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**Article**

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# The Impact of Credit Risk on Bank Profitability in Nigeria

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## ABSTRACT

This study examines the impact credit risk management has on the profitability of commercial banks in Nigeria. The main objective of this material is to show how credit risk parameters are related to the expected performance of commercial banks in Nigeria. Using the regression analysis, relationship was drawn between credit risk parameters (which include capital adequacy ratio and non-performing loan ratio) and the profitability ratio (return on average asset, in particular) of five big Nigerian banks. Mixed research methodology was adopted in that primary data were sourced via questionnaires and secondary data were used via annual report of selected banks. Regression analysis was used to analyse the data. The conclusion drawn from the data analysis shows that there is a strong relationship between credit risk parameters and returns of the bank implying that credit risk management has a strong impact on the profitability of commercial banks in Nigeria. The study recommends that banks' capital should be matched with their total risk exposure and if there is an imbalance, new capital requirements are necessary. Insider-related interests in loan applications should be closely monitored by the regulators to ensure continuous performance of the loan facility. Also, there should be an extant profiling of loan defaulters whether individuals or corporate entities.

*JEL Classification*: G21, G28, G32, C23

*Keywords*: Credit risk, Management, GRETL, Commercial Banks, Nigeria.

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## 1. INTRODUCTION

Banks play a significant role in all the economic and financial activities in modern society. One of the core activities of the banking industry worldwide and, in particular, Nigeria, is the granting of credit to deserving and deficit units of the economy. It is no more news that the financial crisis between 2008 and 2010 emanated from improper risk management. These show the effect financial institutions can have on the national economy as well as the global economy. As a result, this spurred diverse research into maintaining healthier portfolio mixes and how to assess, measure, monitor, and mitigate the effects of the inherent risks. Between 2014 and date, bank-wide non-performing loans (NPL) have risen by over ₦ 6.5 Trillion. With this inherent risk of default, banks need to revise their risk management processes continually; this will help them determine their risk appetite and risk management methods.

This research will influence risk practices, including rates charged to specific customers and varieties of collaterals required from customers in individual segments, aside from other intelligent risk management decisions. Collateral realization is not a holistic solution to mitigating the effects of bad loans as there are collaterals that take a very long time to realize even when they hav thrown into the market at forced-sale value. Securities like legal mortgage have been exempted by Basel 2 as collateral, given that its realization success is shallow. Aside from issues around litigation, which can potentially delay the realization, mortgages sell at huge sums, which only a handful of the populace can afford at a go (without taking a structured facility). Also, the location of the property will determine how soon or long it will take to sell. Using the time to realization to discount the value of the property to the present value hence further drops the value of the collateral realized. Most prominent audit firms (most notably the *Big Fours*) in Nigeria presently set the haircut for mortgage security at 50% or more, to calculate the impairment on a loan exposure.

It is interesting to know that the financial crisis of 2008, which had a ripple effect for years all around the economies of the world, was triggered by uncollateralized mortgage loans (even when the mortgage properties should have served as collateral for these facilities). Hence the Basel convention derecognizes mortgage as suitable collateral for loans while measuring the capital adequacy ratio of a financial institution.

Like many other countries, Nigeria was affected by the global financial crises, most evident is a slowdown in credit in the real economy. As a result, it hurt the banking system, resulting in reform in the banking sector. It resulted in the dismissal of five managing directors of some commercial banks by the Central Bank of Nigeria. The reason for the action taken stipulated by the Central Bank Governor was the excessively high level of the non- performing loans, lax credit administration process, and non-adherence to the bank's credit risk management practice. (CBN report 2006). There is a need for banks and financial institutions to investigate how credit risk is managed while creating a robust system in the banks which would be responsible for managing such risk. Primarily, this work aims to enlighten risk managers and members of Board Risk Committees and other stakeholders in the business of lending in Nigeria and neighbouring countries. Neighbouring countries that might share the same, or somewhat same macroeconomic conditions as Nigeria should be aware that credit risk management does impact the level of profit the commercial banks make and how much impact this could be. It also enlightens the general public on some risk management practices in commercial banks and guides them in analysing credit applications' acts and perspectives.

