Credit Management and Issues of Bad Debts: An Empirical Study of Listed Deposit Banks in Nigeria

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Authors' contributions

This work was carried out in collaboration between both authors. Both authors read and approved the final manuscript.

Data Article

ABSTRACT

This study examines the impact of credit management on firm performance amidst bad debts, among Nigerian deposit banks. Five hypotheses were formulated following the dependent variables of Return on Asset and Tobin Q. The independent variables employed for this study include: Loan Loss Provision, Loan to Deposit Ratio, Equity to Asset Ratio, and Loan Write off. This study is based on ex-post facto research design and employed a panel data set collected from fourteen (14) commercial banks over six years ranging from 2014 to 2019 financial year. We analyzed the data set using descriptive statistics, correlation and Ordinary Least Square Regression Technique. The random effect models established that non-performing loan, loan loss provision and equity to asset impact significantly on banks' performance in both Return on Asset and Tobin-Q models. This suggests that the sampled banks need to establish efficient arrangements to deal with credit risk management. In all, credit risk management indicators considered in this research are important variables in explaining the profitability of Nigerian commercial banks. However, based on the outcome from the empirical analysis, the study carefully recommends that investors and shareholders in these banks should be aware of the possible use of provisions for losses on non-performing loans by managers for smoothening of profits. The shareholders specifically should be ready to meet optimal agency costs to reduce the manager's information asymmetry by hiring competent internal and external auditors.

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1. INTRODUCTION

Credit Management can be viewed as written guidelines that set the terms and conditions for supplying goods on credit, customer qualification criteria, the procedure for making collections and steps to be taken in case of customer delinquency. Pandey [1] submitted that credit is a marketing tool for expanding sales and considers it as the centre of a business entity for both short and long-term survival aiming at short term and long term financial gains Uwonda et al. [2]. There are numerous objectives of credit management. According to Aminu [3], credit management seeks to: accelerate cash inflows, delay cash outflows, invest excess cash to earn a return, borrow cash at the best rates available and maintain an optimal cash level. With better credit and cash flow management practices, a business is capable of holding the right amount of cash and allows the business to make and receive payments in time.

A critical objective of credit management is to ensure that a business identifies its needs in good time to avoid cash flow crisis Horner [4]. An efficient credit management system reduces the amount of capital tied up with debtors and minimizes bad debts. As noted by Horner [4] there exists a positive correlation between credit management and profitability.

The performance of financial institutions in any economy influences economic growth positively as they are responsible for mobilizing savings for productive investments through facilitating capital flows towards various sectors of the economy [5,6,7]. Hence, the significance of commercial banks in an economy may not be eliminated as they are seen as institutions, which provide liquidity for both lender and borrower Kashyap et al. [8]. Hence many authors have argued that when there is a poor performance from this sector, the effects hamper economic growth and enhances poverty in the recipient country Barth et al. [9]. However, to be able to raise funds through customers' deposit, banks have to evaluate the risk, which it faces daily while lending Mohammad [10]. Consequently, managing the risk associated with the loan process becomes imperative. Aminu [3] documents that a well-managed loan process tends to maximize bank risk, adjusted risk rate of return by maintaining credit risk exposure to shield the bank from the adverse effects of credit risk.

Given the need to tackle all issues faced by the Nigerian banking sector in recent times, the Central Bank of Nigeria (CBN) entered into an agreement in 1987 known as Basel I and Basel II accords. Both accords emphasized the importance of capital adequacy for mitigating credit risks, which cushions the effects of sudden financial losses on banks [11-13].

High levels of non-performing loans (NPL) tend to reduce the lending ability of deposit money banks and possibly put them out of business. In line with this assertion, Nawaz et al. [14], postulated that the magnitude of non-performing loans in the banking system eroded investors' confidence and alarmed stakeholders in the banking industry. Osuka and Amako [15] posits that excessively high level of NPL among commercial banks in Nigeria during the 1999 and 2009 era was as a result of poor corporate governance practices, lax credit administration processes and the absence or non- adherence to credit risk management practices.

1.1 Statement of Problem

Credit risk management is very vital to measuring and optimizing the profitability of banks. The long term success of any banking institution depends on an effective system that ensures the repayments of loans by borrowers. Effective credit risk management system involved establishing a suitable credit risk environment; operating under a sound credit granting process, maintaining an appropriate credit administration that involves monitoring, processing as well as enough controls over credit risk Greuning and Bratanovic [7]. During the financial crises of the late 1980s, 1990s and beyond, many banks collapsed mainly due to huge nonperforming loans indicating that nonperforming loans portfolio is rather a sign of pending bank failure than a pointer to bank profitability.

The crucial problem faced by financial institutions in Nigeria is credit risk as a result of defaulters not repaying credits. The failure to manage bad debts leads to insolvency and losses among financial institutions Abiola & Olausi [16]. The growing trend of Non-Performing loans is becoming an issue worthy of consideration not only for the banking sector but also for the national economy of Nigeria. It hinders the financing capacity of the banks and, therefore,

harms the overall socio-economic development of the country. Banks are susceptible to many risks including credit risk that usually brings about bad loan to write off. However, it is against this backdrop that this study seeks to establish the relationship between the various components of credit risk management and issues of bad debt among commercial deposit banks in Nigeria. Therefore the broad objective of this study is to investigate the impact of credit management on firm performance amidst bad debts in Nigeria deposit banks**.** The specific objectives are to establish the relationship betweencredit management on firm performance amidst bad debts in Nigeria deposit banks.

1.2 Significance of the Study

This study will be useful and will greatly enhance the efficiency and effectiveness of fiscal and monetary activities of deposit money banks and will also provide further support for the constant search for a more allocative efficient and equitable distribution of the nation's wealth. For researchers, this study will open up critical areas in the fiscal literature that many researchers will find useful and extend from thus creating a body of knowledge that can always be drawn from by policymakers. Members of faculty will also be guided by the output of this research on what should be emphasized in the design and implementation of fiscal plans and policies, to improve students understanding and appreciation of the complex relationship between credit management techniques and other fiscal variables.

2. LITERATURE REVIEW

This section presents the literature review. This begins with a conceptual review of the literature. Then, established a theoretical framework on credit risk management practices and performance. Finally, conclude with a review of empirical studies.

