borrower had deteriorated to the point that the value of an asset (including off-balance-sheet assets) is being reduced or extinguished. Credit risk is the potential that the real return on an investment or loan may differ from the projected return (Conford, 2000). Credit risk, according to Coyle (2000), are losses resulting from credit customers' unwillingness or inability to pay what is being owe in full and on time. In addition, the Basel Committee on Banking Supervision BCBS (2001) sees credit risk as the probability of losing the existing loan in part or all owing to credit events (default risk). Bankruptcy, failure to pay a due debt, repudiation/moratorium, or credit rating change and restructuring are examples of credit events.

Empirical Review

Kolapo, Ayeni and Oke (2012)examined the effect of credit risk on the performance of commercial banks in Nigeria over the period of 11 years (2000-2010) using a sample of 5 commercial banking firms selected on a cross sectional basis for eleven years. The traditional profit theory was employed to formulate profit, measured by Return on Asset (ROA), as a function of the ratio of Non-performing loan to loan & Advances (NPL/LA), ratio of Total loan & Advances to Total deposit (LA/TD) and the ratio of loan loss provision to classified loans (LLP/CL) as measures of credit risk. Panel model analysis was used to estimate the determinants of the profit function and the results showed that the effect of credit risk on bank performance measured by the Return on Assets of banks is cross-sectional invariant. Ogboi and Unuafe (2013) examined the empirical evidence on the magnitude of the relationships between credit risk and bank's profitability in Nigeria using a time series and cross sectional data from 2004-2009 which were obtained from selected banks annual reports and accounts in Nigeria. They examined the impact of credit risk and capital adequacy on banks financial performance in Nigeria. Panel data model was used to estimate the relationship that exists among loan loss provisions (LLP), loans and advances (LA), non-performing loans (NPL) and capital adequacy (CA) which were the independent variables and return on asset (ROA) as the dependent variable to measure the profitability of the banks and the findings showed that sound credit risk management and capital adequacy impacted positively on bank's financial performance with the exception of loans and advances which were found to have a negative impact on banks' profitability during that period.

Abiola and Olausi (2014) investigated the impact of credit risk management on the performance of commercial banks in Nigeria using financial reports of seven commercial banking firms were used to analyze for seven years (2005 – 2011). The panel regression model was employed for the estimation of the model. In the model, Return on Equity (ROE) and Return on Asset (ROA) were used as the performance indicators while Non-Performing Loans (NPL) and Capital Adequacy Ratio (CAR) are used as credit risk management indicators. The findings revealed that credit risk management has a significant impact on the profitability of commercial banks' in Nigeria. Samuel (2015) examined the effect of credit risk on commercial banks performance. The result shows that the ratio of loan and advances to total deposit negatively relate to profitability though not significant at 5% and that the ratio non-performing loan to loan and advances negatively relate to profitability at 5% level of significant. Yimka, Taofeek, Abimbola and Olusegun (2015) examined the role of credit risk management in value creation process among commercial banks in Nigeria. The study analyzes the impact of loan and advance loss provision, total loan and advances, non-performing loan and total asset on accounting Return on Equity (ROE) and Return on Asset (ROA). The panel data come from 10 commercial banks listed on Nigeria Stock Exchange (NSE) between 2006 and 2010. The results reveal that credit risk management has significant effect on financial performance of commercial banks.

Alshatti (2015) examined the effect of credit risk management on financial performance of the Jordanian commercial banks during the period (2005-2013) using a sample of 13 Jordanian commercial banks. Two mathematical models have been designed to measure this relationship; the research revealed that the credit risk management affects the financial performance of the Jordanian commercial banks as measured by ROA and ROE. The study concludes that credit risk management indicators considered in this research have a significant effect on financial performance of the Jordanian commercial banks. Iftikhar (2016) examined the effect of credit risk management on the financial performance of commercial banks of Pakistan listed in KSE using a sample of 10 banks. A statistical model had been designed to measure this relationship and the study showed that the credit risk management impact on financial performance of the commercial banks of Pakistan as calculated by ROE and ROA, where the indicator of credit risk management were non-performing loan and capital adequacy ratio. Data was analyzed using panel regression model and study concludes that the factor of credit risk management have significant impact on financial performance of commercial banks of Pakistan. Kimotho and Gekara (2016) conducted a study on the effect of credit risk management and financial performance of commercial banks in Kenya. The study adopted descriptive research design and target population consisted of credit risk managers, credit analyst and debt recovery managers. The study revealed that credit risk management procedures are used to influence profitability of the bank positively.

