



CREDIT RISK MANAGEMENT AND PROFITABILITY OF DEPOSIT MONEY BANKS IN NIGERIA

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Abstract

Banks in all climes are primarily faced with problem of credit risk whenever they mediate between the surplus and the deficit units of the economy. This study examined the impact of credit risk management on the profitability of deposit money banks in Nigeria. Specifically, this study evaluated the impact of credit risk management on return on assets, return on equity, and net operating income of deposit money banks in Nigeria. This study adopted an ex post facto research design. Nineteen listed deposit money banks as at December 31, 2018 form the population of this study out of which a sample of fifteen banks were selected based on complete availability of data from 2007-2018. Data obtained was subjected to fixed and random effects regression estimations for the various models in this study using the Hausman test. Findings revealed that: (i) loan-value ratio and loan-deposit ratio significantly impacted on return on assets of deposit money banks, while non-performing loan ratio, bank size, and log of total loans did not significantly impact on return on assets of deposit money banks in Nigeria; (ii) total loans significantly affected return on equity of deposit money banks, while loan-value ratio, loan-deposit ratio, bank size, and non-performing loans did not significantly affect return on equity of deposit money banks in Nigeria; and (iii) bank size, non-performing loan, and total loans were found to significantly affect net operating income of deposit money banks in Nigeria, while loan-value ratio, and loan-deposit ratio did not significantly exert on net operating income of deposit money banks in Nigeria. The study therefore, concluded that loan-value ratio, loan-deposit ratio, value of total loans, bank size, and non-performing loans influence banks profitability in Nigeria, and recommended that proper attention be paid to these variables in order to increase the profitability of deposit money banks in Nigeria.

Keywords: return on asset, return on equity, net operating income, credit risk management.

JEL Classification Codes: F65, G21, G32

INTRODUCTION

Globally, deposit money banks are known for financial mediation and credit creation. The later entails giving out loans obtained from depositors' funds held in respective bank accounts at a determined rate of interest in order to maximise banks profitability. Banks are however faced



with diverse risks in carrying out their credit creation functions. These risks are linked to the ability of the borrower to pay back the borrowed fund. Hence, the borrower's ability to repay the loan has to be determined (Nwankwo, 1991). Credit risk arises when borrowers default and do not fulfil their own part of the obligation, which could result to non-performing loans. This calls for several approaches to risk management to ensure profitability in banks (Kargi, 2011). Excess exposure to risk of default could result to increase in non-performing loans and reduction in banks profitability which leads to financial distress and bankruptcy (Mirach, 2010). Other risks faced by banks stem from their reputation, liquidity, market, credit compliance, legal or regulatory, and operational risks (Aigbomian & Akinlosotu, 2017). Of all these risks, the credit risk has been argued to have the most adverse effect on banks' growth and profitability (N'jai, 2000; and Choudhry, 2011). For this reason, credit risk management is emphasised in the Basel II Accord with the aim of mitigating the rate of loan default. Strict compliance is required as this Accord provides a sound approach to addressing credit risk, which will in turn improve the performance of banks (Nwanna & Oguezie, 2017).

In Nigeria, there is a growing list of non-performing loans being recorded in the banking sector and this poses concern as to deposit money banks' profitability (Nwanna & Oguezie, 2017; Adegbe & Otitolaiye, 2020). There have been questions of whether credit risk affects banks' profitability in Nigeria. Several studies such as Taiwo & Abayomi (2013); Ogboi & Unuafe (2013); Alalade, Binuyo & Oguntodu (2014); Uwalomwa, Uwuigbe & Oyewo (2015); Imad (2017); and Sahiti, Ahmeti, & Aliu (2018) have examined the impact of credit risk management on banks' performance. Different measures of banks' performance have also been employed in these studies. These ranging from return on assets to return on equity, profit after tax, capital adequacy and net interest margin. Furthermore, mixed findings exist among these studies as to the impact of credit risk management on performance of banks. Although most of these studies found significant impact of credit risk management on banks' performance, other studies found insignificant relationship. This study is therefore, conducted to contribute to the on-going debate as to the impact of credit risk management on profitability of deposit money banks in Nigeria. This study aims at examining the exact relationship between credit risk management and banks profitability in Nigeria. This therefore, serves as the motivation for this study.

LITERATURE REVIEW

The review of conceptual issues, theoretical propositions and empirical literature are provided in this section. These are relevant and therefore, lay a strong foundation upon which this study is built.

Conceptual Review

The concepts discussed here are those related to credit risk, credit risk management, and bank's profitability.

Credit Risk

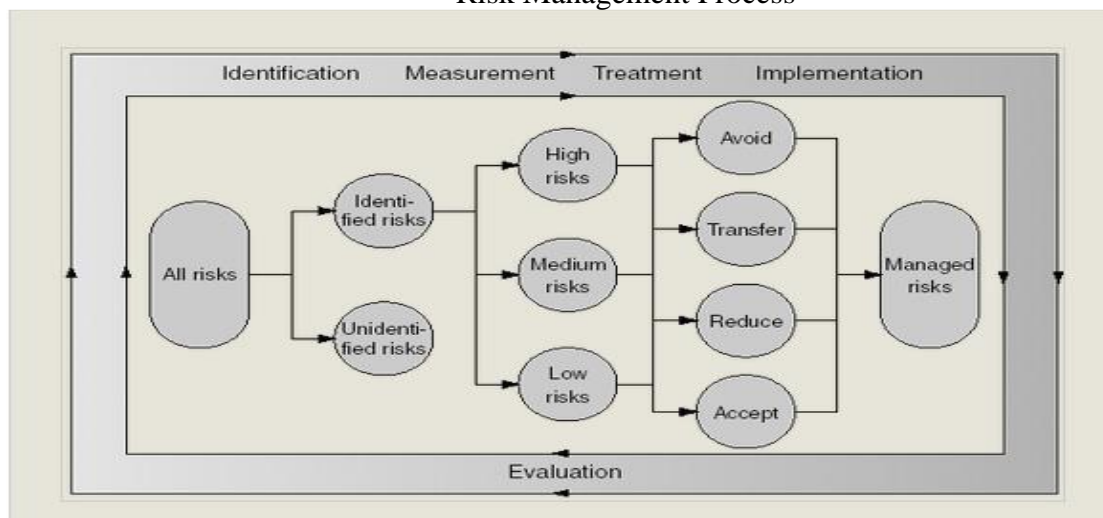
Credit risk or risk of default, as opined by the Global Association of Risk Professionals (GARP) (2013) refers to the potential for a loss due to failure of a borrower to meet his obligations to repay a debt in accordance with agreed terms. Credit risks according to GARP (2013) reside in the assets (loans, and bonds held to maturity) and can arise in the banking book as counterparty credit risk.