2.1 Conceptual Clarification

Credit risk management and bank performance: The fundamental objective of the Bank management is to maximize shareholders wealth (Koch and MacDonald, 2006). This goal is interpreted to mean maximizing the market value of the firm's ordinary shares. Wealth maximization, in turn, requires that managers evaluate the present value of cash flows under uncertainty with larger, near- term cash flows

proffered when evaluated on a risk-adjusted basis Koch and MacDonald, (2006). To obtain higher yields on returns, a bank must either take an increased risk or lower operating costs Kegode (2006). Thus managers must evaluate and balance the tradeoffs between the opportunity for higher returns, the probability of not realizing those returns and the possibility that the bank might fail Koch and MacDonald, (2006).

Relationship between Non-Performing Loan (NPL) and bank profitability: The key measure of banking industry performance it's the level of Non-performing loans and accounts [17]. Non-Performing Loans is the possibility of a borrower defaulting an unpaid loan either partly or in full [18]. NPLs reflects the profitability of any financial institution hence a decline in the ratio of Non-performing loans indicates an improvement in the asset quality of both public sector banks and private sector banks. Batra [19] noted that for most failed banks, the real problems are systemic and deeply rooted in a bank's credit culture and management style.

Fofack [20] also associated banks' heavy accumulation of NPLs with profitability and observed that the NPLs can heavily contribute to possible financial distress. Non-Performing Loans have a direct impact on the profitability of banks by diluting returns on assets. This is because Banks are required to make provisions for losses on non-performing loan assets which in turn affect profitability.

Relationship between loan to deposit and bank profitability: Loan-deposit ratio is a useful instrument to determine bank liquidity and by extension, it influences the profitability of the banks. The bank profit is based on the interest charged against the deposits; it means the profit is generated through the positive difference between the interest of loans and interest on deposits supported by a study carried out by Joni Tamkin Borhan & Towpek (2006).

In general, banks may not be earning optimal return if the LDR ratio is too low. Many studies analyzed various factors that influences the profitability of a bank: loan to deposit ratio and profitability a study of Bashir and Hasan, (2003): the ratio of equity to assets and profitability carried out by Athanasoglou et al. (2006): Loans & deposit and profitability of the bank from the perspective of Naceur, (2003): and deposits to total assets ratio and profitability by Vong et al. (2009).

The relationship between loan write off (Bad debt) and bank profitability: Importantly, a loan write-off should not be confused with loan loss provisions. Under current accounting principles, a bank must provide for loan losses when it determines that probably that there are additional losses inherent in the loan portfolio. Loan loss provisions are expenses and will negatively affect the overall net profits of the bank. From a supervisory perspective, it is a good practice to write off a loan on a timely basis as soon as the bank identifies that the loan does not have any realistic prospect of collection or recovery. According to Karim, Chan and Hassan [21], the main effect of bad loans is the ability to hinder the bank to grow financially. This is because bad loans drag banks into liquidity problems and make them unable to extend funds to other potentially viable businesses.

The relationship between equity to asset and bank profitability: The equity-to-assets ratio is the value of the corporation's equity divided by the value of its assets. A high ratio means that the corporation is mostly owned by its shareholders, while a low ratio means that the corporation is likely burdened with high debts. An equity-to-assets ratio of below 0.70 generally makes it difficult for a corporation to borrow money, due to concerns about its solvency.

Theoretical expectations, as well as empirical results, for the equity to assets ratio (Total equity/Total assets), suggest that the ratio will be positively related to bank profitability. More capital means less need for external funding and a lower cost of capital when it is sought. Bankruptcy risk costs will be less due to the larger safety net in case of negative developments. However, recent theoretical work indicates that, when earnings are mean-reverting, the relationship between leverage and current earnings should be negative Sarkar and Zapatero [22]. There is substantial evidence that earnings in banking are mean-revert Knapp et al. [23].

The relationship between loan loss provision and bank profitability: Loan-loss provisioning policy is critical in assessing financial system stability, in that it is a key contributor for fluctuations in banks' profitability and capital positions, which has a bearing on banks' supply of credit to the economy Beatty and Liao [24]. In principle, loan loss provision allows banks to recognize in their profit and loss statements the estimated loss from a particular loan portfolio(s), even before the actual loss can be determined

with accuracy and certainty as the events unfold and are written off. The level of loan loss provisioning should be able to reflect the beliefs of bank management on the quality of the loan portfolio that they have, indicating that provisions should be able to cover the whole spectrum of expected credit losses if they are to think of provisions as a measure of true credit risk Dugan, (2009). Hence we argue that the relationship between loan loss provision and bank profitability is negative.

2.2 Theoretical Framework

The theoretical framework of this study is a blend of the Commercial Loan, Credit Risk and the liquidity theory of credit, due to their relevance to the study. However, a brief overview of each of the theories is presented below:

2.2.1 Commercial loan theory

The oldest theory of banking is the commercial loan theory, also called the real bills doctrine. The commercial loan theory holds that banks should lend only on the short term, self-liquidating, commercial paper. According to Hosna & Manzura [25], the commercial loan theory is geared to influence persuasively both the bank lending and the general economic activities. Strict adoption of this theory will reveal that it is expected to serve as a money supply to changes in aggregate economic activity. The popularity of this doctrine among Deposit-Money Banks (DMBs) in Nigeria is evident. Nigerian bankers believe that since their resources were repayable at short notice, such depositors' monies should be employed accordingly in short-term loans. Kargi [26] posited that the strong tie to this conception is rather orthodox if consideration is given to the fact that at the time of the supremacy of the theory, there were little or no secondary reserve assets, which could have served as a liquidity buffer for the bank. One shortfall of this theory about developing nations such as Nigerian is that it fails to consider the credit needs of Nigeria's developing economy. It has not encouraged banks to fund the purchases of plants, equipment, land, and home-ownership. For a theory to maintain that all loans should be liquidated in the normal course of business shows its failure to recognize the relative stability of bank deposits.

2.2.2 Credit risk theory

Credit risk according to Salas and Saurina [27] refers to the risk that a borrower will default on

any type of debt by failing to make required payments. The risk is primarily that of the lender and includes lost principal and interest, disrupt loss may be complete or partial and can arise in several circumstances, such as an insolvent bank unable to return funds to a depositor. To reduce the lender's risk, the lender may perform a credit check on the prospective borrower, may require the borrower to take appropriate insurance, such as mortgage insurance or seek security or guarantees of third parties. In general, the higher the risk, the higher will be the interest rate that the debtors will be asked to pay on the debt [28].

