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## Risk Management and Financial Performance of Listed Deposit Money Banks in Nigeria

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### **Abstract:**

*The study examined the effect of risk management on the financial performance of Deposit Money Banks in Nigeria. The study employed ex-post-facto research design. The study population consisted of 26 DMBs from which 10 were selected using purposive sampling technique. Secondary data were collected from financial statements. Panel data regression was used to estimate the parameter coefficients. Findings revealed that Debt Equity Ratio, Asset Liability Maturity Mismatch and Capital Adequacy Ratios had significant negative, positive and negative effects on Return on Assets respectively. Loan Deposit Ratio and Type of Auditor had significant negative and positive effects on Return on Equity respectively. Also, Interbank Funding Ratio had significant positive effect on Return on Equity. Risk Asset Portfolio of the DMBs was reasonably diversified with diversification index above 0.6. Capital adequacy ratio of the DMBs averaged 0.22. The study concluded that the effective risk management among the DMBs impacted their financial performance positively. The study recommended that DMBs should determine their optimum loan-deposit mix as well as pay special attention to their balance sheet mismatch to determine the most appropriate bounds of tenors between deposit and risk assets. Also, the Central Bank of Nigeria should bring down the cash reserve ratio that restricts credit creation and causes high cost of funds. The Central Bank of Nigeria should also pay interest rate on cash reserves held by the bank.*

**Keywords:** *Asset liability maturity mismatch, Deposit money banks, Liquidity management, Return on equity, Risk management*

### **1. Introduction**

The process of financial intermediation by Deposit Money Banks (DMBs) whereby funds are channeled from the surplus to deficit sectors of the economy involves borrowing on short-term and lending on long-term bases. This phenomenon, according to Adegbite (2017) promotes savings-investment process, capital formation and real growth of the economy. However, the short-term versus long-term dichotomy has created a risky adventure that throws at the DMBs, liquidity, profitability and going concern challenges. The longer tenured loans make credit payment period longer than the debt collection period of the depositors who can withdraw their deposits on demand. Frank Knight (1921), the most famous scholar to formalize definition of risk and make a distinction between risk and uncertainty (Holton, 2004) defines risk as situations where the outcome of a given action is unknown but the odds are measurable. Uncertainty on the other hand refers to a situation where all needed information to set the odds in the course of a given action are unknown. Recent global economic crisis has revealed that, it is difficult for institutions to accurately capture the riskiness of their activities.

In managing risks, rather than trying to hedge against risk, there is a strategic step to determine the risks to ignore, the ones to reduce or eliminate and those ones to exploit in order to take advantage of opportunities to achieve the objectives of the organisation. Increasing exposures to some risk is an integral part of business success, and any entity that wants large rewards must be ready to take considerable amount of risk (Damodaran, 2017). For any business venture of which the DMBs are part, Audu (2014) submitted that it is difficult to evade risk altogether because without taking some level of risk, the returns from operations will no doubt be compromised and therefore Audu advocated avoidance of risks as much as it is feasible saying that the rational approach to risk, is at the very least to restrict exposure to it.

According to Harle, Havas, Kremer, Rona and Samandari (2015), the analysis of stress has come up as a major supervisory instrument for financial stability, and banks have strengthened their risk lifestyles by always involving members of the board in major risk decisions. Nigerian economy was not shielded from the global financial market crises of 2007/2008 despite initial government posture of immunity. NDIC (2009) reported that the major weaknesses in the Nigerian banking sector include weak corporate governance, ineffective risk management strategies, heavy deteriorating facilities, sudden capital mop up and extreme illiquidity.

Two major roles performed by banks in their intermediation process include creating liquidity and transforming risk; and these twin roles impact on the larger economy by stimulating growth in the real sector (Ndukwe, 2013). The risks DMBs are confronted with from each side of the balance sheet are different. From the liability side, which captures deposit taking, it involves issuing claims that are less risky and demandable at any time while lending on the asset side of the balance sheet is riskier and involves obtaining costly information from unknown customers and extending credit on the basis of the information acquired. By this, according to Ndukwe (2013), banks create liquidity on the balance sheet by financing fewer liquid assets with funds from relatively more liquid liabilities.

The CBN 2015 4<sup>th</sup> quarter report revealed that, while the Cash Reserve Ratio (CRR) was 12 percent as at August 2013, it was moved up to 15 percent in January 2014; and then further to 20 percent in November, 2014. By the second quarter of 2015, the CRR had been increased to 31 per cent, the highest ever. In September 2015, the CBN reduced the Cash Reserve Ratio (CRR) from 31 percent to 25 percent while Monetary Policy Rate and liquidity ratio were left at 13 percent and 30 percent respectively (CBN Report, 2015). These records are pointing to the fact that reserve requirement regime in the midst of liquidity management has become more complex to handle.

The widely fluctuating rates applied since 2013 is a serious challenge to financing credit portfolio of the banks as emergency funding through interbank deposits are more costly. In the same vein the pressure to offer higher rates to attract deposits from the public is also high. The different interest rates offer for the same amount of deposit by different banks is a reflection of desperation and relative liquidity of the banks. Many of the DMBs also rely mainly on term deposits which equally attract high interest costs. Furthermore, some other banks' deposit portfolio is predominated by public sector funds that are highly volatile. Many banks failed and were liquidated due to sudden withdrawal of public sector funds in the past. In view of this, and in order to prevent structural deficiency in the deposit liability of the DMBs, the CBN introduced another cash reserve policy on public sector deposits in July 2013 at 50% which was later increased to 75% in January, 2014 (CBN Monetary Policy Report, 2016).