Chuke & Chinedu (2018) submit that credit risk is the risk that a borrower will default on the loan and/or the interest payable. The risk is damaging to the bank, not only because of the actual loss eventually incurred, but also in terms of the time that management and bank counsel expend on attempting to recover the loss or a portion of the loss (Gisemba, 2010). Financial intermediaries make loans and take on securities that are nothing more than promises to pay, and when customers fail to make some or all of their promised payments, these defaulted loans and securities result in losses that can eventually erode capital (Ogboi & Unuafé, 2013).

Credit Risk Management

Credit risk management according to Gestel & Baesens (2009) involves the identification of potential risks, the appropriate treatment, and the actual implementation of risk models. The Basel Committee on Banking Supervision (2000) argued that credit risk management is a set of sound practices that involves establishing an appropriate credit risk environment, operating under a sound credit-granting process, maintaining appropriate credit risk measurement, monitoring, and ensuring adequate controls over credit risk. It is a structured approach to managing uncertainties through risk assessment, strategy application, and mitigation of risk using managerial resources (Greuning & Brajovic, 2003). The strategies include transferring to another party, avoiding the risk, reducing the negative effects of the risk, and accepting some or all of the consequences of a particular risk (Gestel & Baesens, 2009). According to them, the risk management process is depicted as shown below:

Figure 1
Risk Management Process



Source: Gestel & Baesens, (2009)

From Figure 1 above, risk management process stems from risk identification, measurement and classification of risks into high, medium and low risks, then the treatment and implementation of risk strategies. Gestel & Baesens (2009) argued that it is crucial for banks to have a comprehensive risk management framework due to the growing realisation that sustainable growth path critically depends on the development of comprehensive risk management in banks.



Banks Profitability

Profitability is an important tool used to evaluate the internal performance of a company. It helps to determine whether it has succeeded in achieving its ultimate objectives, and may also reveal managers attitude towards risks (Flamini, McDonald, & Schumpeter, 2009). According to Devinaga (2010) the level of profitability is very significant for shareholders of a bank as it shows how effective management has utilised their investments. In determining the financial performance of banks, measures such as return on assets (ROA) and return on equity (ROE) are widely used in the literature. The ROA demonstrates the level of net income produced by a bank and also determines how the assets utilised by banks generate profit over the years (Ghebregiorgis & Atewebhran, 2016). On the other hand, ROE is the ratio of net income to total equity indicating returns to shareholders on the book value of their investment (Ghebregiorgis & Atewebhran, 2016). It measures the rate of returns for ownership interest (shareholder) and it tells how efficient a bank is generating profits from each unit of shareholder's equity. As a general view, particularly in the banking sector, ROA is known as good profitability multiplier for the reason that equity multiplier does not influence it (Saeed & Zahid, 2016). According to Angela (2016) ROE is the best and most common measure of profitability as it does not consider factors such as timing of cash flows or turnovers. This study therefore, includes both measures in assessing banks profitability in Nigeria.

Theoretical Review

This section presents the agency theory and the portfolio theory as the underlying theories to this research work.

The Agency Theory

The Agency theory was developed by Jensen and Meckling (1976) and it revolves around resolving issues of conflict of interest that occur in a principal-agent relationship. The agency problem normally arises when the principal cannot verify what the agent is doing and therefore, the agent can use his position to advance personal interests. Other problems arise due to the fact that the principal and agents have different attitudes towards risk and hence, the risk has to be shared between the principal and the agent. There is therefore, need to ensure that there is harmony between the actions of the principal and those of the agents (Eisenhardt, 1989). In order to protect the interest and the wealth of bank shareholders and depositors, bank managers need to investigate and monitor the activities of the *will be* and *existing borrowers*. The adequate management of risk related with credit is critical for the survival and growth of any deposit money bank. Therefore, having in place sound credit risk management practices is one way that that the central bank uses to protect the shareholders' interests in banks by protecting them from activities of managers that may lead to losses.

Studies which have built their works on this theory are Imad (2017), Gisemba (2008), Mercy, Robert & Patrick (2018) among others.



The Portfolio Theory

The portfolio theory was pioneered by Harry Markowitz in his paper Portfolio Selection published in 1952 by the journal of finance. It shows how risk-averse investors can construct portfolios to optimise or maximise expected returns based on a given level of market risk, emphasising that risk is an inherent part of higher reward. According to Krugman (2009), banks have successfully applied modern portfolio theory (MPT) to market risk. Many banks are now using value at risk (VAR) and earnings at risk (EAR) models to manage their market risk exposures and interest rate. However, even though credit risk has been the largest risk facing most banks, the modern portfolio theory to credit risk has lagged. Banks have recognised how credit concentrations can unfavourably impact financial performance. As a result, a number of sophisticated institutions are actively pursuing quantitative approaches to credit risk measurement. Significant progress are been made towards developing tools that measure credit risk in a portfolio context. Credit derivatives are also being used to efficiently transfer risk while preserving customer relationships. The combination of these two developments has resulted to an accelerated progress in managing credit risk in a portfolio context over the past several years (Krugman, 2009).