2.2.3 Liquidity theory of credit

This theory, first suggested by Emery [29], proposes that credit rationed firms use more trade credit than those with normal access to financial institutions. The central point of this idea is that when a firm has financially constrained the offer of trade credit can make up for the reduction of the credit offer from financial institutions. Nielsen (2002), using small firms as a proxy for credit rationed firms, finds that when there is a monetary contraction, small firms react by increasing the amount of trade credit accepted. As financially unconstrained firms are less likely to demand trade credit and more prone to offer it, a negative relationship between a buyer's access to other sources of financing and trade credit used is expected. Petersen and Rajan [30] obtained evidence supporting this negative relation.

2.3 Review of Empirical Studies

The issue of credit risk management and performance of financial institutions in ensuring that banks can achieve their set objectives has been well researched upon by numerous academics. There is an overwhelming belief that credit risk management has a strong influence on performance [31].

Lydnon, Ayunku and Ebitare [32] investigated the relationship between non-performing loans and bank performance in Nigeria for the period 1994-2014. The results obtained show that a high level of non-performing loans would reduce the performance of banks in the long run in Nigeria. The study, therefore, recommended that credit reporting agencies and supervising authorities should be strengthened to reduce the high level of non-performing loans in the banking sector of Nigeria. Ugoani [33] found that nonperforming loans portfolio harms bank profitability in Nigeria.

Saba, Kouser and Azeem [34] in their study on determinants of non-performing loans in the US banking sector for the period 1985-2010 using OLS regression model for data analysis found that real total loans have a positive significant effect on non-performing loans, while interest rate and GDP per capita has a negative significant association with non-performing Loan.

Ali and Iva [35] conducted a study on the impact of bank-specific factors on non-performing loans in the Albanian banking system. The study employed the OLS regression model to analyze panel data for the period 2002-2012. Their findings reveal that real exchange rates and loan growth rate have a positive association with non-performing loans, while the GDP growth rate and interest rate had a negative association with NPLs.

Osuka & Amako [15] using time series data from 2001 – 2011 appraised the impact of credit risk management in the bank's financial performance in Nepal. The result of the study indicates that credit risk management is an important predictor of banks' profitability and financial performance.

Chege and Bichanga [36] examined the effect of Non-Performing Loans on the financial performance of commercial banks operating in Kenya. A descriptive survey and empirical research designs were adopted by the study where the target population comprised 44 commercial banks in Kenya. Datasheets were used to collect secondary data from the central bank supervisory reports and banks published audited financial statements for five years 2011-2015.It was established that nonperforming loans had a statistically significant effect on financial performance proxied by ROA.

Taiwo and Taiwo [37] examine the relationship between credit management, liquidity position and profitability of some selected banks in Nigeria using annual data of ten banks from 2006 to 2010.The results from Ordinary Least Square (OLS) estimate found that the current ratio is positively related to debt ratio.

Taiwo et al. [38] investigated the quantitative effect of credit risk management on the performance of Nigeria's Deposit Money Banks (DMBs) and Bank lending growth over 17 years (1998-2014). The result showed that sound credit management strategies can boost investors and increase depositors' confidence in banks which will lead to a growth in funds for loans and

advances as well as increased profitability. The findings revealed that credit risk management has an insignificant impact on the growth of total loans and advances by Nigerian Deposit money banks.

Onaolapo [39] analyzed the relationship between the credit risk management efficiency and financial health in selected Nigerian commercial banking sector. Data collections are mainly secondary spanning 6 years before and after consolidation programme (2004 to 2009). The study hypothesized a negative relationship between Efficiency of Credit Risk Management, bank performance and operational effectiveness. Findings indicate minimal causation between Deposit Exposure and performance but greater dependency on operational efficiency parameters.

Ogboi and Unuafe [40] examined the impact of credit risk and capital adequacy on banks financial performance in Nigeria. Their study used a time series and cross-sectional data from 2004-2009 obtained from selected banks annual reports and accounts in Nigeria. The panel data model was used to estimate the relationship that exists between loan loss provisions, loans and advances, non-performing loans, and capital adequacy. The findings showed that sound credit risk management and capital adequacy impacted positively on the bank's financial performance except for loans and advances which was found to harm banks' profitability during that period.

Marshal and Onyekachi [41] carried out an empirical investigation on the effect of credit risk and performance of banks in Nigeria for over 15 years (1997-2011) on five banking firms. The result shows that there is a positive relationship between Ratio of non- performing loans to loan and advances and banks performance. Their findings were also that there exists a positive relationship between the ratio of loan and advances to total deposit and banks performance. The conclusion was that the increase in loan and advances increases banks performance through interest income generated from loan and advance.

Shafiq & Nasr [42] found that credit risk management had a significant influence on bank profitability. Shafiq & Nasr [42] examined the key determinants of the credit risk of commercial banks on emerging economies banking systems compared with the developed economies. They found that regulation is important for banking systems that offer multi-products and services,

management quality is critical in the cases of loan-dominant banks in emerging economies.

Moti, Masinde, & Mugenda [43] investigated the impact of bank's specific risk characteristics, and the overall banking environment on the performance of 43 commercial banks operating in 6 of the Gulf Co-operation Council (GCC) countries over the period 1998-2008., he observed that bad debts or credit risks, liquidity risk and capital risk are the major factors that affect bank performance when profitability is measured by return on assets while the only risk that affects profitability when measured by return on equity is liquidity risk.

Asantey and Tengey [44] examine the effect of bad loans on the lending potential and financial performance of banks in Ghana between 2008 and 2013. A high negative correlation between bad loans and lending potential is found. Also, the study found that bad loans make a high negative correlation with the return on investment or net profit.

Ezirim [45] further stressed that bank lending decisions generally are fraught with many risks, which calls for a great deal of caution and tact in this aspect of banking operations. The success of every lending activity to a great extent therefore, hinges on the part of the credit analysts to carry out good credit analysis, presentation, structuring and reporting.