It is on the basis of the aforementioned issues, challenges and problems that informed the researcher to conduct this study on risk management and the effects on the financial performance of DMBs, post-consolidation period in 2005. Bank failure is contagious and can pull down many other business ventures. This explains why regulatory disclosure requirement of DMBs' risk management structure has become part of audited financial statements. The main cause of bank failures has been attributed to poor risk management practices in all its ramifications. Owojori, Akintoye and Adidu (2011) said that banks in Nigeria generally take a lot of risks; although their risk appetites are different, many of them take more risks than their capital could carry. The effects of the recent financial/economic crisis on the banking sector included reduced foreign credit lines and capital market downturn, causing second round effects on the balance sheet with increased loan loss provisioning (Soludo, 2009). The treasury single account (TSA) introduced by the government in 2015 has become a policy earthquake that threw the banking system into a debilitating liquidity crisis, especially with banks whose bulk of deposit liability portfolio is from the public sector. Although liquidity ratio in the banking industry increased from 39.32% by year-end 2014 to 48.63% by year-end 2015 (CBN Report, 2015), which is above the benchmark of 30% set by the CBN, it is expected that without appropriate monetary policy measure, the liquidity position of the DMBs may get worse. The Federal Government of Nigeria directed that the accounts of all revenue generating agencies with commercial banks be closed and same should be transferred to the treasury single account and consolidated revenue fund maintained with the CBN not later than 25<sup>th</sup> February, 2015 (Eme, Chukwurah & Iheanacho, 2015).

The underlying problems that are still recurring and begging for solutions include, firstly, banks are susceptible to high risks, which affect their performance both financial and non-financial. Secondly, despite attempts to put in place risk management structure, DMBs still need to determine the optimal level of activity considering complications caused by supervisory and regulatory set-backs and policy summersaults. Thirdly, banks still face funding gaps that make them resort to costly, wholesale funds (inter-bank and tenured deposits) since the cheap retail deposits have become inadequate, creating both maturity and interest rate mismatches in their statement of financial position. The main objective of this study is to examine the effect of risk management on the financial performance of Deposit Money Banks in Nigeria.

This paper, therefore, is arranged as follows: following the introductory session, session 2 reviews the literature, section 3 presents the methodology of the study, section 4 presents the analysis and discussion of results, and section 5 concludes and offers policy recommendation.

## 2. Literature Review

Several empirical studies conducted by many scholars in this area of study revealed the relationship between risk management factors and financial performance of deposit money banks showing variability of these findings from various contexts and perspectives. Tanveer, Muhammad and Sadaf (2017) examined the impact of risk management practices on banks' financial performance in Pakistan for the period 2004 to 2016 using panel data regression analysis revealed a significant impact of risk management practices on financial performance of Pakistani banks categorised into large, medium and small banks. Specifically, CAR was found to be statistically significant at 5% and positively impactful on ROE, while Liquidity risk (measured by interest sensitive asset/total asset), NPLR, interest rate risk was statistically significant at 5% and influence ROE negatively. However, for small banks, liquidity risk impacted ROE positively.

In the work of Harelimana (2017) on The Role of Risk Management on Financial Performance of Banking Institutions in Rwanda: case study Unguka Bank Limited, both quantitative and qualitative techniques were employed. The result of the interviews from 43.3% response rate identified the key determinants of risk management as credit risk, operational risk, interest rate risk and liquidity risk. Findings from the multiple regression analysis of the secondary data showed that there is a strong positive relationship between risk management indicators (credit risk, liquidity risk, interest

rate risk, operational risk and loan default risk) and financial performance. Same result was obtained from the research work of Li & Zou (2014) on the impact of credit risk management on profitability of commercial banks in Europe which showed a positive relationship between credit risk management and profitability.

Another study was conducted by Olusanmi, Uwuigbe & Uwuigbe (2015) to investigate the Effect of Risk Management on Bank's Financial Performance in Nigeria using ordinary least squares regression model on data obtained from audited financial statements of 14 banks listed on the Nigerian Stock Exchange. The period of study was from 2006 to 2012. The result gave a non-significant, indirect relationship between risk management and financial performance measured by ROE. Specifically, non-performing loan, loan to deposit, risk disclosure, and total asset showed an inverse non-significant relationship with ROE, while capital risk revealed a positive, insignificant relationship with ROE. A study was carried out by Bassey & Moses (2015) on bank profitability and liquidity management of some selected deposit money banks in Nigeria. The period covered was 2010 to 2012. Using ordinary least squares (OLS) technique, the empirical results revealed a statistically significant relationship between bank liquidity and ROE. However, the relationship between bank liquidity and profitability became insignificant when ROA was used. Specifically, the results showed a negative relationship between cash to deposit ratio and ROA, and a positive relationship between loans to deposit ratio and ROE. Similar results were obtained when ROA was used as a measure of profitability.

Ofosu-Hene & Amoh (2016) also conducted a study on Risk Management on Performance of Listed Banks in Ghana with the use of multiple regression model. Findings showed that risk management had significant positive impact on bank performance. Non-performing loan, cost to income ratio had significant, negative impact on ROA while Concentration (market share), Capital adequacy, inflation and exchange rate had significant positive influence on ROA. On the other hand, capital adequacy, non-performing loan, cost to income ratio had significant, negative influence on ROE.