Studies which have built their works on this theory are Abobari, Naenwi, Zukbee & Brend (2018), Achou & Tenguh (2008), Abiola & Olausi (2014), among others.

Empirical Review

Literature shows that several studies have been conducted on the subject matter in different space and time. For example, Sujeewa (2015) examined the impact of credit risk management on the performance of the commercial banks in Sri Lanka. The study used a panel data from 2009 to 2013 and revealed that non-performing loans have adverse impact on banks profitability-measured as ROA. Sahiti, Ahmeti, & Aliu (2018) quantitatively examined how risk management affects bank's profitability in Kosovo; using return on equity to proxy performance. Findings showed a substantial relationship among variables and reflect that a higher risk asset ratio would result in a marginal decline of profitability, while higher non-performing loans have a positive and more substantial effect on profitability. Imad (2017) investigated the impact of credit risk on the profitability of five banks in Palestine. Profitability was measured by both return on equity and return on assets while credit risk was measured by net charge-offs to total loans and advances, non-performing loans to total loans and advances, and pre-provision profit to total loans and advances. The study found a weak but positive relationship between credit risk and banks profitability.

Evidence of earlier studies also exists in Nigeria. For example, the study of Kolapo, Ayeni & Oke (2012) used panel data analysis in studying the effect of credit risk on banks' performance. ROA was used as a measure for performance. The study found that an increase in non-performing loans or loan losses provision diminishes profitability (ROA), while an increase in total loan and advances enhanced profitability. Using panel least square (PLS) regression Taiwo & Abayomi (2013) evaluated the impact of credit risk management on banks profitability in Nigeria. The study found that credit risk management has a significant impact on the profitability of Nigerian banks. Alalade, Binuyo & Oguntodu (2014) examined the impact of managing credit risk on the profitability of banks in Lagos state. The result revealed that credit risk reduces the profit.



Uwalonwa, Uwuigbe, & Oyewo (2015) critically assessed the effects of credit management on bank's performance in Nigeria. The study focused only on listed banks from 2007-2011. Findings revealed that the ratio of non-performing loans and bad debt had significant negative effect on the performance of banks in Nigeria, while secured and unsecured loan ratio has no significance on bank's performance.

It is evident that available studies in Nigeria have focused on the link between credit risk management and bank's profitability. These studies however, measured the effect of credit risk on banks profitability employing homogeneous panel regression method, specifically, the ordinary least square regression method, which assumes that all panel members are homogeneous as cited in Taiwo & Abayomi (2013); Uwalonwa, Uwuigbe, & Oyewo (2015) among others. This however, might not be true as there is usually a degree of heterogeneity among deposit money banks, particularly, those in Nigeria. Employing such a method when there is in fact a degree of heterogeneity among panel members would introduce bias into the result. This study therefore, corrects this methodological issue and bridges the gap in literature by examining the impact of credit risk management on the profitability of deposit money banks in Nigeria in a heterogeneous panel setting so as to get rid of the likely bias in the results of previous studies. This study also distinguishes itself from other studies by holistically considering profitability in banks thereby, introducing net operating income (NOI) aside from ROA and ROE to measure banks profitability in Nigeria. The net operating income has been argued to account for deposit money banks earnings generated from core banking business (Ghebregiorgis & Atewebhran, 2016).

METHODOLOGY

This section focuses on the methodology employed in this study and includes model specification, sources of data, and measurement of variables among others.

Research Design

This study made use of the ex post facto research design because data used for examining the impact of credit risk management on profitability of deposit money banks in Nigeria already exists without researchers' prejudice

Population and Sample size

The population of this study includes the nineteen 19 deposit money banks that were listed on the Nigerian Stock Exchange as at 31st December, 2018 out of which a sample of fifteen banks (15) were selected based on the availability of complete data. The selected banks include: Access Bank, Diamond Bank (now merged with Access Bank), Ecobank, First Bank, First City Monument Bank (FCMB), Fidelity Bank, Guarantee Trust Bank (GTB), Skye Bank (now Polaris Bank), Stanbic IBTC, Sterling Bank, United Bank for Africa (UBA), Unity Bank, Union Bank, Wema Bank and Zenith Bank. These banks form the basis for which investigation was conducted in this study.

Model Specification

The model of Nwanna and Oguezie (2017) was adapted and modified for this study. The model of Nwanna and Oguezie (2017) is stated as:

$$ROA_{it} = \beta_0 + \beta_1 LA_{it} + \beta_2 NPL_{it} + \beta_3 LLP_{it} + \varepsilon_i \quad (1)$$



Where: ROA is return on assets, LA is loan and advances, NPL is non-performing loans, and LLP is loan loss provisions.