3. RESEARCH METHODS

3.1 Research Design

A research design is as an overall plan for research undertaking. In this study, a descriptive survey research design was used since the study was exploratory. The research design adopted for this research is the *ex-post facto* research design. The adoption of the *ex-post facto* research design hinged on two main reasons: Firstly, the study relied on historic accounting data obtained financial statements of the sampled companies, as such the event under investigation had already taken place and the researcher does not intend to control or manipulate the data variables. The inability of the researcher to manipulate these data is a basic feature of *ex-post-facto* research design. Thus, perfectly suits this research. Secondly, the *ex-post facto* research is used when the researcher intends to determine the cause-effect relationship between the independent and dependent variables to establish a causal link between them.

Table 1. Operationalization of variables

Variable	Measurement	Sources
Return on Asset (Dependent variable)	Return on the asset in percentage is computed as profit after tax divided Total asset	Asantey and Tengey [44]
Tobin Q (Dependent variable)	Tobin Q in numbers is computed as Market Capitalization + Total Liabilities' -Cash flow divided by Total asset	Ogboi and Unuafe [40]
Non-Performing Loan (Independent variable)	Non-Performing Loans to loans in percentages is computed as non-performing loans divided by total loans and advances to customers.	Boland (2012)
Loan Loss Provision (Independent variable).	Loan loss provisions or credit impairment provisions in thousands is the amount banks set outside to cover bad loans or impaired credits.	Hosna & Manzura [25]
Bad Loan Written off (Independent variable).	Bank Loans Written-off in thousands is the number of loans charged-off or written off as reported under loans and advances note of accounts.	Hosna & Manzura [25]
Loan to Deposit Ratio (Independent variable).	Measured in percentage is derived by dividing the amount of total loan by total deposit	Godlewski, (2004)
Equity to Asset Ratio (Independent variable)	The ratio, expressed as a percentage, is calculated by dividing total shareholders' equity by total assets of the firm, and it represents the amount of assets on which shareholders have a residual claim	Godlewski, (2004)

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Model Specification

$$return\_t_{it} = \partial_0 + \partial_1 loan\_loss\_t_{it} + \partial_2 non\_perfor\_n_{it} + \partial_3 loantodep\_t_{it} + \partial_4 equity\_to\_t_{it} + percentage\_t_{it} + \sum_{it} \tag{1}$$

$$tobin\_q_{it} = \partial_0 + \partial_1 loan\_loss\_t_{it} + \partial_2 non\_perfor\_n_{it} + \partial_3 loantodep\_t_{it} + \partial_4 equity\_to\_t_{it} + percentage\_t_{it} + \sum_{it} \tag{2}$$

Where:

return_t = Return on Asset
tobin_q = Tobin Q
loan_loss_t = Loan Loss Provision
non_perfor_n = Non Performing Loan
loantodep_t = Loan to deposit Ratio
equity_to_t = Equity to Deposit Ratio
percentage_ t = Bad Loan Written Off
∂_0 = constant
$\partial_1.............\partial_5$ = variables that vary across companies but do not vary over time
$\sum$ = error terms over the cross section and time.
it = cross section of listed companies time variant

3.2 Method of Data Analysis

Data analysis methods deal with various statistical analysis involved in the description of the collected data and consequently, making decisions and possible inferences about the phenomena represented by the data. However, fixed and random effects models are two main approaches to empirical research that are based on panel data set because both models can control for unobserved time-invariant heterogeneity peculiar to economic agents. The key assumption for these models is that fixed effects models assume that the heterogeneity is correlated with the explanatory variables while random-effects models suppose that the individual-specific effects are uncorrelated with the explanatory variables Gujarati [46]. The result

of a Hausman test is conducted to determine which model would be appropriate in this context. Hence, the study would employ the Hausman specification test to test the fixed effects and random effects. The major issue is whether there is a significant correlation between the unobserved bank-specific random effects and the explanatory variables [47,48,49].

The study tests the null hypothesis that there is no correlation between the unobserved bank-specific random effects and the explanatory variables.

H_0: Cov $(X_{it}, \alpha_i) = 0$

H_a: Cov $(X_{it}, \alpha_i) \neq 0$

The test statistic is Wald X^2, with k-1 degree of freedom (where k is the number of regressors). If X^2 is statistically significant, we reject the null hypothesis and accept the alternative. It means that there is a correlation between the unobserved bank-specific effects α_l and the explanatory variables. Thus, the fixed-effects model (FEM) would then be the model of choice.

4. DATA PRESENTATION AND RESULTS

4.1 Data Presentation

The study investigates the influence of credit management and issues of bad debts on firm performance by drawing samples from quoted deposit banks (Access Bank, Fidelity Bank, First Bank Holdings, First City Monument, Guaranty Trust Bank, Stanbic Ibtc Holdings, Sterling Bank, Union Bank Of Nigeria, United Bank For Africa and Zenith Bank) on the Nigerian stock exchange market. While firm performance (proxy by Return on Asset and Tobin-Q) is the dependent variable, the explanatory variables that we adopted for this research study include: loan loss provision, non-performing loan, loan to deposit ratio, equity to asset and bank loan written-off. Our data set span through the periods of 2013 – 2018. In identifying the possible influence of credit management on firm performance, we conducted descriptive statistics, correlation matrix, data normality test, and Panel Ordinary Least Square Regression analysis. However, some post estimation test of multicollinearity employing the Variance Inflation Factor Test (VIF) and the test for heteroskedasticity were equally conducted. The results are analyzed as follows: Appendix 1 & 2 shows the mean (average), maximum, minimum, standard deviation, sum, variance standard error of the mean and median for each of the variables in terms of companies and terms of the firm-year. The result provides some insight into the nature of the selected Nigerian quoted companies that were used in this research study.