Other studies focusing on the specific variables also showed results that largely follow the same trend. Berrios (2013), using multiple regression model, worked on the relationship between bank credit risk and profitability of banks in USA and came with findings that showed a positive relationship between return on assets and non-performing loans ratio. Also, Ikpefan (2013)'s study on capital adequacy, management and performance in the Nigerian commercial banks with panel regression analysis revealed a negative impact of capital adequacy, measured by shareholders fund over total assets, on return on assets. In the case of Omid & Javaid (2016), their study was on effect of credit deposit ratio on performance of public sector banks in India using panel regression model. The result revealed a positive relationship between the variables.

Hakimi (2017) examined the relationship between liquidity risk and bank performance in Tunisia using panel data, random effect regression model as well as correlation analysis. Results of correlation analysis liquidity risk, credit risk, size, crisis and inflation rate are negatively correlated while capital adequacy ratio, index of concentration, growth of gross domestic product are positively correlated with bank performance. However, the correlation coefficients of all the variables are weak. The results of regression analysis showed significant, negative relationship between liquidity risk and bank performance while capital adequacy ratio and credit risk showed significant, positive relationship with bank performance. The relationship between size and bank performance is negative but insignificant. The studies of Mathuva (2009) and Ezike & Oke (2013) on the relationship between capital adequacy and banks financial performance gave the same result to the effect that capital adequacy exhibited positive impact on bank performance.

Some observed gaps in literature show that despite the attraction of many scholars in this area of study, their approaches have come from different perspectives. Generally, they focused more on few risk factors and their effect on financial performance without considering the interplay of those risks (Li & Zou, 2014; Hussain, Ihsan & Hussain, 2016; Harelimana, 2017; Ofosu, 2016; Olusanmi, Uwuigbe & Uwuigbe, 2015; Adebisi & Oladunjoye, 2014). Apart from this, gaps noticed include non-consideration of such factors like risk asset diversification, interbank funding, and the very significant impact of asset-liability maturity mismatch and the effects they have on interest rate spread and consequently profitability. Risk assets are the most profitable assets of a bank since bulk of reported profit comes from interest income. In order to achieve higher profit, banks need to increase their interest margin and a key factor to achieving this is to reduce as much as possible their cost of funds. An optimal mix of asset and liability portfolios within regulatory constraints is important to minimize cost of funds and increase income.

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The study is anchored on agency theory which originated formally by the independent but concurrent work of Stephen Ross and Barry Mitnick in the third quarter of 20<sup>th</sup> century (Mitnick, 2006). The most referenced work on agency theory in literature is that of Jensen and Meckling (1976) which proposed the agency theory of the firm, holding that managers acting as agents will not operate to maximize returns to shareholders except an appropriate governance structure is put in place to safeguard the interest of the shareholders (Donaldson & Davis, 1991). Namazi (2013), making reference to the studies of various scholars (including Spence and Zeckhuaster, 1971; Jensen and Meckling, 1976; Harris and Raviv, 1976; and Holmstrom, 1979) also submitted that agency theory was developed to determine the optimal risk-sharing level among different individuals. The differences between the interests of the principal and the agent lead to

agency problem. There is information asymmetry between the principal and the agent in that the actions of the agent are not known by the principal. While the agent may be striving to take additional risks by expanding the business to other market or sectors in the quest for more profit that will bring more returns to the principal, the principal may be more interested in short-term quick returns at the expense of business growth and long-term future earnings. DMBs have responsibility to generate and enhance shareholders wealth. To do this, they need to issue and grow their loan portfolio which they may do beyond the risk appetite of the shareholders. The risk borne by the shareholders and the corporate executives are not even. The shareholders bear all the losses while the corporate managers bear little or no risk even though they take most decisions of running the entity. However, where the dividing line between ownership and management is thin, the larger society may bear all the risk of sharp or unethical business practices in an attempt by owner managers to maximize the gains from the activities.

### 3. Methodology

This study employed ex-post-Facto research design. Secondary data were obtained from the audited financial statements of selected banks for this research. They are pooled data from each of the selected banks (cross-sectional units) over eleven-year period (time series) covering 2006 to 2016, both years inclusive. The population was twenty-seven (27) DMBs in Nigeria by the updated list of CBN as at 28<sup>th</sup> February, 2018; categorized into five as:

Commercial Banks with international operating licence: 10;

Commercial Banks with national operating licence: 9;

Commercial Banks with regional operating licence: 2;

Non-interest banking with national operating licence: 1; and

Merchant Banks with national operating licence: 5

The sample size taken for this study was ten out of the twenty-seven DMBs with both national and international operating licence. The ten DMBs, by deposit share, account for about 75% of all the twenty-seven DMBs on the presumption that the outcome of the research based on this sample would be representative of the industry. The sample was selected based on the ranking done by Nairametrics, a leading financial resource company, for top ten banks in Nigeria on the premise of deposit base and also on another ranking done by Nigerian Finder based on the parameters of international reckoning, profitability, shareholders' funds, total assets, earnings and customer deposits. The top ten banks in Nigeria as at 2016 based on the rankings of these 2 companies were, Zenith bank, GTBank, First Bank, Access Bank, United Bank for Africa (UBA), Fidelity Bank, Stanbic IBTC, Skye Bank, First City Monument Bank (FCMB) and Diamond Bank.