Otieno, Nyagol and Onditi (2016) evaluated the relationship between credit risk management and financial performance of microfinance banks in Kenya using Pearson correlation coefficient. The population of the study comprised of 12

licensed microfinance Banks. Longitudinal research design utilizing panel data covering the period from 2011 to 2015 was used. The results showed that credit risk management with PAR and LLPCR parameters had a strong negative correlation with both ROA and ROE performance measure. Thus, the study concludes that credit risk management impacts performance of MFBs

Maxwell and Peter (2016) investigated the impact of credit risk management on the performance of deposit money banks in Nigeria using the ECM and Granger causality techniques in addition to the IRF and VDC methodology. Data for the study were sourced from the CBN Statistical Bulletin and the Annual Reports and Accounts of the NDIC for the period 1989 to 2013. Our findings demonstrate succinctly that, the selected credit risk management indicators under study significantly 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 causality relationship between the various credit risk management indicators and the various measures of performance except for a uni-directional granger causality relationship from ROE to RNPD and from ROTA to RNPS respectively. Isanzu (2017) examined the impact of credit risk on the financial performance of Chinese banks. Secondary data was collected from five largest commercial banks in the country for the period of 7 years which span from 2008 to 2014. The study used nonperforming loans, capital adequacy ratio, impaired loan reserve, and loan impairment charges as measures of credit risk measure of financial performance return on asset.. Data analysis was done using a balanced panel data regression model, and the study findings revealed that nonperforming loan and Capital adequacy have a significant impact on financial performance of Chinese commercial banks.

Annor and Obeng (2017) examined the impact of credit risk management on the profitability of 6 selected commercial banks listed on the Ghana stock exchange. Secondary data were gathered from the annual reports of the six selected banks and Ghana banking survey for the years under consideration. 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, non-performing loans, loan loss provisions ratio, loan to asset ratio and capital adequacy ratio as credit risk and the findings showed that, credit risk management have significant relationship with the profitability of 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 showed statistically significant negative relationship with the profitability of a bank. Mendoza and Rivera (2017) examined the credit risk and capital adequacy of the 567 rural banks in the Philippines for the purpose of investigating how both variables affect bank profitability using the Arellano-Bond estimator and discovered that credit risk had a negative and statistically significant relationship with profitability. Also, empirical analysis showed that capital adequacy had no significant impact on the profitability of rural banks in the Philippines.

Theoretical Framework

Independent Variables **Dependent Variables**

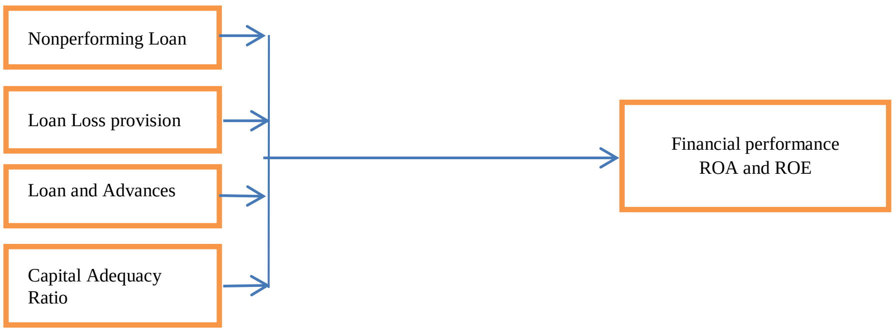

Figure 1: Theoretical framework
Source: The Researcher

3. Methodology

Ex-post facto design was used in this study and a census sample was employed in order to generate sufficient number of observations that will facilitate the conduct of data analysis. The population of the study is the 16 DMBs listed on the floor of Nigerian stock exchange as at 31st December, 2021.The study extracts panel data from the financial statements of all the 13 listed DMBs in Nigeria that have the required data available for the period 2012 – 2018. Also, data on the macro economic variables were obtained from the World Bank economic database.

Stata 14 software was used to generate both descriptive statistics and correlation matrix for the dataset to examine the main characteristics of the data and understand the direction and extent of relationship between and among the variables. The study also conducts normality test for the dataset to see its behaviour. Relevant diagnostic and robustness tests that include Multicollinearity Test, Model Specification Test, Heteroskedasticity Test, and Hausman Specification Test were conducted to determine the most suitable model for analysis as well as determine whether or not the estimated models satisfy the conditions for acceptance.