4.2 Results

Descriptive statistics: The descriptive statistics table is used to describe the basic features of the data in the study. It provides simple summaries about the sample and the measures. Together with a simple analysis, they form the basis of virtually every quantitative analysis of the data. From appendix 1 & 2, we find every year, 2013 (2.427), 2014 (2.083) and 2015 (2.269) average that rise above the overall average of return on asset. This suggests that every naira utilization of asset yielded profit above the average for the period 2013 to 2015 clearly before the economy fell into recession. Furthermore, we observe that the only year 2013 (0.999), 2014 (1.051) and 2015 (1.013) have higher average Tobin-Q than the overall average of 0.9838. Again this result shows a correction with the result obtained from the variable of Return on Asset. In terms of loan loss provision, we find that on the average, the sampled banks made more loss provision in the year 2013 (-1.214), 2014 (-1.606), and 2015 (-2.064) have higher averages than the overall average of -2.591186. Surprise, we find that loan loss provision from the sampled banks was higher before the economy fell into recession than after the recession period. Another distinct revelation from the descriptive statistics suggests that non-performing loan during the period of the economic crisis in Nigeria (2015 (5.164), 2017 (5.878) and 2018 (6.7889)) rose beyond the sector average of 4.367414. This finding displays the consequences of a recessed economy on the banking sector in Nigeria. In terms of the loan to deposit, only 2016 (2.096) was above the overall average of 0.8955. As expected, three years (2014, 2015 and 2017) had averaged below the overall average. In the year 2013, 2015 and 2018 we observe that the result obtained from the variable of equity to asset (14.654), (14.928) and (14.89) were all lower than the sector average of 14.99 while on the average, the sampled banks wrote off loans (bad debt) worth more than the sector average of 1.67 in the year 2017 (1.73) and in the year 2018 (4.49).

In terms of the sampled banks, GTB, Zenith Bank, Stanbic IBTC and Access Bank have above the overall average return on asset. In the

same vein, GTB, Stanbic IBTC and Zenith Bank possess average Tobin Q which is above the overall Tobin-Q value of 0.9838. Five banks have averages above the overall average loan loss provision which include: Access bank (-1.2667), Fidelity Bank (-1.285), GTB (-1.1317), Sterling Bank (-1.7333) and UBA (-1.117).

Only First Bank (12.6966), Stanbic IBTC (5.822) and Union Bank (7.466) have above the overall average in the non-performing loan variable. Surprisingly, on UBA (2.7) has above average in the overall loan to deposit an average of 0.8955. As in the case of loan loss provision, the averages of five (5) banks were above the overall average in the equity to asset variable. These are Fidelity Bank (15.21), First City Monument (14.61167), GTB (16.41833), Union Bank (21.57667) and Zenith Bank (16.623). The overall bank loan written off the average of 1.6667 was below just two (2) banks. These were First Bank (7.449) and Access Bank (1.994).

The above analysis showed how individual banks fared in terms of averages. It gives an insight into the performance of the individual banks under question.

Pearson correlation statistics: Autocorrelation implies the existence of a linear relationship between two or more explanatory variables. Autocorrelation makes it difficult to differentiate the individual effects of the explanatory variables hence, the regression estimators may be biased in that they tend to have large variances [50].

Furthermore, if there is a perfect linear relationship among the explanatory variables, the estimates for a regression model cannot be uniquely computed. The possible existence of autocorrelation is tested based on the correlation matrix incorporating all the variables of interest. Pearson correlation matrices in Table 2 show that the correlation coefficients among the variables are less than 0.8, which is the limit or cut off correlation percentage commonly suggested by prior studies after which the consequences of autocorrelation is likely to be present [46].

The correlation matrix result suggests that there is no multicollinearity among the independent variables of interest. The possible existence of multicollinearity is further tested by computing for the variance inflation factor (VIF) seen in Table 3. According to Gujarati (2004), there is no consequence of multicollinearity if the mean VIF is less than 10.

Table 3 presents the mean-variance inflation factor (VIF) result of the explanatory variables. The table shows that the mean VIF is 1.33. Therefore, the results from the Variance Inflation Factor test indicate that there is no unacceptable level of multicollinearity among the independent variables of interest further confirming that there is no presence of multicollinearity.

4.3 Data Normality Test

In statistics, normality tests are used to determine if a data set is well-modelled by a

Table 2. Correlation matrix

Return_on~t	1.0000						
Tobin~q	0.7221	1.0000					
Loan_loss_~n	0.1862	0.05122	1.0000				
Non_perfon~n	-0.2670	-0.0948	-0.5122	1.0000			
Loantodepo~t	-0.0045	-0.0757	0.0375	-0.0865	1.0000		
Equity_to~t	0.2918	0.0376	-0.0033	0.0919	-0.0664	1.0000	
Percentage~f	-0.1867	-0.1281	-0.2127	0.5216	-0.0138	-0.0312	1.0000

Source: Author computation 2019

Table 3. Test results for Multicollinearity (VIF)

Variable	VIF	1/VIF
Non_perfon~n	1.83	0.545054
Percentage~f	1.40	0.716274
Loan_loss_~t	1.37	0.730995
Equity_to~t	1.02	0.976586
Loantodepo~t	1.01	0.988036
Mean VIF	1.33	

Source: Author computation 2019

normal distribution and to compute how likely it is for a random variable underlying the data set to be normally distributed. Here, the rule of thumb states that if the probability value of the variable/s of interest is significant at 1% or 5% then the variable is normally distributed otherwise not. However, the result of skewness and kurtosis test for normality seen in Table 4 shows that all the variables of interest are normally distributed since the variables all pass at 1% or 5% level.

Table 4. Data normality test results

Variable	Obs	Pr(skewness)	Pr(kurtosis)	Adj chi2(2)	Joint >prob chi2
Return_on~t	60	0.0116	0.7727	6.05	0.0485
Tobin~q	60	0.0000	0.0001	30.41	0.0000
Loan_loss_~n	59	0.0000	0.0000	39.45	0.0000
Non_perfon~n	58	0.0000	0.0000	43.85	0.0000
Loantodepo~t	60	0.0000	0.0000		0.0000
Equity_to~t	60	0.0083	0.1702	7.81	0.0202
Percentage_f	60	0.0000	0.0000		0.0000

Author Computation 2019

```
TEST FOR HETEROSKEDASTICITY

. estat hettest

Breusch-Pagan / Cook-Weisberg test for heteroskedasticity
        Ho: Constant variance
        Variables: fitted values of return_on_asset

        chi2(1)      =      5.88
        Prob > chi2  =    0.0153
```

The value of the Breusch-Pagan / Cook-Weisberg test for heteroskedasticity showed that there is no heteroskedasticity in the dataset and thus can be used for inferences.