There is a deep gap in the credit risk management space, which has been gradually filled by scholars who have written about different blurry sides of credit and on-lending. However, there are many more materials with foreign accents than local articles that address the peculiarity of the West African climes, especially the Nigerian market. Hence, there is a need to provide a reference


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document for oncoming and prospective researchers to draw from, add, and build on. This study will increase the availability of literature in the field of risk management, especially credit risk management in the Nigerian banks and other related business associates that involve risk in the businesses' day-to-day running. The result of this study should provide some consciousness and awareness to the commercial banks' risk management department on the severity of the business of lending and how it could impede the growth and profitability of financial institutions in Nigeria and likely its immediate environment.

## 2. LITERATURE REVIEW

This section explores the literature review based on the variables under study. The literature composes of two parts – theoretical and empirical literature review. These two sections will examine various aspects of risk management and how they are related to the profitability of banks around the world. Immediately after this is a literature gap section and a dashboard of the conceptual framework for this study. The CBN publishes – in its annual Financial Stability Report – the aggregate NPL bank-wide across Nigeria. This report shows the trend of NPL across banks on an annual basis. This bit of information is important to economists, governments, foreign investors, and other stakeholders. It measures different economic metrics in Nigerian Space and gives suggestions and insights about the Nigerian market. How is the quality of a loan measured? According to the International Monetary Fund (2004), loans are classified into five stages, depending on their performance as follows:

- **Performing**: Loans that are not past due more than 30 days. That is, the obligor has not missed a payment for more than 30 days.
- **Watch list**: Facilities are past due for more than 30 days, but less than 90 days fall into the watch list.
- **Substandard**: Credit facilities that are past due for more than 90 days, but less than 180 days, are said to be substandard.
- **Doubtful**: Facilities are past due for more than 180 days, but less than 270 days are said to be doubtful.
- **Lost**: Credit exposures that are past due more than 270 days are said to be lost.

It is worthy of note though that under the IFRS 9 framework, which came into full implementation in Nigeria and many foreign countries and took its full effect from January 2018, credit exposures are classified into three categories:

- **Stage 1 Facilities**: Facilities that are performing and have no significant increase in credit risk. Stage One also includes facilities in their initial recognition stage.
- **Stage 2 Facilities**: These are facilities that have a significant increase in credit risk. These facilities might not have defaulted, but there are already reasons to be concerned about them. Business events around these facilities suggest that there might be a default in the future.
- **Stage 3 Facilities**: These are facilities that are impaired. They have now missed repayments either of principal or interest.

How does the credit risk management of banks affect the non-performance of these facilities? It is evident from all indications that the actions and inactions of credit managers will significantly affect the performance of banks as the asset quality the bank carries and this will, in turn, determine the kind of investors the bank attracts, its cost of funds, its cost of risks, provisioning, and other direct and indirect performance factors of the bank.



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### 2.1. Conceptual Review

Credit exposure is any obligation in which the bank parts with money (or is liable to part with money) to a customer to receive it **later**, either as a lump sum or in instalments at a specified time(s). Not all credit exposures are on-balance sheet exposures, and some credit contracts might be an off-balance sheet. An on-balance sheet exposure is one in which the bank parts with cash, which is recognized in the bank's balance sheet. Examples are loans, drawn portions of overdrafts, drawn portion of credit cards. For off-balance sheet exposures, the bank does not exchange cash at the instant, but the bank is liable to exposure in the case of a default or future occurrences. Examples are the undrawn portion of an overdraft, undrawn portion of a credit card, a bank guarantee, performance bonds, letter of credit and bill of collection.

Under the IAS 39 reporting, off-balance sheet exposures were irrelevant in the measurement of a bank loan provision. However, under the IFRS 9 reporting (enforced by the CBN on all Banks starting January 2018), off-balance sheet exposures would also be measured and assessed for the computation of loan impairment. All off-balance sheet exposures would now have to be converted to on-balance sheet exposures using predictive credit conversion factors (CCF). Banks' profitability took a further hit from this new reporting method as banks had to make more provision for expected loan loss. Every bank is exposed to credit risk because it accepts deposits and grants credit facilities to the deficit units. Of all risks that banks are prone to, credit risk is arguably the top one, and the bank's success depends mostly on how it can assess, measure, and manage this risk in its business activities (Giesecke, 2004). The credit risk management strategies are measures employed by banks to avoid or minimize the adverse effect of credit risk. An apt approach to managing credit risk and forging its framework is crucial for banks to guarantee her survival and ensure her profitability.