In order to examine the effect of credit risk on the performance of listed DMBs in Nigeria, the following models are specified: The original regression model is specified as follows:

$$Z_{it} = \alpha + \alpha_1 P_{1it} + \alpha_2 P_{2it} + \alpha_3 P_{3it} + \alpha_4 P_{4it} + \varepsilon_{it} \quad \ldots\ldots\ldots\ldots \quad 1$$

Where the dependent variable denoted by Z_{it} of bank i at time t, α is the constant, while the coefficients of the independent variables are denoted by α_1, α_2, α_3, andα_4 for bank i at time t and ε_{it} is the disturbance or error term.

Based on the above, the model can be decomposed as follows:

$$ROA_{it} = \alpha + \alpha_1 NPL_{it} + \alpha_2 LLPR_{it} + \alpha_3 LAR_{it} + \alpha_4 CAR_{it} + \alpha_5 BSIZE_{it} + \alpha_6 BAGE_{it} + \alpha_7 GDP_{it} + \alpha_8 IR_{it} + \varepsilon_{it} \quad \ldots\ldots 2$$

$$ROE_{it} = \beta + \beta_1 NPL_{it} + \beta_2 LLPR_{it} + \beta_3 LAR_{it} + \beta_4 CAR_{it} + \beta_5 BSIZE_{it} + \beta_6 BAGE_{it} + \beta_7 GDP_{it} + \beta_8 IR_{it} + \varepsilon_{it} \quad \ldots\ldots 3$$

From equation 2a and 2b above, the financial performance was measured using Return on Asset (ROA) and Return on Equity (ROE). The independent variable, Credit Risk was proxied by Non-Performing Loan (NPL), Loan Loss Provision (LLPR), Loan and Advances Ratio (LAR) and Capital Adequacy Ratio (CAR). Bank Size (BSIZE), Bank Age (BAGE), Gross Domestic Product (GDP) and Inflation Rate (IR) are the control variables while α and ε_{it} were previously defined. The control variables were introduced in this study based on the idea that bank financial performance may also be affected by some factors that are not incorporated in the explanatory variable.

The study's dependent variable is bank performance, which is represented by the return on asset (ROA) and return on equity (ROE). Return on Assets measures efficiency and it determines how well banks utilize their scarce resources to make profits. Return on assets was chosen as a measure of a bank's financial performance because it is an important performance factor in forecasting bank failures (Samad& Glenn 2012). However, ROA calculated by dividing Net Income with Total Assets. Return on Equity on the other hand is the return shareholders get from their investment. ROE shows the amount of profit banks generate relative to shareholders' equity as shown in the balance sheet (Ongore & Kusa, 2013; ECB, 2010). ROE is calculated by dividing net income with total equity (Khrawish, 2011). It was used in studies conducted byMansyur (2017); Mendoza and Rivera (2017); Muthii, Githinji, and Muchiri (2017).

The independent variable credit risk is proxied by nonperforming loan, loan loss provision ratio, loan advances ratio and capital adequacy ratio. a) Non-performing Loans Ratio It is a measure of the percentage of gross loans in a bank's loan portfolio that are nonperforming or doubtful. This is calculated as the ratio of nonperforming to Total Loans and Advances. Kolapo et al., 2012; Samad, 2004; Rajan and Dhal, 2003 used this as a credit risk indicator. b) Loan Loss Provision Ratio: Banks use loan loss provisions to create reserves to cover the expected losses in their loan portfolios. It is calculated as the ratio of loan loss provision to gross loan. This is a credit risk indicator used by Annor and Obeng (2017); Maxwell and Peter (2016); Muriithi (2016); Aishatti (2015). c) Loan and Advances Ratio:The loan and advances ratio measures a bank's ability to withstand deposit withdrawals as well as its willingness to meet loan demand by reducing its cash assets. It is the ratio of total loan and advances to total deposit. Annor and Obeng (2017), Maxwell and Peter (2016), Muriithi (2016), Aishatti (2015), and Gizaw, Kebede, and Selvaraj (2015) used it as credit risk indicator. d) Capital Adequacy Ratio (CAR):It is the ratio of bank's core capital to risk-adjusted assets. A higher ratio indicates that the bank's capital is adequate, that the assets are of high quality, and that the credit risk is low. This measure was used by Muriithi (2016), Francis (2013); Perera et al. (2013); and Masood and Ashraf (2012).