Table 5. Summary of return on ASSET and TOBIN Q model (Fixed and random effect)

	(1) ROA (FE)	(2) ROA (RE)	(3) Tobin (FE)	(4) Tobin (RE)
Loan_loss_~n	0.112	0.111	0.235*	0.213*
	(0.123)	(0.105)	(0.036)	(0.046
Non_perfor~n	-0.214*	-0.218*8	-0.106	-0.104
	(0.018)	(0.0009)	(0.429)	(0.420)
Loantodepo~t	-0.049	-0.046	-0.065	-0.064
	(0.393)	(0.398)	(0.456)	(0.452)
Equity_to_~t	0.521***	0.496***	0.158	0.117
	(0.000)	(0.000)	(0.423)	(0.482)
Percentage~f	0.025	0.026	0.042	0.034
	(0.701)	(0.679)	(0.672)	(0.731)
N	58	58	58	58
R-sq	0.454		0.199	
Adj. Rsq	0.277		-0.061	
Hausman	0.998		0.704	

Standardized beta coefficient: p-values in percentages
*<0.05, ** p<0.01, *** p<0.001
loan_loss_t = Loan Loss Provision, non_perfor_n = Non Performing Loan, loantodep_t = Loan to deposit Ratio,
equity_to_t = Equity to Deposit Ratio, Percentage_ t = Bad Loan Written Off

4.4 Regression Results

In testing for the cause-effect relationship between the dependent and independent variables, the two widely used panel data regression estimation techniques (fixed effect and random effect) were adopted. Table 4 presents the two-panel data estimation techniques results. The results revealed differences in the magnitude of the coefficients, signs and several insignificant variables. The estimation of the fixed effect panel regression was based on the assumption of no correlation between the error term and explanatory variables, while that of the random effect, considers that the error term and explanatory variables are correlated. In selecting from the two-panel regression estimation results, the Hausman test was conducted. The results of these tests can be seen in the summary Table 5 The test is based on the null hypotheses that the fixed effect model is preferred to the random effect model. A look at the p-values of the Hausman test result implies that we should accept the null hypothesis. This implies that we should adopt the random effect panel regression results in drawing our conclusion and recommendations. This also implies that the random effect results tend to be more appealing statistically when compared to the fixed effect. Table 5 shows both the fixed effect and random effect results, though our analysis will focus on the random effect result.

4.5 Summary of Regression Result

From the analysis, the independent variable of Loan Loss Provision was revealed to be positive and statistically significant against the dependent variable of Tobin q model. This follows the coefficient value of 0.213 and P-value of 0.046. We find that it was statistically significant at 5% level. This value did not conform to apriori expectation. However, the analysis showed that loan loss provision has no significant relationship with return on asset.

From the regression summary Table 5, we find that the variable of non-performing loan is consistent with apriori expectation. It shows a significant negative impact with performance variable of return on asset. This corresponds to a coefficient value of -0.218 and P-value of 0.009.This outcome suggests that as non-performing loans accumulate; firm performance in terms of return on an asset will decline.Since the variable conforms to apriori expectation,we

reject the null hypothesis of *no significant relationship between non-performing loan and profitability among commercial banks in Nigeria.* However, this variable of the non-performing loan was found to be insignificantly related to the market value of the firm proxy with Tobin (Coef = -0.104 and P-value = 0.420).

Furthermore, the analysis reveals that the ratio of loan to deposit has no statistically significant relationship with the profitability of the sampled banks in Nigeria in both ROA (coef of -0.046 and a P-value of 0.398) and Tobin Q model (coef of -0.064 and a P-value of 0.452). O*n this ground, we reject the alternative hypothesis of a significant relationship between loan to deposit ratio and firm profitability.*

Following the empirical evidence for the relationship between Asset to Equity ratio and bank performance as revealed from the regression table, we observed that the performance variable of return on asset is positive and significantly related to Asset to Equity ratio (debt financing), due to the coefficient value of 0.496 and P-value of 0.000. This conforms to apriori expectation. However, we observed an insignificant relationship with market value as a proxy by Tobin Q.

The outcome of our analysis shows that the amount of bad loan proxy as (loan is written off) has no statistically significant relationship with the profitability of banks in Nigeria in Nigeria in both ROA (coef of 0.026 and a P-value of 0.679) and Tobin Q model (coef of 0.034 and a P-value of 0.731). *Following the outcome of this result, we reject the alternative hypothesis of a significant relationship between loan written off and firm profitability.*

5. DISCUSSION OF RESULTS

The nature of the result obtained from the relationship between the non-performing loan and bank performance can be traced to the banks' lending policy which could have a crucial influence on non-performing loans. Default is not entirely an irrational decision. Rather a defaulter takes into account probabilistic assessment of various costs and benefits of his decision. Lazy banking' critically reflects on banks' investment portfolio and lending policy [51,52,53]. Furthermore, this result may be attributed to the lack of effective monitoring and supervision on the part of banks, lack of effective lenders' recourse, weaknesses of legal infrastructure, and

lack of effective debt recovery strategies Adhikary, [54]. Our finding is consistent with that of Lydnon et al. [32] Onaolapo [39] Ugoani [33] who reported the same finding from a Nigerian experience. We also find the same result with Boland (2012) Shafiq and Nasr [42] Chege and Bichanga [36].

Following the findings obtained from the relationship between loan written off and firm performance, it is likely that serious bad loan issue led to management becoming very stringent regarding their lending attitude which is evident from the underutilization of customers' deposit. To write off the bad loan problem in their portfolios, the banks may use their unrealized gains on their stock market holdings for capital but adhering to the warning of progressively maintaining its capital adequacy which reduces credit risk assets, an example of which would be the lending.

Both loans and deposit are equally important in the banking operation like two sides of the same coin. Here a low ratio can result to lower productivity which our result represents. Our study result may have taken this shape because most of the sampled banks have poorly and perhaps underutilized customers deposit in terms of disbursing loan facilities. However, the fear seems to be laid in high liquidity risk avoidance. Our finding is seen to be incompatible with previous findings of Ramanathan, [55].