The secondary data used for this study were considered reliable having been extracted from the financial statements of the selected ten banks prepared in compliance with International Financial Reporting Standards (IFRS) as well as provisions of the Companies and Allied Matters Act, 2014, and audited by reputable independent auditors.

In this study, two models were considered. Model 1 was built on return on assets while Model 2 was built on return on equity as dependent variables. The models are specified below.

$$ROA_{it} = b_0 - b_1NPLR_{it} + b_2LDR_{it} + b_3CAR_{it} + b_4DER_{it} - b_5CRR_{it} + b_6RAD_{it} - b_7ALMM_{it} + b_8IBR_{it} + b_9lnSoF_{it} + b_{10}lnGDP_{it} + b_{11}ToA_{it} + e_{it} \dots\dots\dots 1$$

$$ROE_{it} = b_0 - b_1NPLR_{it} + b_2LDR_{it} + b_3CAR_{it} + b_4DER_{it} - b_5CRR_{it} + b_6RAD_{it} - b_7ALMM_{it} + b_8IBR_{it} + b_9lnSoF_{it} + b_{10}lnGDP_{it} + b_{11}ToA_{it} + e_{it} \dots\dots\dots 2$$

Where;

ROA = Return on Assets

ROE = Return on Equity

NPLR = Non-Performing Loan Ratio

LDR = Loan Deposit Ratio

CAR = Capital Adequacy Ratio

DER = Debt Equity Ratio

CRR = Cash Reserve Ratio

RAD = Risk Asset Diversification

ALMM = Asset Liability Maturity Mismatch

IBR = Interbank Ratio.

$b_0$  = constant or intercept.

$b_1, b_2, b_3, b_4, b_5, b_6, b_7, b_8$ , constitute the parameters

$e$  = residual error

$it$  = bank  $i$  in year  $t$

#### 3.1. A Priori Expectation for the Models

The 'a priori' position taken in this study on each of the independent variables has been reflected in the models 1 and 2 and as summarized in the schedule below.

Dependent Variable	Independent Variable	Relationship between Dependent an Independent Variable	Relevant Theory/Empirical Study
Financial performance	Non-performing Loan Ratio	Negative	Agency theory
Financial performance	Loan Deposit Ratio	Positive	Agency theory
Financial performance	Capital Adequacy Ratio	Positive	Ezike & Oke (2013)
Financial performance	Cash Reserve Ratio	Negative	Agency theory
Financial performance	Risk Asset Diversification	Positive	Portfolio theory
Financial performance	Asset Liability Mismatch	Negative	Agency theory
Financial performance	Debt Equity Ratio	Positive	Agency theory
Financial performance	Interbank Ratio	Negative	Solvency theory

Table 3.3: Schedule of A priori Expectation for Models

Panel data regression analysis was used to determine the relationship between the dependent and independent variables, given the cross-sectional and time series dimensions of the data in order to blend intra-individual dynamics and inter-individual differences. The method was also considered to control un-observed or un-measurable sources of individual heterogeneity that may vary across individuals but do not vary over time (Fingleton, 2016). The panel contains a schedule of 100 observations arising from collated data over 11-year period (2006 – 2016), while the model contained analyses under Ordinary Least Squares (OLS), Fixed Effects (FE), Random Effects (RE) and Driskoll/Kraay. A number of post-estimation tests were conducted (such as Multicollinearity test, Omitted variables test, heteroscedasticity and serial correlation test) to determine the validity of the model and ensure that the parameter estimates meet the Best, Linear, Unbiased Estimate (BLUE) properties of Ordinary Least Squares (Gujarati, 2004). Where the tests failed, corrective actions were taken on the model to ensure valid inferences can be drawn. Among the tests include:

#### 4. Results and Discussion

A review of descriptive statistics in Table 1 shows the minimum ROE and ROA values to be zero which means that some of the DMBs earned zero profits or losses during the study period. The trend also revealed the standard deviation for ROA to be 0.0162 and ROE to be 0.0850 which means that there are more variations in ROE than ROA. The mean values of return on assets and return on equity are 0.02 and 0.12 respectively which means that the average return on assets in the industry is about 2% while return on equity is about 12%.

Variable	No of Obs.	Mean	Max.	Min.	Std. Deviation	Skew	Kurtosis
ROA	110	0.0209	0.1396	0	0.0162	3.6429	27.6172
ROE	110	0.1171	0.4530	0	0.0850	0.7436	3.9677
NPLR	110	0.0620	0.3658	0.0103	0.0610	2.4891	9.9487
LDR	110	0.6667	1.2775	0.1544	0.1937	0.2086	2.9023
ALMM	110	2.7395	77.7105	0.0078	8.2399	7.2958	64.2869
IBR	110	1.6647	31.6139	0.0041	3.9881	5.2455	34.6234
DER	110	5.5046	19.8257	-8.8235	2.8413	0.6964	14.8560
RAD	110	0.7357	0.9315	0.1559	0.1507	-1.6234	5.6736
CRR	110	0.0815	0.2440	0.0067	0.0747	0.6404	1.8763
CAR	110	0.2217	0.4820	-0.1330	0.0865	-0.2430	6.6748
ToA	110	1.0273	2.000	1.000	0.1636	5.8047	34.6947
lnGDP	110	17.7124	18.4472	16.7368	0.6418	-0.4034	1.4452
lnSoF	110	13.8112	15.27034	11.57694	0.7887	-0.5777	3.2307