The inclusion of control variables in this study was motivated by the fact that factors other than those included in the explanatory variable could have an impact on bank financial performance. Therefore, the control variables of this study are classified into banks' specific variables and macroeconomic variables. The banks' specific variables included are Bank Size (BSIZE) and Bank Age (BAGE) while the macroeconomic variables are Gross Domestic Product (GDP) and Inflation Rate (IR). Bank size (BSIZE) was measured by the natural logarithm of total assets of the firm (Skopljak&Luo, 2012) while Bank Age (BAGE) was measured by logarithm of the number of years from the time of its incorporation (Elvin & Hamid, 2016). Also, Gross Domestic Product (GDP) was measured by annual growth rate of the economy (Trabelsi, 2015, Eneyew, 2013, Dumicic & Ridzak, 2015 while the annual Inflation Rate (IR) was used to calculate the Inflation Rate (Knezevic&Dobromirov, 2016; Khanna, Srivastava, &Medury, 2015; Kanwal& Nadeem, 2013).

4. Results

This section presents the study's empirical findings for both descriptive and inferential statistics.

Table 1: Descriptive Statistics

Variable	Obs.	Mean	Std. Dev.	Min	Max
ROA	91	7.006	1.533	1.375	8.858
ROE	91	6.857	1.589	1.025	8.767
NPL	91	1.876	.237	1.015	3.044
LLPR	91	2.655	.168	2.246	2.992
LAR	91	2.043	.115	2.003	2.679
CAR	91	1.167	.047	1.101	1.299
BSIZE	91	7.705	1.629	2.008	9.599
BAGE	91	4.276	1.786	1.538	8.24
GDP	91	1.636	.171	1.008	1.856
IR	91	1.464	.325	.903	2.076

Note: ROA= return on asset, ROE= return on equity, NPL= nonperforming loan, LLPR= loan loss provision ratio, LAR= loan and advances ratio, CAR= capital adequacy ratio, BSIZE= bank size, BAGE= bank age, GDP= gross domestic product, IR= inflation rate

From the result in table 1, the descriptive statistics of all variables used in the study show mean values of 7.006, 6.857, 1.876, 2.655 2.043, 1.167, 7.705, 4.276, 1.636, and 1.464 for ROA, ROE, NPL, LLPR, LAR, CAR, BSIZE, BAGE, GDP, and IR while 1.375 and 8.858, 1.025 and 8.767, 1.015 and 3.044, 2.246 and 2.992, 2.003 and 2.679, 1.101 and 1.299, 2.008 and 9.599, 1.538 and 8.24, 1.008 and 1.856, and.903 and 2.076 are the corresponding minimum and maximum values for the variables. In most of the variables, the values show a wide range of dispersion. Similarly, the standard deviations of the most of the variables differ significantly from the respective means of the data, indicating that the banks' responses to these phenomena vary widely.

Furthermore, the Shapiro Wilk test for data normality indicates that all variables are not normally distributed. Normal distributed data when using financial data is almost impossible because the distribution is unsystematically randomly distributed

between and within banks (Wooldridge, 2013). However, non-normality of data does not affect the validity of estimations with regression based on the Gauss-Markov Theorem (Shao, 2003). The model specification test was also conducted using link test. The link test is based on the assumption that if a regression is properly specified, then the inclusion of additional independent variable, except by chance should not be significant. The _hat values that are the predicted values of the models are significant as expected for both ROA (0.001) and ROE (0.000) models. Likewise, _hatsq values are insignificant for both ROA (0.324)and ROE (0.152) models suggesting that both ROA and ROE models are correctly specified. The variables were also subjected to a Pearson correlation analysis to determine the degree of relationship between the dependent and independent variables, as well as among the independent variables. The correlation matrix is shown in Table 2 as follows:

Table 2: Pairwise correlation among components of Credit risk

	ROA	ROE	NPL	LLPR	LAR	CAR	BSIZE	BAGE	GDP	IR
ROA	1.00									
ROE	0.97*	1.00								
NPL	0.13	0.16	1.00							
LLPR	0.21*	0.28*	0.18	1.00						
LAR	-0.08	-0.12	-0.09	-0.35*	1.00					
CAR	-0.19	-0.19	0.08	-0.04	0.10	1.00				
BSIZE	0.88*	0.91*	0.42*	0.34*	-0.17	-0.18	1.00			
BAGE	-0.02	-0.01	-0.00	0.13	-0.05	-0.03	0.00	1.00		
GDP	0.08	0.11	-0.04	-0.01	-0.28*	0.06	0.0457	-0.66*	1.00	
IR	-0.42*	-0.39*	0.13	-0.10	-0.23*	0.03	-0.32*	-0.11	0.20*	1.00

*Note: * denotes 5% level of significance. ROA= return on asset, ROE= return on equity, NPL= nonperforming loan, LLPR= loan loss provision ratio, LAR= loan and advances ratio, CAR= capital adequacy ratio, BSIZE= bank size, BAGE= bank age, GDP= gross domestic product, IR= inflation rate*

In correlation analysis, high level and strong form of relationship between dependent and individual independent variables are expected while low level and weak form of relationship between and among independent variables are expected. However, from the correlation matrix presented in table 1 above, only NPL, LLPR, CAR, BSIZE and IR have strong relationship with ROA while only NPL, LLPR, CAR, BSIZE, GDP and IR have strong relationship with ROE. The result also showed that, the components of credit risk and control variables are not strongly associated among themselves. However, this means there is no multicollinearity issue as recommended by Gujatati (2004).

The study then runs diagnostic tests on the pooled panel result, testing for multicollinearity and heteroskedasticity. The variance inflation factor and tolerance value revealed values that are less than 10 and greater than 0.10, indicating the absence of multicollinearity. The low mean VIF of 1.65 showed a weak correlation among the regressors. The Breusch-Pagan/Cook-Weisberg test was used to check for heteroskedasticity. The results show chi2 values of 4.41 and 5.21 for ROA and ROE models respectively, which are significant at 1% indicating that the dataset violates the assumption of homoscedasticity. Due to the violation of the homoscedasticity assumption in the pooled panel result as revealed by the Breusch-

Pagan/Cook-Weisberg test that turns chi2 values of 4.41 and 5.21, to significant at 1%, the study re-run a pooled panel regression using robust option as recommended by Gujarati and Porter (2009) to correct the problem of heteroskedasticity.

The Generalized Least Squares (GLS) method was employed to run both fixed effects (FE) and random effects (RE) tests. The results revealed a significant difference between FE and RE, allowing the Hausman specification test to be used to select the best model between the two. The Hausman test resulted in a chi^2 statistic of 46.12 and 41.04 with eight degrees of freedom and corresponding p-values of 0.000 and 0.000 for both ROA and ROE models respectively. Based on the Hausman result, the FE model is preferred over RE model to control for time-invariant unobserved characteristics across the listed DMBs. Therefore, the fixed effect model should be interpreted.

Table 3: Result of Generalized Least Squares Regression

Model A ROA				Model B ROE		
	Coef.	T-statistic	P-values	Coef.	T-statistic	P-values
NPL	-1.018	-3.16	0.000***	-1.309	-5.24	0.000***
LLPR	-.373	-0.97	0.007***	-.139	-0.46	0.045**
LAR	-.260	-0.40	0.041**	.265	0.52	0.003***
CAR	-.312	-0.30	0.048**	.038	0.05	0.034**
BSIZE	.588	4.62	0.000***	.587	5.93	0.000***
BAGE	-.022	-0.52	0.105	-.038	-1.17	0.147
GDP	.954	1.36	0.050**	.497	0.91	0.036**
IR	-6.208	-6.35	0.000***	-5.417	-7.13	0.000***
CONS	13.889	5.07	0.000	11.853	5.58	0.000
R-Squared	Within	0.7317			0.8086	
	Between	0.4598			0.4423	
	Overall	0.4625			0.4630	
Rho		.955			.967	
F-statistic		23.86***			36.97***	

Fixed Effect Estimates for credit risk components

*Note: ***, **, * denotes 1%, 5%, and 10% level of significance. ROA= return on asset, ROE= return on equity, NPL= nonperforming loan, LLPR= loan loss provision ratio, LAR= loan and advances ratio, CAR= capital adequacy ratio, BSIZE= bank size, BAGE= bank age, GDP= gross domestic product, IR= inflation rate.*