### 2.2. Theoretical Framework

As discussed above, credit risk is one of the most frequent and most menacing of the risks faced by commercial banks. Credit risk is described as the possibility that an obligor will fail to meet its obligations (principal, interests, and commissions), on time, or in tandem with the contractual agreement. Banks are losing many of their returns to provisioning for impaired loans, which is the crux of why banks are prudent in their lending. The bigger banks will instead lend to the least risky obligors; even when it seems they are less profitable in the short run, as their interest income will be lower, this has turned out to be more profitable in the long run.

To put this study into proper context, we examine two relevant theories:

#### *Segmentation Theory*

This theory states that there is a relationship between instruments with similar rates and tenors. It explains further that financial instruments with similar interest rates and tenors tend to behave in the same way and are mostly affected by the same conditions and are accessed by somewhat the same market. For instance, long term, substantial value facilities are mostly accessed by manufacturing companies while the medium term, small value loans, are accessed by retail customers, mostly salary earners. Furthermore, the above classification helps categorize the bank's portfolio into homogenous groups, collectively assessed under umbrella conditions.

#### *The Financial Economic Theory*

Financial economics methodology to managing risk is borne out of the Modigliani-Miller paradigm and is arguably the most proficient method in terms of theoretical model extensions and empirical research (Klimczak, 2007). The financial-economic theory stipulates that hedging leads


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to lower cash flow volatility and ipso facto, **lower firm value volatility**. The theory argues that the climax of hedging is earning the firm a premium – a better value other than the norm (Jin and Jorion, 2006).

### 2.3. Empirical Framework

This subsection examines works and articles of scholars and students all around the world who have done related researches to the subject of this study. As it is known that knowledge is not isolated, this study is not in isolation of ideas. Around East Africa and other parts of the world, many students and researchers have done diggings and drillings that have suggested that the profitability of commercial banks is dependent on the depth of the credit risk management (CRM) of the banks. Tekalagn, Lu & Md. Shafiqul (2015), strived to derive a relationship between the CRM parameters and profitability of financial institutions in Ethiopia. They found that there is a negative relationship between the capital adequacy ratio (CAR) and the ROA of the banks in Ethiopia, hence suggesting that the more the capital held to mitigate, the less profitable the banks is. They used the method of regression analysis to the CAR on the NPL, ROA, and ROE of banks in Ethiopia. In the study by Serwadda (2018), the objective was to determine if credit factors were significant in determining the performance of banks in Uganda and to determine the level of significance. He utilised panel regression model as the sole econometric method and found that credit risk factors such as non-performing loans (NPLs) and loss provisioning are crucial in determining the profitability of Ugandan banks. Raad (2015), in his article wished to scrutinize how CRM practices could impact on banks profitability and sustainability. Using a regression of ROA to NPL ratio, loss ratio and CAR, he found that banks make a lot of profits from credits and hence should practice good CRM. He however added that the main challenges of CRM were the additional cost of training, deployment of technology and employee motivation. In their article on banks in Sri Lanka, Perera and Morawakage (2016) sought to investigate the effect of credit risk management on shareholder value in listed commercial banks in Sri-Lanka. Relying on OLS regression models, findings shows that credit risk management has a significant effect on shareholder value in the selected eight banks. The above authors highlighted that NPLR (non-performing loan ratio) has the most significant effect on the return on shares buttressed further by the 26.7% predicting ability of NPLR of return on shares.

## 3. METHODOLOGY

### 3.1. Research Design

The design of this study chosen is mixed-method research design. Drawing from the mix of qualitative and quantitative approaches inherent in the mixed-method research design, the researcher adopts the primary and secondary data. Primary data is sourced from questionnaires and secondary data from the five banks' financial statements published in their Annual Investor Relations Publications and audited financial statements. These publications are accessible to the general public, investors, auditors, creditors, regulators, and all interested persons devoid of barriers.