This study modifies the model in equation (1) by including loan-deposit ratio, loan-value ratio, as additional explanatory variables in line with the Basel standards (2000), while bank size (log of total assets) was included as a control variable. Bank size has been noted to account for the potential economies and diseconomies of scale in the banking sector as opined by Adegbie & Otitolaiye (2020) and therefore, serves as a control variable in this study. Also, loan loss provision was removed as it is mainly a proxy of bank managers' expectation of the quality of their assets. Further, this study introduced net operating income as another profitability measure, as opposed to only return on assets and return on equity employed by Nwanna and Oguezie (2017). The net operating income was included in this study to account for deposit money banks earnings generated from their core lending business in line with Ghebregiorgis & Atewebhrhan (2016). The models of this study are therefore, specified in the following equations.

$$ROA_{it} = \alpha_0 + \alpha_1 size_{it} + \alpha_2 NPL_{it} + \alpha_3 LV_{it} + \alpha_4 LD_{it} + \alpha_5 lnTL_{it} + \varepsilon_i \quad (2)$$

$$ROE_{it} = \theta_0 + \theta_1 size_{it} + \theta_2 NPL_{it} + \theta_3 LV_{it} + \theta_4 LD_{it} + \theta_5 lnTL_{it} + \varepsilon_i \quad (3)$$

$$NOI_{it} = \delta_0 + \delta_1 size_{it} + \delta_2 NPL_{it} + \delta_3 LV_{it} + \delta_4 LD_{it} + \delta_5 lnTL_{it} + \varepsilon_i \quad (4)$$

Where: ROA is return on assets, ROE is return on equity, NOI is net operating income, Size is bank size, NPL is non-performing loans ratio, LV is loan-value ratio, LD is loan-deposit ratio, and lnTL is log of total loans.

Sources of Data, Operational Definition and Measurement of Variables

Data were sourced from the audited financial reports of fifteen deposit money banks used as sample in this study from 2007-2018. Table 1 presents the operational definition and measurement of variables as used in this study.

Table 1

Operational Definition and Measurement of Variables

VARIABLE	SYMBOL	MEASUREMENT
Return on Assets	ROA	Ratio of net income to average total assets
Return on Equity	ROE	Ratio of net income to shareholders' equity
Net Operating Income	NOI	Net Earnings Plus Interest Expense Plus Taxes
Bank Size	Size	Natural logarithm transformation of total assets
Non-Performing Loans Ratio	NPL	Ratio of total non-performing to the total amount of outstanding loans in the bank's portfolio



Loan-to-Value Ratio	LV	Ratio of total amount borrowed (or debt) to the appraised value of the bank
Loan-to-Deposit Ratio	LD	Ratio of bank's total loans to total deposits
Total loans	lnTL	Natural logarithm of total loans
Time lag	TLAG	No of days from financial year end to the signing of results by auditors

Source: Authors' Compilations, (2020)

RESULTS AND DISCUSSIONS

This section presents the empirical findings of this study starting with the descriptive analysis of the data, and also presents the inferential analysis through a panel regression analysis to examine the effects of credit risk management on profitability of deposit money banks in Nigeria.

Table 2
Descriptive Statistics

Variable	Mean	Std. Dev.	Min	Max
ROA	1.57151	5.284091	-53.1251	17.04484
ROE	4.762516	48.75234	-386.698	289.9937
NOI-Assets ratio	28.76239	44.42413	-39.867	241.247
Total assets	1.23 trillion	1.08 trillion	75.4 billion	4.50 trillion
NPL ratio	3.764955	7.818183	0	43.62273
Loan-value ratio	40.90999	12.89677	0	61.03506
Loan-deposit ratio	64.57019	17.63668	16.20604	109.911
Total loans	647.7 billion	504.1 billion	0.432 billion	2.14 trillion

Source: Authors' Computations, 2020.

Table 2 presents the summary statistics of variables used in this study. As seen from the Table 2, return on assets (ROA) of the deposit money banks has a mean value of 1.57151, standard deviation of 5.284091, minimum of -53.5251 and maximum of 17.04484. This indicates that an average deposit money bank in Nigeria has a return on assets of approximately 1.57 per cent. While the bank with the lowest return on assets has a negative of approximately 53.13 per cent, the bank with the maximum return on assets recorded 17.04 per cent.

Return on equity (ROE) of the deposit money banks has a mean value of 4.762516, standard deviation of 48.75234, and a minimum of -386.698 with a maximum of 289.9937. This indicates that an average deposit money bank in Nigeria has a return on equity of approximately 4.76 per cent however; these banks are widely dispersed around this average value. The bank with the lowest return on equity has negative of approximately 386.70 per cent while the bank with the maximum return on equity recorded 289.99 per cent.

As for the summary statistics of net operating income to total assets ratio, the results show a mean



value of 28.76239, standard deviation of 44.42413, minimum of -39.867 and maximum of 241.247. This indicates that an average deposit money bank in Nigeria recorded a net operating income ratio of approximately 28.76 per cent however; these banks are widely dispersed around the average value of 44.42 per cent. The bank with the lowest net operating expenses recorded a negative of approximately 39.867 per cent, while the bank with the maximum net operating expenses recorded it as 241.25 per cent of total assets.

The total assets of these banks have a mean value of 1.23 trillion naira, with standard deviation of about 1.08 trillion naira, minimum of 75.4 billion naira and maximum of 4.50 trillion naira. This indicates that an average deposit money bank in Nigeria has a total assets worth of 1.23 trillion naira. While the firm with the lowest total assets recorded assets worth of 75.4 billion naira, the firm with the largest total assets recorded assets worth of 4.50 trillion naira.

The summary statistics for non-performing loans ratio show a mean value of 3.764955, standard deviation of 7.818183, minimum of 0 and maximum of 43.62273. This indicates that an average deposit money bank in Nigeria recorded a non-performing loans ratio of approximately 3.76 per cent of the total amount of outstanding loans. These banks have a wide dispersion around this average value of 7.8 per cent. The bank with the lowest non-performing loans ratio recorded a zero per cent of total outstanding loans while the bank with the highest non-performing loans ratio recorded it as 43.62 per cent of total outstanding loans.

As for the summary statistics of loans to value ratio, the results show a mean value of 40.90999, standard deviation of 12.89677, minimum of 0 and maximum of 61.03506. This indicates that an average deposit money bank in Nigeria recorded loans to value ratio of approximately 40.9 per cent; however, these banks are dispersed around this average value by 12.9 per cent. The bank with the lowest loans to value ratio recorded a zero value while the bank with the highest loans to value ratio recorded it as 61.03 per cent.