The positive relationship between debt financing and firm performance revealed that financial managers of the sampled banks depend on debt as financing source more than owner equity). The financial manager prefers debt source more than equity refers to two reasons: the cost of debt is less than equity cost and the tax advantage of debt, which would, therefore, maximize the firm performance. Hence we can carefully say here that quoted banks in Nigeria take advantage of non-debt tax shield to improve its performance. This finding further suggests that debt structures are a very important factor to consider in the management of credit risk. Our finding lends credence to the findings of Sayeed [56], Soumadi and Hayajneh [57], Arbabiyan and Safari [58], Berger and Bonaccorsi di Patti [59]. We also note that the results obtained from this study, like other studies; show that proper debt structure leads to the increased performance and increases the organization's ability in the competitive environment as well. Thus it can be concluded from the theory that high leverage or low equity/asset ratio reduce agency cost of outside equity and thus boost up firms performance by compelling managers to act more in the interest of shareholders.

6. SUMMARY, CONCLUSION AND RECOMMENDATION

The objective of the study was to establish the effect of credit management on firm performance among deposit banks in Nigeria. The findings from the random effect models established that in both models of Return on Asset and Tobin-Q, non-performing loan, loan loss provision and equity to asset impact significantly on banks' performance, while loans are written off and loan to deposit have no significant impact on banks' performance.

This result reveals that the Non-Performing Loan ratio has a positive effect on profitability. This means that the selected banks need to establish efficient arrangements to deal with credit risk management.

Based on findings from the empirical analysis, have necessitated the following;

- Nigerian commercial banks should take into consideration, the indicators of credit risk such as Non-performing loans, provision for loss that were found significant in determining credit risk management.
- Banks need to establish a suitable credit risk environment; operating under a sound credit granting process
- Bank management needs to place and devise strategies that will not only limit the bank's exposure to credit risk but will develop the performance and competitiveness of the banks.
- The central bank of Nigeria is the regulator of the banking sector should consider reporting on ratios because reporting of mere increases in these variables could be misleading.
- Management of commercial banks should mitigate against Moral hazard and adverse selection risks when advancing loans

COMPETING INTERESTS

Authors have declared that no competing interests exist.

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Appendix 1

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DESCRIPTIVE STATISTICS by(year)


tabstat return_on_asset tobin_q loan_loss_provision non_performing_loan_to_loan
loantodeposit equity_to_asset percentage_bank_loan_written_off,
statistics( mean median max min sd cv semean
> sum )

Summary statistics: mean, p50, max, min, sd, cv, se(mean), sum
  by categories of: year (Year)