Table 1: Descriptive Statistics for Secondary Data

The non-performing loan mean ratio is 0.06; that is, 6 % of total loan portfolio is generally impaired. Non-performing loans have been attributed to poor corporate governance, lax administration, and lack of transparency, weak regulations and shady bank practices (Oluwanisola, 2016). The mean ratio for loan deposit ratio is 0.67 and the Cash reserve ratio (CRR) averaged is 0.08. This indicates that 67% of the total customers' deposits are lent out to funds users and also 8% of the customers' deposit liabilities respectively. The CRR are restricted by the CBN and are not available for investment for the purpose of generating income. At some recent past in Nigeria, the CBN implemented the Public Sector Deposit reserve that went as high as 75%. CRR remained 22.5% as at the end 2016 in Nigeria and this means that a big chunk of customers' deposits has been blocked from being invested by the DMBs to enhance their earning capacity.

The mean ratio for risk assets diversification from Table 1.0 is 0.74 which means that the risk assets of the DMBs generally are 74% diversified among the various sectors of the economy. In terms of level of dispersion and range, Asset Liability Maturity Mismatch, Interbank Ratio and Debt Equity Ratio with standard deviations of 8.2399, 3.9881 and 2.8213 respectively exhibit significant dispersion than other variables. They are the most volatile in the series compared with the others whose standard deviations are much lesser. This is also apparent in the wide range between the minimum and maximum values.

ROA	NPLR	LDR	ALM	IBR	DER	RAD	CRR	CAR	TOA	lnGDP	lnSOF	
ROA	1.0000											
NPLR	0.0309	1.0000										
LDR	0.0384	-0.0511	1.0000									
ALMM	0.0411	-0.0329	-0.0814	1.0000								
IBR	-0.0624	0.0035	-0.0036	-0.0300	1.0000							
DER	-0.4488	-0.0039	-0.2402	0.1271	-0.0532	1.0000						
RAD	0.2062	-0.0074	0.1233	-0.2423	-0.0174	-0.0940	1.0000					
CRR	-0.0633	-0.3011	0.1242	0.0526	0.0503	0.1047	-0.1172	1.0000				
CAR	-0.1744	-0.1631	0.1546	-0.0253	-0.0570	-0.3122	0.0590	-0.2329	1.0000			
ToA	0.0117	0.3656	-0.1861	-0.0373	-0.0489	0.0091	0.0612	-0.1214	-0.1308	1.0000		
lnGDP	-0.0005	-0.3837	0.2102	0.0419	0.0775	-0.0287	-0.0319	0.7524	-0.2001	-0.2229	1.0000	
lnSOF	0.0516	-0.4649	0.0210	0.0136	-0.0540	0.1438	0.1914	0.5119	-0.1921	-0.0868	0.6762	1.0000

Table 2: Correlation Matrix for Model 1

	ROE	NPLR	LDR	ALM	IBR	DER	RAD	CRR	CAR	TOA	lnGDP	lnSOF
ROE	1.0000											
NPLR	-0.2376	1.0000										
LDR	-0.0906	-0.0511	1.0000									
ALM	0.0594	-0.0329	-0.0814	1.0000								
IBR	-0.0776	0.0035	-0.0036	-0.0300	1.0000							
DER	0.2312	-0.0039	-0.2402	0.1271	-0.0532	1.0000						
RAD	0.2396	-0.0074	0.1233	-0.2423	-0.0174	-0.0940	1.0000					
CRR	-0.0555	-0.3011	0.1242	0.0526	0.0503	0.1047	-0.1172	1.0000				
CAR	-0.0153	-0.1631	0.1546	-0.0253	-0.0570	-0.3122	0.0590	-0.2329	1.0000			
ToA	0.0670	0.3656	-0.1861	-0.0373	-0.0489	0.0091	0.0612	-0.1214	-0.1308	1.0000		
lnGDP	-0.1339	-0.3837	0.2102	0.0419	0.0775	-0.0287	-0.0319	0.7524	-0.2001	-0.2229	1.0000	
lnSoF	0.1398	-0.4649	0.0210	0.0136	-0.0540	0.1438	0.1914	0.5119	-0.1921	-0.0868	0.6762	1.0000

Table 3: Correlation Matrix for Model 2

The results of the correlation analyses revealed correlation coefficients between the 12 variables being less than 0.80. Indeed, the highest coefficient of 0.75 in the correlation matrix for model 1.1 is between lnGDP (Gross Domestic product) and CRR (Cash Reserve Ratio). This result is an indication that there is no problem of multicollinearity among the variables under study. This position is further confirmed by Variance Inflation Factor (VIF) values (Table 4), all of which are below 10.