### 3.2. Sample Size and Sampling Techniques

The simple random sampling technique was employed for the primary data analysis. The essence of this is to ensure that every respondent is given equal representation in the exercise. Furthermore, it means that every worker has an equal chance of being selected, and no person will


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be omitted deliberately. For the secondary data, different variables of five banks in Nigeria were sourced consistently for seven consecutive years to monitor both trends and eliminate spikes and anomalies that may have occurred in the data during the period under review. The sample was chosen consists of four Tier 1 banks and one Tier 2 bank. The data span the years 2012 to 2018 for all five banks, which are First Bank of Nigeria (FBN), Zenith Bank PLC, Guaranty Trust Bank (GTB), United Bank for Africa (UBA) and First City Monument Bank (FCMB) – FCMB being the only tier 2 bank. These banks put together control about 60 percent of bank credits in Nigeria.

### 3.3. Data Sources and Instrument

The data sources for this research include the primary and secondary data. The primary data entails responses directly sourced from respondents, mostly bankers and other credit risk analysts, through a questionnaire that was drawn and tested for validity. The sample space for the primary data is bankers and risk managers across Guarantee Trust Bank, Zenith Bank, UBA, FBN, and FCMB. The above decision gives a more rounded database for the data gathered and eliminates biases and enhances versatility.

The secondary data were obtained from published financials of audited data of GTB, Zenith, UBA, FBN, and FCMB for the last seven years. These publications are prepared and published by the banks on their official websites and yearly publications. The secondary data were gathered for years 2012, 2013, 2014, 2015, 2016, 2017, and 2018. It is essential to state that these banks have more than fifty-five percent of the Assets and Liabilities of all the commercial banks in Nigeria as contained in the Central Bank of Nigeria for a half-year, 2019 report.

### 3.4. Techniques of Data Analysis

The data collected by administering questionnaires were analysed using simple pictorial analysis and graphical representations. Descriptive analysis will also be used to summarize and organize the data.

The secondary data were analysed using Panel Regression. The F-statistic test was used to determine which method would be better off between the Pooled OLS model and the fixed-effect model; then, the Hausman test was used to determine which would be better of the Random effect model and fixed effects model. When these tests were concluded, the most consistent method was used to run a panel regression of the data.

### 3.5. Model Specification

The model used to analyse the data upon concluding the various diagnostic tests was the fixed effects model panel regression. This model is adopted as the parameters needed to populate the model fit properly with the financial ratios derived from the secondary data. Hence, we do not need to tweak our variables to fit into the model.

A typical panel regression equation is given as

$$Y_{it} = a_0 + a_1 x_{it} + a_2 Z_i + U_{it} \quad (1)$$

(Where the Zi's are time-invariant heterogeneities across the indices i = 1, 2, …, n and n is he number of observations, ai's are constants, xit's are independent variable observations with respect to time, Uit's are error terms with respect to time and Yit's are dependent variables with respect to time, per observation).



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If we hold Zi's constant, our model becomes:

$$Y_{it} = b_i + a_1 x_{it} + U_{it} \quad (2)$$

(Where $b_i = a_0 + a_2 Z_i$ across observations i = 1, 2, …, n).

The equation (2) above is regarded as a fixed effects model of the panel regression equation (1).

In this study, our independent variables are Non-Performing Loan Ratio and Capital Adequacy Ratio (CAR), and our dependent variable is the Return on Average Asset (RoAA). It is worthy of note that the two independent variables used above are some of the factors with which credit risk management can be measured. They are somewhat reflective of the quality of risk management practiced by the commercial bank.

Hence, our regression equation will be in the form of:

$$RoAA_{it} = e_{it} + a_{it} NPL_{it} + a_{it} CAR_{it} \quad (3)$$

The a priori expectation is that when the regression is run using data from the banks' financial ratios, there will be a strong coefficient of correlation between the return on average asset and the CRM factors highlighted. Also, we expect that the coefficient of NPL should be negative (since higher NPLs should lead to less profitability for the bank) and CAR should be positive (since the higher this value, the better the quality of the risk assets portfolio of the bank and hence the better the bottom-line of the bank).