Loan to deposit ratio of the deposit money banks has a mean value of 64.57019, standard deviation of 17.63668; a minimum of 16.20604 and maximum of 109.911. This indicates that an average deposit money bank in Nigeria has a loan-deposit ratio of approximately 64.57 per cent. While the bank with the lowest loan-deposit ratio recorded approximately 16.21 per cent, the bank with the highest loan-deposit ratio recorded 109.911 per cent.

The total loans of these banks have a mean value of 647.7 billion naira, with standard deviation of 504.1 billion naira, minimum of 0.432 billion naira and maximum of 2.14 trillion naira. This indicates that an average deposit money bank in Nigeria recorded a total loans worth of 647.7 billion naira. The firm with the lowest total loans recorded loans worth of 0.432 billion naira, while the firm with the largest total loans recorded loans worth of 2.14 trillion naira.

Table 3
Results of Correlation Analysis

	ROA	ROE	NOI	Size	NPL	L-V	L-D	Loans
ROA	1.00							



ROE	-0.06 (0.45)	1.00						
NOI	0.21* (0.00)	0.16* (0.03)	1.00					
Size	-0.02 (0.80)	0.07 (0.33)	0.49* (0.00)	1.00				
NPL	-0.04 (0.55)	0.06 (0.42)	-0.03 (0.73)	0.00 (0.98)	1.00			
L-V	-0.24* (0.00)	0.01 (0.86)	0.13* (0.08)	0.44* (0.00)	-0.01 (0.86)	1.00		
L-D	0.20* (0.01)	0.04 (0.60)	0.13* (0.08)	0.09 (0.25)	-0.13* (0.08)	0.51* (0.00)	1.00	
Loans	0.29* (0.00)	0.18* (0.02)	0.38* (0.00)	0.37* (0.00)	-0.20* (0.01)	0.18* (0.02)	0.28* (0.00)	1.00

Source: Authors' Computation, (2020). Note: Probability values in parenthesis.

The results of correlation analysis presented in Table 3 shows that return on assets (ROA) has significant relationship with net operating income (NOI), loan-value ratio (L-V), loan-deposit ratio (L-D) and total loans but not significantly related to return on equity (ROE), size and non-performing loans (NPL). The relationship between return on assets and net operating income, loan-deposit ratio and total loans is positive while its relationship with loan-value ratio is negative. This indicates that return on assets is moving in the same direction with the former variables but in opposite direction with the latter.

Return on equity has significant relationship with net operating income and total loans but not significantly related to size, non-performing loans, loan-value ratio and loan-deposit ratio. The relationship between return on equity and each of net operating income and loans is positive, indicating that return on equity is moving in the same direction with both variables.

Net operating income has significant relationship with size, loan-value ratio (L-V), loan-deposit ratio (L-D) and total loans but not significantly related to non-performing loans. The relationship between net operating income and each of size, loan-value ratio (L-V), loan-deposit ratio (L-D) and total loans is positive, indicating that net operating income is moving in the same direction with each of these variables.

Size has significant relationship with loan-value ratio (L-V) and total loans but not significantly related to non-performing loans and loan-deposit ratio (L-D). The relationship between size and each of loan-value ratio (L-V) and total loans is positive, indicating that bank size is moving in the same direction with each of these variables.



Non-performing loans ratio has significant relationship with loan-deposit ratio (L-D) and total loans but not significantly related to loan-value ratio (L-V). The relationship between non-performing loans ratio and each of loan-deposit ratio (L-D) and total loans is negative, indicating that non-performing loans ratio is moving in opposite direction with each of these variables. Loans to value ratio has significant relationship with loan-deposit ratio (L-D) and total loans. The relationship between loans to value ratio and each of loan-deposit ratio (L-D) and total loans is positive, indicating that loans to value ratio is moving in the same direction with each of these variables. Loans to deposit ratio has significant relationship with total loans and this relationship is positive, indicating that loans to deposit ratio is moving in the same direction with total loans.

The items on the principal diagonal of the matrix show the relationship between a variable and itself, which is 1 (100 per cent). The results generally show that none of these correlation coefficients have values close to 0.8, which is a rule of thumb above which the explanatory variables, if included in the same model will result to a problem of severe multicollinearity. This implies that all these variables can be included in the same model without any fear of severe multicollinearity.

Regression Results: Model of Return on Assets (ROA)

The regression result for the model of return on assets is presented in Table 4, for both the fixed and random effects estimations. The Hausman test was conducted to determine the appropriate model between the Fixed and Random effects models. The test shows a chi-squared value of 10.23 and p-value of 0.069 which is significant at 10% level of significance hence, a rejection of null hypothesis that differences in coefficients of fixed and random effects are not systematic. This indicates that the fixed effects model should be considered.

Table 4
Regression Results for ROA

VARIABLES	Fixed Effects		Random Effects	
	Coefficient	p-value	Coefficient	p-value
Size	0.978 (1.160)	0.413	0.457 (0.806)	0.570
NPL ratio	0.0354 (0.0519)	0.507	0.0331 (0.0449)	0.460
Loan-value ratio	-0.301** (0.124)	0.030	-0.218*** (0.0580)	0.000
Loan-deposit ratio	0.144* (0.0716)	0.064	0.118*** (0.0397)	0.003
Log loans	0.545 (0.385)	0.178	0.949* (0.533)	0.075
Constant	-15.92 (16.97)	0.364	-15.81 (11.43)	0.167



Observations	180		180	
Number of Bank	15		15	
R-squared	0.142		0.739	
F/Chi-sq. statistic	9.87***	0.000	189.94***	0.000
Hausman Test	10.23*	0.069		

Source: Authors' Computations, (2020)

Note: Robust standard errors in parentheses; *** $p < 0.01$, ** $p < 0.05$, * $p < 0.1$

From Table 4 the R-squared value of 0.142 indicates that about 14.2 per cent of variation in return on assets of deposit money banks in Nigeria is explained by the factors considered in the model. The reported F-statistic value of 9.87 also indicates that the variables are jointly significant in affecting return on assets of these banks at 1 per cent significance level. This is evident from its p-value (0.000) being less than 0.01.