Variable	VIF	1/VIF
lnGDP	3.78	0.264399
lnSoF	2.61	0.383471
CRR	2.47	0.404985
NPLR	1.62	0.619162
CAR	1.33	0.750598
DER	1.27	0.785072
TOA	1.26	0.791331
RAD	1.24	0.803926
LDR	1.21	0.827105
ALMM	1.08	0.924378
IBR	1.04	0.963015
Mean	VIF	1.72

Table 4: Variance Inflation Factor

The direction and strength of the relationship between the dependent variable ROA and the independent variables as revealed in model 1 is as follows:

From the result in Table 1.1, there is a weak, positive correlation between return on assets and non-performing loan ratio (0.03), loans deposit ratio (0.04), asset liability maturity mismatch (0.04), risk asset diversification (0.21), type

of auditor (0.01) and log of size of the firm (0.05). This is an indication that return on asset and the independent variables move in the same direction. When ROA rises, the independent variables rise and when it falls, they equally fall. The result also revealed a weak, negative correlation between return on assets and interbank ratio (-0.06), debt equity ratio (-0.45), cash reserve ratio (-0.06), capital adequacy ratio (-0.17) and log of Gross Domestic Product (-0.00). In this case, the dependent and independent variables move in opposite direction. When return on assets rises, the independent variables fall and when it falls, the independent variables rise.

Table 1.2 reveals the result of the correlation analysis for model 2 between return on equity and the independent variables. There is a weak, positive correlation between return on equity and asset liability maturity mismatch (0.06), debt equity ratio (0.23), risk asset diversification (0.24), type of auditor (0.07) and log of size of the firm (0.14). This is also an indication that return on equity and the independent variables move in the same direction. When ROE rises, the independent variables rise and when it falls, they equally fall. Conversely, there is a weak negative correlation between return on equity and non-performing loan ratio (-0.23), loan deposit ratio (-0.09), interbank ratio (-0.08), cash reserve ratio (-0.06), capital adequacy ratio (-0.02) and log of Gross Domestic product (-0.13). This means that the dependent and independent variables move in opposite direction. When return on equity rises, the independent variables fall and when it falls, the independent variables rise.

#### 4. Results of the Panel Data Regression Analysis

Variables	(1)			(2)			(3)			(4)		
	OLS			FE			GLS			DRISC/KRAAY		
ROA	coef.	t-stat	p>t	coef.	t-stat	p>t	coef.	z-stat	p>z.	coef.	t-stat	p>t
NPLR	-.0033	-.13	.899	.0254	.89	.378	-.0033	-.13	.899	.0256	1.03	.329
LDR	-.0027	-0.38	.708	-.0181	-2.04	.045	-.0027	-0.38	.707	-.0181	-1.71	.118
ALMM	.0003	1.85	.067	.0003	2.07	.041	.0003	1.85	.064	.0003	4.44	.001
IBR	-.0004	-1.12	.264	-.0002	-.68	.500	-.0004	-1.12	.261	-.0002	-1.14.	.280
DER	-.0035	-6.96	.000	-.0036	-7.30	.000	-.0035	-6.96	.000	-.0036	-2.83	.018
RAD	.0192	2.05	.043	.0089	.49	.624	.0192	2.05	.040	.0089	.640	.534
CRR	-.0017	-.06	.949	.0121	.45	.652	-.0017	-.06	.949	.0121	.560	.587
CAR	-.0746	-4.42	.000	-.0765	-3.96	.000	-.0746	-4.42	.000	-.0765	-2.55	.029
ToA	-.0078	-0.90	.369	-.0079	-.83	.408	-.0078	-0.90	.367	-.0079	-1.03	.329
LnGDP	-.0052	-1.34	.182	-.0072	-1.54	.127	-.0052	-1.34	.179	-.0072	-1.81	.101
LnSoF	.0031	1.21	.230	.0063	1.47	.144	.0031	1.21	.227	.0063	1.66	.128
Constant	.1007	1.70	.092	.1085	1.82	.073	.1007	1.70	.089	.1085	1.92	.084
Observations	110			110			110			110		
Adjusted R-squared	.3327											
R-squared overall				.3399			.4000					
R-squared within										.4296		
country effect	NO			YES			YES			YES		
period effect	NO			NO			NO			NO		
Rmse	.0132											
F-test	5.94			6.09						28.39		
Prob > F	0			0						0		
Number of countryid				10			10			10		
F-test(u <sub>i</sub> =0)				2.60								
Prob > F(u <sub>i</sub> =0)				.0104								
chi-squared							0					
Prob > chi2							1.000					

Table 5: Panel Data Regression Estimators for Model 1

Table 5 reveals the extracts of the panel data regression analysis for model 1 and shows the impact of the independent variables on the dependent variable – return on assets. The F-test (u<sub>i</sub>=0) value of 2.60 and the 0.0104 probability value of F-test indicate that Fixed Effect (FE) is statistically significant at 5%; which shows that there is an existence of FE, meaning that each of the banks listed in the panel has distinct characteristics different from other banks and are time invariant. However, the results from Hausman's test revealed that there is no existence of random effect (RE). The 0.00 chi<sup>2</sup> value and 1.000 probability value of chi<sup>2</sup> show that RE is statistically insignificant at 5%. The FE and RE results manifest that there is no conflict between FE and RE; and since only FE exists, further analysis is based on FE.

Ramsey's Regression Equation Specification Error Test was carried out to determine whether there were omitted variables. The results gave F-statistics of 14.47 and probability of F-statistics of 0.00 which means that there were no omitted variables because the F-statistic is greater than 0.1.