### 3.6. Limitation of Methodology

Shadish, Cook, and Campbell (2002) argue that correlation does not necessarily suggest causation. They argue that most times, we discover some of the necessary conditions (which they call the *inus* conditions) that must be met for an event to occur and not necessarily the cause. However, we often assume that these are the causes rather than factors that increase the probability of occurrence. Hence the fact that the concepts in this material suggest high correlation might not ultimately suggest a causal effect. It is worthy of note; still, that correlation is one of the most mathematical ways to measure causation.

There is no straight method to calculate the returns earned on risk assets. Using the return on average asset might not be a true representation of the returns on risk assets as we are making a major assumption that the banks have a similar proportion of risk assets to non-risk assets. This assumption may not always be the case, as some banks are more risk-averse than others, and the converse also holds.

## 4. PRESENTATION OF DATA, ANALYSIS AND INTERPRETATION

### 4.1. Socio-Demographic Characteristics of Respondents

The process of collecting the questionnaires from the sample size was simple. The questionnaire was populated on Google Doc. The link was then sent directly to the mails of 78 persons who are staff members of Guaranty Trust Bank, Zenith Bank, First Bank of Nigeria, United Bank for Africa, and First City Monument Bank. Responses were got from 55 respondents showing a response rate of 70.51%.



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### 4.2. Primary Data Analysis

An analysis of respondents' educational qualifications shows that 40% are BSC/HND holders, 56% are MSc/MBA holders, and 4% have doctoral degrees. The attitudes of respondents to issues are discussed in this section. In order to effectively measure the attitudes, the five-point Likert scale was employed. The Personal Opinion section is tabulated below:

**Table 1**
Personal Opinions from Study Participants

| Most failed Nigerian banks failed due to inadequate credit risk management | | |
|---|---|---|
| Views | Responses | Percentage (%) |
| Strongly Agree | 18 | 32.73 |
| Agree | 19 | 34.54 |
| Neutral | 6 | 10.91 |
| Disagree | 6 | 10.91 |
| Strongly Disagree | 6 | 10.91 |
| **Grand Total** | 55 | 100 |
| Poor credit risk management - more than all other factors- has given rise to non-performing loans in Nigeria | | |
| Views | Responses | Percentage (%) |
| Strongly Agree | 19 | 34.55 |
| Agree | 20 | 36.36 |
| Neutral | 5 | 9.09 |
| Disagree | 7 | 12.73 |
| Strongly Disagree | 4 | 7.27 |
| **Grand Total** | 55 | 100 |
| A good bank should carefully do its risk analysis before it approves a credit proposal | | |
| Views | Responses | Percentage (%) |
| Strongly Agree | 34 | 61.82 |
| Agree | 15 | 27.27 |
| Neutral | 1 | 1.82 |
| Disagree | 0 | 0 |
| Strongly Disagree | 5 | 9.09 |
| **Grand Total** | 55 | 100 |


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| Some banks engage in more risk than their capital can bear | | |
|---|---|---|
| Views | Responses | Percentage (%) |
| Strongly Agree | 10 | 18.18 |
| Agree | 27 | 49.09 |
| Neutral | 12 | 21.82 |
| Disagree | 4 | 7.27 |
| Strongly Disagree | 2 | 3.64 |
| **Grand Total** | 55 | 100 |

| If not for regulators, the aggregate non-performing loans across banks in Nigeria would be worse than it is now | | |
|---|---|---|
| View | Responses | Percentage (%) |
| Strongly Agree | 27 | 49.10 |
| Agree | 20 | 36.36 |
| Neutral | 5 | 9.09 |
| Disagree | 0 | 0 |
| Strongly Disagree | 3 | 5.45 |
| **Grand Total** | 55 | 100 |