    year | return~t   tobin_q   loan_l~n   non_pe~n   loanto~t   equity~t   percen~f
---------+----------------------------------------------------------------------------
    2012 |    2.427      .999     -1.214      3.396       .532     14.654   1.163772
         |     2.18      .985       -.93      2.615         .5     14.175   .8051601
         |        5      1.21        .13      11.19        .82      21.47       3.49
         |      .71        .9      -3.55       1.41        .32       8.74          0
         | 1.401159  .0936246   1.072238   2.923568   .1458919   4.031997   1.181674
         | .5773212  .0937183   -.883227   .8608857   .2742329   .2751465   1.015382
         | .4430853  .0296067   .3390713   .9245133   .0461351    1.27503    .373678
         |    24.27      9.99     -12.14      33.96       5.32     146.54   11.63772
---------+----------------------------------------------------------------------------
    2013 |    2.083     1.051     -1.606      2.574       .611     14.242   1.301005
         |     1.79      .995      -1.27       2.35       .595      14.21   .7841896
         |     4.28      1.45       -.29       6.36        .89      19.88   3.537846
         |      .61       .91      -5.26       1.11        .43        8.9   .0000587
         | 1.219408  .1641443   1.405333   1.624419    .131947   3.520915   1.214008
         | .5854097  .1561791  -.8750515   .6310875   .2159525   .2472205   .9331308
         | .3856108   .051907   .4444052   .5136865   .0417253   1.113411    .383903
         |    20.83     10.51     -16.06      25.74       6.11     142.42   13.01005
---------+----------------------------------------------------------------------------
    2014 |    2.269     1.013     -2.064   2.454444       .701     13.875   .6328212
         |     1.98       .95      -1.12       2.27        .71     13.445   .5950869
         |     4.19      1.45        -.3       5.41        .84      22.02   1.586706
         |     1.09       .89     -11.18        .58        .49       9.61          0
         | .9691514   .170036   3.236601   1.387868   .103328    3.463894   .5258966
         | .4271271  .1678539   -1.56812    .565451   .1474008     .24965   .8310351
         | .3064726  .0537701   1.023503   .4626227   .0326752   1.095379   .1663031
         |    22.69     10.13     -20.64      22.09       7.01     138.75   6.328212
---------+----------------------------------------------------------------------------
    2015 |    1.782      .939     -3.601      5.164       .696     14.928   .6902938
         |     1.67      .915     -1.725      3.285       .695     14.095   .2818157
         |     3.94      1.04       -.49      18.61        .85       23.3   2.997366
         |      .36       .88     -17.56        .65         .5      11.95   .0254351
         | 1.102833  .0589632   5.219686   5.221199   .1266842   3.215175   1.042968
         | .6188736  .0627937   -1.44951   1.011076   .1820175   .2153788   1.510905
         | .3487463  .0186458    1.65061   1.651088   .0400611   1.016728   .3298156
         |    17.82      9.39     -36.01      51.64       6.96     149.28   6.902938
---------+----------------------------------------------------------------------------
```

2016	1.798	.929	-3.739	5.878	2.096	14.405	1.725862
	1.64	.92	-2.885	3.46	.8	13.82	1.536219
	4.24	1.06	-1.21	27.39	13.8	21.69	3.742787
	.36	.86	-10.85	1.45	.57	10.27	.0041863
	1.203013	.0631488	2.990256	7.781806	4.114101	3.060419	1.306435
	.6690839	.0679751	-.7997476	1.323887	1.962834	.2124553	.7569753
	.3804261	.0199694	.9456021	2.460823	1.300993	.9677893	.413131
	17.98	9.29	-37.39	58.78	20.96	144.05	17.25862
2017	2.006	.972	-3.404444	6.788889	.737	14.89	4.486622
	1.44	.94	-2.05	4.04	.67	14.02	.8881634
	5.09	1.17	-.84	24.53	.99	23.75	35.08658
	.79	.85	-7.52	1.73	.49	9.6	0
	1.449844	.110534	2.437715	7.058131	.1707532	3.863642	10.83624
	.722754	.1137181	-.7160389	1.039659	.2316869	.259479	2.415233
	.4584811	.0349539	.8125715	2.35271	.0539969	1.221791	3.426719
	20.06	9.72	-30.64	61.1	7.37	148.9	44.86622
Total	2.060833	.9838333	-2.591186	4.367414	.8955	14.499	1.666729
	1.9	.95	-1.54	3.06	.675	14.085	.7379346
	5.09	1.45	.13	27.39	13.8	23.75	35.08658
	.36	.85	-17.56	.58	.32	8.74	0
	1.20502	.1211679	3.09727	5.063541	1.701215	3.409371	4.535981
	.5847244	.123159	-1.195309	1.159391	1.899738	.2351453	2.721486
	.1555674	.0156427	.4032302	.6648756	.219626	.4401479	.5855926
	123.65	59.03	-152.88	253.31	53.73	869.94	100.0038

Appendix 2

Guaranty Trust B	4.456667	1.138333	-1.131667	4.121667	.7533333	16.41833	.0087832
	4.26	1.155	-.7	3.405	.745	16.185	.0074348
	5.09	1.21	-.09	8.02	.85	18.31	.0254351
	3.94	1.04	-4.11	3.04	.68	15.56	0
	.4717062	.0730525	1.491944	1.930144	.0691858	.9700598	.0094542
	.1058428	.064175	-1.31836	.4682922	.0918395	.0590839	1.076396
	.1925732	.0298236	.6090836	.7879782	.028245	.3960252	.0038596
	26.74	6.83	-6.79	24.73	4.52	98.51	.052699
Stanbic Ibtc Hol	2.703333	1.193333	-5.593333	5.822	.6916667	13.28167	.2674232
	2.915	1.105	-3.88	5.29	.69	13.36	.2397506
	3.49	1.45	-.63	8.52	.89	14.17	.6261181
	1.5	1.01	-17.56	3.18	.49	12.31	.0032494
	.7990912	.2063654	6.401208	2.219903	.1596767	.6750827	.2848131
	.2955948	.1729319	-1.144435	.3812957	.2308579	.0508282	1.065028
	.3262276	.0842483	2.613282	.9927709	.0651878	.2756014	.1162745
	16.22	7.16	-33.56	29.11	4.15	79.69	1.604539
Sterling Bank	1.061667	.9483333	-1.733333	2.745	.6916667	10.11333	.9137111
	1.185	.95	-2.025	2.58	.71	10.06	.5618402
	1.3	.98	.13	4.51	.87	11.95	3.169942
	.62	.92	-2.5	1.32	.49	8.74	.0503996
	.2919874	.0213698	.9711574	1.241076	.1411973	1.062199	1.135002
	.2750274	.022534	-.5602831	.4521225	.2041406	.1050296	1.242189
	.1192034	.0087242	.3964733	.5066672	.0576435	.4336409	.4633627
	6.37	5.69	-10.4	16.47	4.15	60.68	5.482266
Union Bank Of Ni	1.251667	.895	-2.744	7.466	.5733333	21.57667	1.406284
	1.115	.89	-2.71	7.07	.615	21.855	1.186329
	2.63	.96	-.94	11.19	.77	23.75	3.742787
	.61	.85	-5.26	5.41	.32	18.82	0
	.731421	.0408656	1.681675	2.208105	.155392	1.917318	1.434683
	.5843577	.0456599	-.6128553	.2957548	.2710325	.0888607	1.020194
	.2986014	.0166833	.7520679	.9874947	.0634385	.7827417	.5857069
	7.51	5.37	-13.72	37.33	3.44	129.46	8.437704
United Bank For	2.02	.955	-1.116667	1.461667	2.7	10.94	1.33838
	1.995	.955	-1.04	1.55	.495	10.845	1.153287
	2.47	1	-.3	2.04	13.8	13.01	4.107039
	1.73	.92	-1.99	.65	.38	8.9	.1258228
	.2779928	.0320936	.7214338	.4786822	5.438371	1.886457	1.463729
	.1376202	.0336059	-.6460601	.3274907	2.014212	.1724367	1.093657
	.1134901	.0131022	.2945241	.1954212	2.220206	.7701429	.5975648
	12.12	5.73	-6.7	8.77	16.2	65.64	8.030278

Zenith Bank	3.255	1.01	-3.31	2.095	.65	16.62333	1.213526
	2.96	1.005	-1.165	1.86	.645	14.845	1.321051
	4.7	1.07	-.79	4.04	.78	21.47	1.852097
	2.64	.95	-11.18	.58	.51	14.68	.0660834
	.8045308	.0517687	4.132583	1.306105	.1126055	2.958085	.6282824
	.2471677	.0512562	-1.248514	.6234391	.1732392	.1779478	.5177329
	.3284483	.0211345	1.68712	.5332151	.045971	1.207633	.2564952
	19.53	6.06	-19.86	12.57	3.9	99.74	7.281156
Total	2.060833	.9838333	-2.591186	4.367414	.8955	14.499	1.666729
	1.9	.95	-1.54	3.06	.675	14.085	.7379346
	5.09	1.45	.13	27.39	13.8	23.75	35.08658
	.36	.85	-17.56	.58	.32	8.74	0
	1.20502	.1211679	3.09727	5.063541	1.701215	3.409371	4.535981
	.5847244	.123159	-1.195309	1.159391	1.899738	.2351453	2.721486
	.1555674	.0156427	.4032302	.6648756	.219626	.4401479	.5855926
	123.65	59.03	-152.88	253.31	53.73	869.94	100.0038

CORRELATION MATRIX

correlate return_on_asset tobin_q loan_loss_provision non_performing_loan_to_loan
loantodeposit equity_to_asset percentage_bank_loan_written_off
(obs=58)

	return~t	tobin_q	loan_l~n	non_pe~n	loanto~t	equity~t	percen~f
return_on_~t	1.0000						
tobin_q	0.7221	1.0000					
loan_loss_~n	0.1862	0.0580	1.0000				
non_perfor~n	-0.2670	-0.0948	-0.5122	1.0000			
loantodepo~t	-0.0043	-0.0757	0.0375	-0.0865	1.0000		
equity_to_~t	0.2918	0.0376	-0.0033	0.0919	-0.0664	1.0000	
percentage~f	-0.1867	-0.1281	-0.2127	0.5216	-0.0138	-0.0312	1.0000