As seen under fixed effects in Table 4, loan-value ratio and loan-deposit ratio have statistically significant coefficients, while bank size, non-performing loans ratio, and log of total loans do not have statistically significant coefficients. This indicates that only loan-value ratio and loan-deposit ratio exert significant impacts on return on assets of deposit money banks while other variables do not have significant impact on return on assets. Loan-value ratio is significant at 5% significance level while loan-deposit ratio is significant at 10% significance level. This is evident from the p-value loan-value ratio being less than 0.05 and the p-value loan-deposit ratio being less than 0.1. The coefficient of loan-value ratio is negative (-0.301) while the coefficient of loan-deposit ratio (0.144) is positive.

The significant positive coefficient of loan-deposit ratio indicates that a per cent point increase in loan-deposit ratio will result to 0.301 per cent points increase in return on assets of deposit money banks in Nigeria. This implies that more effort to bring an increment to the proportion of deposit given out as loans will result to an increment in return on assets of deposit money banks in Nigeria. On the other hand, the statistically significant negative coefficient of loan-value ratio indicates that a per cent point increase in loan-value ratio will result to 0.144 per cent points decrease in return on assets of deposit money banks in Nigeria. This implies that an attempt to bring an increment to the share of loans in value (i.e. the lending risk) will result to a decline in return on assets of deposit money banks in Nigeria.

Summarily, based on the impact of credit risk on return on assets, results showed that loan to value ratio, i.e. the lending risk, is influential in causing a decline in the level of return on assets of deposit money banks in Nigeria. Since the ratio is used as an assessment of lending risk, a higher ratio will imply a higher lending risk, which will reduce the amount of loans granted and consequently, cause a decline in the income that would accrue to the bank and, in turn, a fall in profitability. This finding is in conformity with those of Taiwo & Abayomi (2013); Alalade *et. al.*, (2014); Imad (2017); and Sahiti, Ahmeti, & Aliu (2018). This study also found that loan to deposit ratio is influential in improving return on assets of banks. This may result from the improved level of income from loans granted as established in studies of Achou & Tenguh (2008); and Koch & MacDonald (2009).

**Regression Results: Model of Return on Equity (ROE)**

The regression result for the model of return on equity is presented in Table 5 for both the fixed and random effects models. The Hausman test conducted showed a chi-squared value of 4.88 and p-value of 0.431 which indicates it is not significant even at 10% significance level, hence, a non-rejection of null hypothesis that differences in coefficients of fixed and random effects are not systematic. This indicates that the random effects model should be considered.

Table 5

Regression Results for ROE

VARIABLES	Fixed Effects		Random Effects	
	Coefficient	p-value	Coefficient	p-value
Size	-5.967 (7.471)	0.438	0.984 (3.344)	0.769
NPL ratio	-0.478 (0.519)	0.372	-0.167 (0.535)	0.755
Loan-value ratio	0.146 (0.887)	0.872	-0.105 (0.279)	0.708
Loan-deposit ratio	0.00382 (0.672)	0.996	0.000465 (0.280)	0.999
Logloans	2.442* (1.230)	0.067	6.069*** (1.525)	0.000
Constant	49.76 (106.4)	0.647	-82.39 (69.39)	0.235
Observations	180		180	
Number of Banks	15		15	
R-squared	0.010		0.529	
F/Chi-sq. statistic	3.26**	0.037	345.51***	0.000
Hausman Test	4.88	0.431		

Source: Authors' Computations, (2020).

Note: Robust standard errors in parentheses; *** $p < 0.01$, ** $p < 0.05$, * $p < 0.1$

The reported R-squared value of 0.529 indicates that about 52.9 per cent of variation in return on equity of deposit money banks in Nigeria is explained by the factors considered in the model. The reported Chi-squared statistic value of 345.51 also indicates that the variables are jointly significant in affecting return on equity of these banks at 1% significance level. This is evident from its p-value (0.000) being less than 0.01.

As seen under random effects in Table 5, log of total loans has a statistically significant coefficient, while bank size, non-performing loans ratio, loan-value ratio, and loan-deposit ratio do not have a statistically significant coefficient. This indicates that only log of total loans exert significant impacts on return on equity of deposit money banks, while other variables do not have significant impact on return on equity. Log of total loans is significant at 1% significance level. This is evident



from the p-value of log of total loans being less than 0.01. The coefficient of log of total loans is positive (6.069). The significant positive coefficient of log of total loans indicates that a per cent increase in total loans will result to 0.061 per cent points (i.e. 6.069/100) increase in return on equity of deposit money banks in Nigeria. This implies that attempts to improve the amount of loans given out will result to an increment in return on equity of deposit money banks in Nigeria.

Therefore, based on the impact of credit risk management on return on equity, results revealed that total loans granted is influential in causing a rise in the level of return on equity of deposit money banks in Nigeria. Increase in total loans, accompanied with proper credit management will induce higher income and consequently increase the level of profitability. This finding is in tandem with those of Taiwo and Abayomi (2013), Alalade *et. al.*, (2014), and Sujeewa (2015).

Regression Results: Model of Net Operating Income (NOI)

The regression result for the net operating income model is presented in Table 6. The Hausman test was also conducted to determine the appropriate model between the Fixed and Random effects models. The test showed a chi-squared value of 11.81 and p-value of 0.037, which indicates that it is significant at 5% significance level, hence, a rejection of null hypothesis that differences in coefficients of fixed and random effects are not systematic. This indicates that the fixed effects model should be considered.