In order to determine the existence or otherwise of heteroskedasticity, Modified Wald test was carried out and the outcome was affirmative. Chi<sup>2</sup> value of 5.74 and 0.8363 probability value of chi<sup>2</sup> showed that it is statistically insignificant at 5% which means that the Null hypothesis (H<sub>0</sub>) indicating constant variance (homoskedasticity) of error terms is rejected and we accept the alternate hypothesis (H<sub>1</sub>) that there is heteroskedasticity.

Also, carried out was Wooldridge test to determine the existence or otherwise of serial correlation or autocorrelation in the panel data under the assumption that there is no first order autocorrelation (H<sub>0</sub>). The results gave F-stat value of 7.173 and probability of F-stat value of 0.0253 showing that it is statistically significant at 5%. This means that there is no first order autocorrelation. In other words, the error term in one year is not dependent on the error term of previous year.

Still in furtherance of ensuring the validity of our analysis and inference, Pesaran's test of cross-sectional independence was done to determine if each of the banks under study exert an influence on one another. The outcome of the test gave a Pesaran's value of 2.592 and probability value of 0.0095 which means that it is statistically significant at 5%, an indication that there is cross sectional dependence; that is, the banks within the study group exert influence on one another. For instance, the failure of one bank has consequences on other banks within the group and indeed in the industry at large.

Out of the 11 independent variables in model 1, only 3 are statistically significant with probability of t value (p>t) less than 0.05 (Table 5). As shown in the table, the probability values are, Asset Liability Maturity Mismatch (.001), Debt Equity Ratio (.018) and Capital Adequacy Ratio (.029). Out of the 3 statistically significant variables, ALMM is directly related to ROA, DER and CAR have inverse relationship with ROA. Indeed, to underscore the importance of liquidity, Asset Liability Maturity Mismatch is statistically significant at 1%. This is strengthened further with the debt equity ratio, being also a measure of both financial leverage and liquidity ratio. DER shows the proportion of external financing of operations compared to investor financing.

Although Asset Liability Maturity Mismatch (ALMM) has a strong statistical significance at 1% with the p-value of 0.001, the coefficient of 0.0003 revealed a weak positive relationship with ROA. Deciphering the relationship between ALMM and financial performance has been rather elusive given the paucity of previous literature on this relationship. DER has a coefficient of -0.0036 and p-value of 0.018, which means that a unit change in DER will result in 0.004 unit indirect or inverse change in ROA. This result conforms to the study of Berrios (2013) in USA which equally found the relationship between debt equity ratio and ROA negative. The coefficient of capital adequacy ratio as shown in Table 5 is -0.0765 with p-value of 0.029. This indicates that a unit increase in capital adequacy ratio will bring about 0.08 unit decrease in ROA. This outcome agrees with the findings of Ikpefan (2013) in Nigeria whose study on the impact of capital adequacy ratios of Nigerian commercial banks from 1986 to 2006 using panel data regression model revealed a negative impact of capital adequacy, measured by shareholders fund over total assets, on return on assets. This result however conflicts with the findings of Ezike and Oke (2013) in Nigeria, Mathuva (2009) in Kenya which gave a positive relationship between CAR and ROA. These fluctuating results between negative and positive relationship between CAR and ROA are in harmony with the outcome of research findings by Li and Zou (2014) in Europe which reported an insignificant and fluctuating relationship between CAR and ROA. This is an indication that there is an optimum level of investors' fund injection into the business that gives maximum returns, beyond which more injection will create idle funds whereby the marginal yield coming in from additional injection will be less than the marginal cost of the new fund.

Variables	(1)			(2)			(3)			(4)		
	OLS			FE			GLS			Drisc/kraay		
ROE	coef.	t-stat	p>t	coef.	t-stat	p>t	coef.	z-stat	p>z.	coef.	t-stat	p>t
NPLR	-.4839	-3.15	.002	-.2022	-1.44	.154	-.4839	-3.15	.002	-.2022	-1.62	.137
LDR	.0050	.120	.906	-.1005	-2.33	.022	.0050	.120	.905	-.1005	-4.14	.002
ALMM	.0010	1.07	.285	.0010	1.27	.206	.0010	1.07	.283	.0010	1.68	.125
IBR	-.0010	-.270	.785	.0013	.083	.408	-.0010	-.270	.784	.0013	1.84	.096
DER	.0057	1.95	.054	.0042	1.78	.079	.0057	1.95	.051	.0042	1.46	.175
RAD	.1383	2.54	.013	-.0440	-5.00	.619	.1383	2.54	.011	-.0440	-.550	.597
CRR	.0740	.480	.634	.2451	1.89	.062	.0740	.480	.633	.2451	1.67	.127
CAR	-.0489	-5.00	.620	-.0047	-.05	.961	-.0489	-5.00	.619	-.0047	-.150	.887
ToA	.0573	1.13	.261	.1089	2.37	.020	.0573	1.13	.258	.1089	2.69	.023
LnGDP	-.0496	-2.22	.029	-.0273	-1.20	.232	-.0496	-2.22	.026	-.0273	-1.22	.250
LnSoF	.0131	.870	.389	-.0093	-.44	.658	.0131	.870	.387	-.0093	-.630	.540
Constant	.6534	1.89	.061	.6826	2.35	.021	.6534	1.89	.058	.6826	2.22	.051
Observations	110			110			110			110		
Adjusted R-squared	.1810											
R-squared overall				.0340			.2636					
R-squared within										.2910		
country effect	No			Yes			Yes			Yes		
period effect	No			No			No			No		