Table 3 shows that the F-statistics return values of 23.86 and 36.97 for ROA and ROE models that are statistically significant at 1% level of significance. These confirm the overall significance of the models. It further supports the assumption of a significant linear relationship between the dependent variables ROA and ROE, and the independent variables. The interclass correlations (rho) are 95.5% and 96.7% implying that 95.5% and 96.7% of the variations in in both ROA and ROE are due to differences across the banks. The within and between R-squares are 73.2% and 46% and 80.7% and 44.2% respectively. Thus, 73.2% and 80.7% of

variations in both ROA and ROE are due to differences within individual listed DMBs while 46% and 44.2% of the variations are due to differences between the listed DMBs. The overall R-squares are 46.2% and 46.3%, indicating that, the variables considered in the models explain about 46.3% and 46.3% change in both ROA and ROE, while about 53.8% and 53.7% change may be as a result of other variables not captured by the models.

NPL is negatively associated with ROA and ROEwith coefficients of -1.018 and -1.309 with p-values less than 0.01. This means that holding other factors constant, a percentage increase in NPL decreases the profitability of listed DMBs by 102% and 131% measured by ROA and ROE. These results show sufficient evidence to support the research finding at 1% level of significance.This is consistent with the findings of Hamza (2017), Annor and Obeng (2017), Isanzu (2017), Olalere and Wan (2016), and Muriithii (2016), who found a significant negative effect of NPL on bank profitability, but contradicts the findings of Afriyie (2011) and Ogboi (2013), Marshal and Onyekachi (2014) who found a significant positive effect of NPL on bank profitability.

Loan loss provision ratio (LLPR) is negatively associated with ROA and ROE with coefficients of -0.373 and -0.139 with p-values 0.01and 0.045 for ROA and ROE respectively indicating significant negative effect on financial performance. This means that holding other factors constant, a percentage increase in LLPR decreases profitability of listed DMBs by 37.3% and 13.9% measured by ROA and ROE. This result shows sufficient evidence to support the research finding at 1% and 5% levels of significance. Therefore, the result shows that LLPR negatively affect the financial performance of listed DMBs in Nigeria. This is consistent with the findings of Hamza (2017), Annor and Obeng (2017), Kolapo, Ayeni, and Oke (2012)who found a significant negative effect of LLPR on bank profitability

Also, loan and advances ratio (LAR) is negatively and positively correlated to ROA and ROE with coefficient of -0.260and 0.265 with p-valuesof 0.041 and 0.003 for ROAand ROE indicating significant negative and positive effects on financial performance. This means that holding other factors constant, a percentage increase in LAR decreases and increases profitability of listed DMBs by 26% and 27% measured by ROA and ROE respectively. This result shows sufficient evidence to support the research finding at 5% and 1% levels of significance. Therefore, the result shows that LAR is negatively and positively associated with financial performance of listed DMBs in Nigeria measured by ROA and ROE respectively. This is consistent with the findings of Annor and Obeng (2017) and Kargi (2011).

Capital adequacy ratio (CAR) is negatively and positively associated with ROA and ROE with coefficients of -0.312 and 0.038 with p-values of 0.048and 0.034 for ROA and ROE respectively, indicating a significant negative and positive effect on financial performance. This implies that holding other factors constant, a percentage increase in CAR decreases and increases profitability of listed DMBs by 31.2% and 3.4% measured by ROA and ROE respectively. This result shows sufficient evidence to support the research finding at 5% levels of significance. Therefore, the result shows that CAR has negative and positive effect on financial

performance of listed DMBs in Nigeria measured by ROA and ROE respectively. This is consistent with the findings of Hamza (2017), Mendoza and Rivera (2017), Annor and Obeng (2017), Ogboi and Unuafe (2013) who found positive effect of CAR on performance of banks and findings of Isanzu (2017), Abiola and Olausi (2014) found negative effect of CAR on performance of banks.

Bank size (BSIZE) is positively related with ROA and ROE with coefficients of 0.588and 0.587 with p-values of 0.000 and 0.000 indicating significant positive effect on financial performance. This implies that holding other factors constant, a percentage increase in total assets(BSIZE) increases profitability of listed DMBs by 58.8% and 58.7% measured by ROA and ROE respectively. This result shows sufficient evidence to support the research findings at 1% level of significance.The finding is consistent with studies by Nomanet al. (2015), Pervanet al. (2015), Saona (2016), Tradet al. (2017), and Hasanovet al. (2018) who found that bank size has a significant positive effect on banks profitability indicating the existence of economies of scale while the finding contradicts studies by Trujillo-Ponce (2013) Knezevic and Dobromirov (2016), and Batten and Vo (2019); and Neveset al. (2020) who found that bank size has significant negative effect on banks profitability.