The reported R-squared value on Table 6 is 0.448 and indicates that about 44.8 per cent of variation in net operating income of deposit money banks in Nigeria is explained by the factors considered in the model. The reported F-statistic value of 4.04 also indicates that the variables are jointly significant in affecting return on equity of these banks at 5% significance level. This is evident from its p-value (0.017) being less than 0.05.

As seen under fixed effects result on Table 6, bank size, non-performing loans ratio and log of total loans have statistically significant coefficients, while loan-value ratio and loan-deposit ratio do not have statistically significant coefficients. This indicates that only bank size, non-performing loans ratio and log of total loans exert significant impacts on net operating income of deposit money banks while other variables do not have significant impact on net operating income. Bank size, non-performing loans ratio and log of total loans are significant at 5% significance level. This is evident from each of their p-values being less than 0.05. The coefficients of bank size, non-performing loans ratio and log of total loans are positive (18.0, 0.618 and 2.569 respectively).

Table 6
Regression Results for NOI

VARIABLES	Fixed Effects		Random Effects	
	Coefficient	p-value	Coefficient	p-value
Size	18.00** (7.140)	0.024	19.46*** (6.669)	0.004
NPL ratio	0.618** (0.267)	0.036	0.538** (0.237)	0.023



Loan-value ratio	-0.322 (0.589)	0.593	-0.504 (0.428)	0.239
Loan-deposit ratio	0.0194 (0.280)	0.946	0.149 (0.203)	0.465
Logloans	2.569** (1.054)	0.029	3.619** (1.482)	0.015
Constant	-239.4** (91.20)	0.020	-273.5*** (83.39)	0.001
Observations	180		180	
Number of cd	15		15	
R-squared	0.448		0.509	
F/Chi-sq. statistic	4.04**	0.017	26.52***	0.000
Hausman Test	11.81**	0.037		

Source: Author's Computations, (2020)

Note: Robust standard errors in parentheses; *** $p < 0.01$, ** $p < 0.05$, * $p < 0.1$

The significant positive coefficient of bank size indicates that a per cent increase in total assets will result to 0.18 per cent (i.e. 18.0/100) increase in net operating income of deposit money banks in Nigeria. This implies that increase in bank size will result to an increment in net operating income of deposit money banks in Nigeria. The significant positive coefficient of non-performing loans ratio indicates that a per cent point increase in non-performing loans ratio will result to 0.618 per cent points increase in net operating income of deposit money banks in Nigeria. This implies that increase in the proportion of non-performing loans to the total amount of outstanding loans will result to an increment in net operating income of deposit money banks in Nigeria. The significant positive coefficient of log of total loans indicates that a per cent increase in total loans will result to 0.026 per cent points (i.e. 2.569/100) increase in net operating income of deposit money banks in Nigeria. This implies that attempts to improve the amount of loans given out will result to an increment in net operating income of deposit money banks in Nigeria.

Summarily, based on the impact of credit risk on net operating income, findings therefore, showed that bank size and non-performing loan ratio is influential in causing a rise in the level of net operating income of deposit money banks in Nigeria. Although, it is expected that higher non-performing loans should affect banks profitability negatively but perhaps, this result stems from the fact that increase in this ratio will require more attention to credit risk management, which may assist these banks to improve their profitability. Results also revealed that total loan granted was influential in causing a rise in the level of net operating income of deposit money banks in Nigeria. Increase in total loans, accompanied with proper credit management will induce higher income and consequently increase the level of profitability. Findings are however, in conformity with the submissions of Smircich (1985), Abayomi (2013), Alalade *et. al.*, (2014), Sujeewa (2015) and Uwalonwa *et. al.*, (2015).

CONCLUSION AND RECOMMENDATIONS



This study concludes that the loan-deposit ratio and loan-value ratio significantly impacts on return on assets of deposit money banks in Nigeria, while non-performing loan ratio, bank size, and log of total loans did not significantly impact on return on assets of deposit money banks in Nigeria. Also, the study concludes that the value of total loans was found to significantly affect return on equity of deposit money banks in Nigeria, while loan-value ratio, loan-deposit ratio, bank size, and non-performing loans did not significantly affect return on equity of deposit money banks in Nigeria. Further, the study also concludes that bank size, non-performing loan, and total loans were found to significantly affect net operating income of deposit money banks in Nigeria, while loan-value ratio and loan-deposit ratio did not significantly exert on net operating income of deposit money banks in Nigeria. The study therefore, recommends that regulatory bodies especially, the Central Bank of Nigeria (CBN) should put in place appropriate policies to encourage deposit money banks to pay proper attention to loan-value ratio and loan-deposit ratio in order to improve banks return on assets in Nigeria; while proper attention be paid to the value of total loans to increase their return on equity. The study also recommends that bank size, non-performing loan ratio and value of total loans should be giving considerate attention in order to improve the net operating income of deposit money banks in Nigeria. If these are given considerate attention, the profitability of deposit money banks is likely to increase in Nigeria.