Variables	(1)		(2)		(3)		(4)	
	OLS		FE		GLS		Drisc/kraay	
Rmse	.0769							
F-test	3.19		3.32					
Prob > F	.0010		.0007					
Number of countryid			10		10		10	
F-test(u <sub>i</sub> =0)			8.07					
Prob > F(u <sub>i</sub> =0)			.0000					
chi-squared					0			
Prob > chi2					1.000			

Table 6: Panel Data Regression Estimators for Model 2

Tables 6 contains the extracts of the panel data regression analysis for models 2. From here, the 2 independent variables that showed statistical significance at 5% level are LDR and ToA against ROE. LDR coefficient showed -0.1005 which indicates that a unit change in LDR will cause an inverse change in ROE. This outcome agrees with the findings of Bassey and Moses (2015) in Nigeria as well as Hakimi (2017) in Tunisia in similar studies where financial performance and liquidity risk measured by credit deposit ratio showed negative relationship. However, the result is at variance with that of Berrio (2013) in USA and Omid & Javaid (2016) in India where the same study gave a positive relationship between loan deposit ratio and ROE. The import of these divergent results is an indication that there is an optimum level of loans that a bank should book to get maximum interest income and beyond which, any further booking of credit will result in the marginal yield being lower than the marginal cost of funds. Another possible cause of the divergent results is the interest rate mismatch between assets and liabilities of the firms. ToA coefficient from the result was 0.1089 which indicates that a unit change in type of auditor will cause a same directional change in ROE. This can occur if the equity holders support a change from existing auditor to another to boost their confidence.

The interbank ratio revealed statistical significance at 10% and has coefficient of 0.0013. This means that there is a positive relationship between interbank ratio and return on equity. Interbank ratio can be positive or negative. It is positive when there is net placement, in which case a bank has more funds with other banks than other banks have with it and consequently makes net interest income which is a boost to return on equity. This result shows that the interbank ratio of the DMBs is a net placement and results from interbank trading to generate income rather than to finance funding gaps. When interbank ratio is negative, it means we have net-takings position, a situation whereby a bank has more interbank deposits in its books than placement. In this situation the net position will be net interest expense which is a drain on income.

## 5. Conclusion and Recommendation

The study revealed a significant relationship between risk management and financial performance of DMBs in Nigeria. The results obtained from the survey data analysis, the behaviour of the variables over the study period from trend analysis and the statistically significant independent variables form a harmony of elements to meaningfully arrive at this conclusion.

There has been a rising trend in risk management indicators and financial performance over the study period with occasional periodic exceptions that can be linked with specific developments in the economy. The banking industry is among the most profitable sectors in the economy and a veritable source of government revenue. Year after year, jumbo profits are declared and government rakes in heavy corporate tax.

Liquidity management has come out as the most critical success factor in the banking industry. This is evident from the statistically significant variables most of which are linked to liquidity risk. The loan deposit ratio and asset liability maturity mismatch are liquidity related. Apart from this the debt equity ratio and capital adequacy ratio also have liquidity risk inherent in their components. The following recommendations are drawn from the findings and conclusion on this study which are considered useful to bank management, investors and policy formulators: DMBs should determine the optimum level for their loan-deposit mix up to when marginal cost (MC) is equal to marginal revenue (MR). The negative coefficient obtained in the regression analysis is an indication that the DMBs have exceeded the optimum level. More often than not their marketing officers are given very tasking loan amount and deposit mobilization targets without a thorough analysis of asset liability maturity and interest rate mismatches. The balance sheet size may be enhanced but the bottom line not correspondingly improved. CBN as regulators need to initiate policy that will bring down the cash reserve ratio to very low, single digit rate in order to increase the risk asset creating capacity of the DMBs to boost their earnings. CRR in Nigeria is one of the highest in the world. An alternative course of action is for CBN to pay some interest rate on this deposit in order to off-set part of the DMBs' cost of funds.

Due to the high statistical significance of ALMM from the regression analysis, the Assets and Liability Committee (ALCO) should be strengthened among the DMBs not just to determine the gaps for the purpose of liquidity management, but to determine the effect on net earnings in order to strike an appropriate balance between liquidity and income.

DMBs should build up their deposit around retail liability products like current and savings deposits rather than the volatile, toxic deposits from the public sector that can be withdrawn at short notice creating a serious balance sheet mismatch. This will also promote the policy of financial inclusion since a large proportion of the populace do not have access to banking services.

In line with the recommendations, DMBs should determine the stable stock of their retail deposit portfolio in order to mark a safety margin of balance sheet mismatch that will accrue maximum profit without jeopardizing their ability to meet maturing obligations.

Considering the statistical significance of the Type of auditor in the regression analysis, Deposit Money Banks should ensure that they engage independent auditors that reputable. Equity holders may react negatively by withdrawing their investment in the event of any attempt to replace reputable independent auditor with relatively unknown audit firm. The findings from the study also have important policy implications for the regulators. Having established that developments in one bank have effects on other banks in the industry (positive cross-sectional dependence test), there is the need to enhance and strengthen the regulatory fireworks to ensure that the actual financial situation in each bank is known. The joint banking examination by the CBN and NDIC should be done more regularly in addition to periodic stress tests by CBN in order to detect danger signals in the DMB's financial position before they lead to industry crisis.

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