Bank age (BAGE) is negatively associated with ROA and ROE with coefficients of -0.022 and-0.038with p-values 0.105 and 0.147 indicating nonsignificant negative effect on financial performance of listed DMBs. This implies that holding other factors constant, a percentage increase in bank age (BAGE) decreases profitability of listed DMBs by 2.2% and 3.8% measured by ROA and ROE respectively. However, there was no sufficient evidence to support this finding as the p-values of 0.105and 0.147are not significant at all conventional levels. This is consistent with studies by Salman & Yazdanfar (2012); Dogan (2013) and Sulub (2014) who found negative relationship between age and profitability and study by Stiewarld (2009) who found nonsignificant relationship between age and profitability.

GDP is positively associated with ROA and ROE with coefficients of 0.954and 0.497 with p-values of 0.050 and 0.036 indicating significant positive effect on financial performance of listed DMBs. This implies that holding other factors constant, a percentage increase in GDP increases profitability of listed DMBs by 95.4% and 49.7% measured by ROA and ROE. This is an evidence to support the research finding at 5% level of significance. However, the finding is consistent with studies by of Trujillo-Ponce (2013), Rachdi (2013), Pervanet al. (2015), Djalilov and Piesse (2016), and Ha (2020)who found that GDP has a significant positiveeffect on banks profitability while it contradicts studies by Saeed (2014), Islam and Nishiyama (2016), Garcia and Guerreiro (2016), Saona (2016), and Garcia and Trindade (2019) who found that GDP growth has a significant negative effect on banks profitability.

Inflation rate (IR) has negative coefficients of -6.208and -5.417 with p-valuesof 0.01 and 0.000 for ROA and ROE indicating significant negative effect on financial performance. This means that holding other factors constant, a percentage increase in inflation rate (IR) decreases profitability of listed DMBs by 620.8% and 541.7%

measured by ROA and ROE. This is an evidence to support the research finding at 1% level of significance. From the findings, inflation rate (IR) has significant negative effects on financial performance of listed DMBs in Nigeria. The finding is consistent with studies of Kosmidou (2008), Saeed (2014) and Hasanovet al. (2018) who found that inflation rate has significant negative effect on bank profitability while it contradicts studies by Nishiyama (2016), Saona (2016), Tradet al. (2017) and Batten and Vo (2019) who found that inflation rate has significant positive effect on banks profitability.

To test whether credit risk affect the financial performance of listed DMBs in Nigeria, F test was used. The test has a null hypothesis that all the coefficients of the measures of credit risk are jointly equal to zero. Table 3 shows that the F statistics are 23.86 and 36.97 for both ROA and ROE models which are greater than the critical value at 1% level of significance. Therefore, the hypothesis one that, credit risk has no significant effect on the financial performance of listed DMBs in Nigeria is rejected. This is consistent with studies by (Ogboi & Unuafe, 2013, Marshal & Onyekachi, 2014, Muriithii, 2016, Isanzu, 2017, Annor and Obeng, 2017)) who found significant negative effect of credit risk on financial performance of banks while it contradicts the findings of (Kithinji, 2010,Ogboi & Unuafe, 2013, Maxwell & Peter, 2016) who found significant positive effect of credit risk on financial performance of banks.

5. Conclusion and Recommendations

The study examined the effect of credit risk on the financial performance of listed DMBs in Nigeria. However, credit risk measures (NPL, LLPR, LAR and CAR) have significant negative effect on profitability of DMBs in Nigeria. Therefore, the study concludes that credit risk (CR) significantly affect the financial performance of listed DMBs in Nigeria.

Based on the findings of this study, the result on the effect of credit risk on the financial performance of listed DMBs in Nigeria has significant negative effect on the profitability of listed banks. Hence, the study recommends that Listed DMBs should have comprehensive credit risk management procedures that will cover the formulation of an overall credit strategy for managing problem credits, and a credit risk management framework which will serve as a tool for monitoring and controlling risk inherent in individual credit as well as banks credit portfolios.

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