References

- Abiola, I., & Olausi, A. S. (2014). The impact of credit risk management on performance of commercial banks in Nigeria. *International Journal of Management and Sustainability*, 3(5), 295-306.
- Abobari, C., Naenwi, M., Zukbee, S. A., & Brend, M. D. (2018). Impact of credit management on bank performance in Nigeria. *Equatorial Journal of Finance and Management Sciences*, 3(1)17 – 23.
- Achou, T. F., & Tenguh, N. C. (2008). *Bank performance and credit risk management*. University of Skoved: School of technology and society.
- Adegbe, F. F., & Otitolaiye, E. D. (2020). Credit risk and financial performance: An empirical study of deposit money banks in Nigeria. *European Journal of Accounting, Auditing and Finance Research*, 8(2), 38-58.
- Aigbomian, E., & Akinlosotu, N. T. (2017). Credit risk management and profitability of deposit money banks in Ekpoma, Edo State. *Journal of Economics and Sustainable Development*, 8(3), 222 – 235.
- Angela, D. (2016). Determinants and differences of domestic and foreign commercial bank profitability. Honors Theses and Capstone. University of New Hampshire. Retrieved on 01/02/2020 from <https://scholars.unh.edu/285>



- Basel Committee on Banking Supervision (2000). Principles for the management of credit risk. Retrieved on 02/03/2020 from <https://www.bis.org/publ/bcbs75.pdf>
- Global Association of Risk Professionals (2013). Credit risk management. Retrieved on 03/03/2020 from <http://www.garp.org>
- Sahiti, A., Ahmeti, S., & Aliu, M. (2018). Banking activities in Kosovo and the importance of credit risk management. *Journal of Finance and Banking Studies*, 7(3), 35 -43.
- Alalade, S., Binuyo, O., & Oguntodu, A. (2014). Managing credit risk to optimize banks profitability: A survey of selected banks in Lagos State, Nigeria. *Research Journal of Finance and Accounting*, 5(18), 76-84.
- Choudhry, M. (2011). *Bank asset – liability and liquidity risk management*. London: Palgrave Macmillan
- Chuke, N., & Chinedu, O. (2018). Impact of credit risk management on the performance of selected Nigerian banks. *International Journal of Economics and Financial Issues*, 8(2), 287-297.
- Devinaga, R. (2010). Theoretical framework of profitability as applied to commercial banks in Malaysia. *European Journal of Economics, Finance and Administrative Sciences*, 19(19), 75-97.
- Eisenhardt, K. M. (1989). Agency theory: An assessment and review. *Academy of Management Review*, 14(1), 57-74.
- Flamini, V., McDonald, C., & Schumacher (2009). The determinants of commercial bank profitability in Sub-Saharan Africa. IMF working paper WP/09/15, 1– 30.
- Gestel, T. V., & Baensens, B. (2009). *Credit risk management*. [E-book] Available through: Oxford Scholarship Online.
- Ghebregiorgis, F., & Atewebrihan, A. (2016). Measurement of banks' profitability, risk and efficiency: The case of the commercial bank of Eritrea and housing commerce bank of Eritrea. *African Journal of Business Management*, 10(22), 554-562.
- Greuning, H., & Bratanovic, S. (2007). *Analyzing and managing banking risk: A framework for assessing corporate governance and financial risk* [Brochure]. Washington, DC, United State of America: The World Bank.
- Gisemba, P. (2010). *The Relationship between credit risk management practices and Financial Performance of SACCOs in Kenya*. Unpublished MBA Dissertation, University of Nairobi.
- Imad, K. (2017). The impact of credit risk on the profitability of banks listed on the Palestine exchange. *Research Journal of Finance and Accounting* 8(8), 136 – 141.



- Kargi, H. S. (2011). *Credit Risk and the Performance of Nigerian Banks*. Unpublished Master's Thesis, Ahmadu Bello University, Kaduna, Nigeria.
- Koch, T.W., & MacDonald, S. S. (2009). *Bank management*. Ohio: Cengage Publisher.
- Kolapo, T. F., Ayeni, R. K., & Oke, M. O. (2012). Credit risk and commercial banks' performance in Nigeria: A panel model approach. *Australian Journal of Business and Management Research*, 2(2), 31-38.
- Krugman, P. (2009). *The Return of Depression Economics and the Crisis of 2008*. W.W. Norton & Company Limited.
- Mercy, N. J., Robert, O., & Patrick, K. (2018). Effects of credit management on the financial performance of deposit taking savings and cooperative societies in Nakuru Town, Kenya. *Journal of Business and Management*, 20(8), 69 -78.
- Mirach, H. (2010). *Credit Management: A Case Study of Wegagen Bank Share Company in Tigray Region*. College of Business & Economics, Mekelle University, Mekelle.
- N'jai, L. (2000). *An Assessment of the Impact of Credit Management of the Commercial Viability of Telecommunications Industry*. Unpublished Dissertation, IPAM-USL, Sierra Leone.
- Nwankwo, G. O. (1991). *Bank Management Principles and Practices: Managing the Lending Portfolio*. Lagos, Nigeria: Malthouse Press Ltd.
- Nwanna, I. O., & Oguezie, F. C. (2017). Effect of credit management on profitability of deposit money banks in Nigeria. *IIARD International Journal of Banking and Finance Research*, 3(2), 137-160.
- Ogboi, C., & Unuafé, O. K. (2013). Impact of credit risk management and capital adequacy on financial performance of commercial banks in Nigeria. *Journal of Emerging Issues in Economics, Finance and Banking*, 2(3), 703-717.
- Saeed, M., & Zahid, N. (2016). The impact of credit risk on profitability of the commercial banks. *Journal of Business and Financial Affairs*, 5(2), 1-7.
- Sujeewa, K. (2015). Impact of credit risk management on the performance of commercial banks in Sri Lanka. *International Journal of Scientific Research and Innovative Technology*, 2(7), 24-29.
- Taiwo, A. M., & Abayomi, S. T. (2013). Credit management spur high profitability? Evidence from Nigerian banking sector. *Journal of Applied Economics and Business*, 1(1), 46- 53.
- Uwalonwa, U., Uwugbe, O. R., & Oyewo, B. (2015). Credit management and bank performance of listed banks in Nigeria. *Journal of Economics and Sustainable Development*, 6(2), 27 – 34.



Van Greuning, H, & BrajovicBratanovic, S. (2003). *Analyzing and Managing Banking Risk a Framework for Assessing Corporate Governance and Risk Management*. 2nd edition, Washington, D. C.: The World Bank.