Personal opinions of bank staff in the selected commercial banks under review answered questions from the research questionnaire administered. The first question in table 1 shows that bank staff, to a great extent, believe that most Nigerian banks failed due to inadequate credit risk management evidenced by a SA – 32.73% and A – 34.54% while others possessed contrary views. The second question in table 1 vis-a-vis the views of selected bank staff reinforces the claim that poor credit risk management remains the principal factor causing the spike in non-performing loans evidenced by SA – 34.55% and A – 36.36%. However, 9.09% of bank staff's responses remained neutral, while 20% of responses by bank staff strongly disagreed that poor credit risk management increases the rate of non-performing loans. The third question in table 1 centred on a thorough risk analysis before credit approval. 89.09% of responses by bank staff depicts a flawless acceptance that banks in utmost carefulness should conduct a thorough risk analysis before approval. The fourth question in table 1 borders on the degree of risk exposures and 67.27% of responses by bank staff. It concurred that banks indeed increases its risk exposure beyond its capital threshold; on the other hand, 21.82% of responses bank staff remained neutral i.e., neither agree nor disagree. The fifth question in table 1 portrayed the importance of the regulators amidst this loan menace affecting banks' health in Nigeria. Bank staff flawlessly agreed that without the regulators' presence and instant wading into the loan menace, NPLs would have grown much worse than it is now. 85.46% of responses by bank staff were in perfect agreement while 9.09% of responses by bank staff remained neutral, and a paltry 5.45% of responses by bank staff strongly disagreed. In addendum to the questionnaire shared amongst the participants contained a question on loan recovery timing and the responses are sorted and a pie chart is effectively employed to present received responses.


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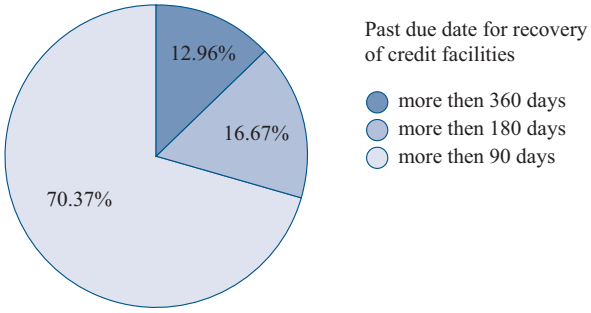
***Principal Question: How many days does a credit facility have to be past due before the respondent's institution begins the recovery process?***

Judging by the responses, it is evident that most banks will commence recovery at 90 days past due that is when the facility is substandard, as seen from the response chart below:

**Figure 1**
A Pie Chart is showing recovery loan timing responses from staff of selected commercial banks




Source: Authors compilation from Field Work, 2019.

## 4.3. Secondary Data Analysis

The secondary data sourced included the Return on Average Asset, Non-Performing Loan Ratio and Capital Adequacy Ratio for the years 2012 to 2018, for the four-tier one banks and one tier-two bank.

The data for seven years is as follows:

**Table 2**
Raw Data of RoAA, NPL and CAR for GTB, Zenith, UBA, FBN and FCMB

| BANK | YEAR | RoAA | NPLR | CAR |
|---|---|---|---|---|
| | | Percentage (%) | | |
| GTB | 2018 | 5.6 | 7.3 | 28.1 |
| | 2017 | 5.2 | 7.7 | 25.7 |
| | 2016 | 4.7 | 3.7 | 19.8 |
| | 2015 | 4.1 | 3.2 | 18.2 |
| | 2014 | 4.2 | **3.1** | 17.5 |
| | 2013 | 4.7 | 3.6 | 21.4 |
| | 2012 | 5.2 | 3.8 | 21.6 |
| ZENITH | 2018 | 3.3 | 5.0 | 25.0 |
| | 2017 | 3.4 | 4.7 | 27.0 |
| | 2016 | 3.0 | 3.0 | 23.0 |
| | 2015 | 2.7 | 2.2 | 21.0 |
| | 2014 | 2.9 | 1.8 | 20.0 |
| | 2013 | 3.3 | 2.9 | 26.0 |
| | 2012 | 4.1 | 3.2 | 31.0 |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| BANK | YEAR | RoAA | NPLR | CAR |
|---|---|---|---|---|
| | | Percentage (%) | | |
| UBA | 2018 | 1.8 | 6.5 | 24.0 |
| | 2017 | 2.1 | 6.7 | 22.0 |
| | 2016 | 2.3 | 3.9 | 20.0 |
| | 2015 | 2.2 | 1.7 | 20.0 |
| | 2014 | 1.8 | 1.6 | 17.0 |
| | 2013 | 1.9 | 1.2 | 20.0 |
| | 2012 | 2.6 | 1.9 | 23.5 |
| FBN | 2018 | 1.1 | 25.5 | 17.3 |
| | 2017 | 0.9 | 22.5 | 17.7 |
| | 2016 | 0.3 | 24.2 | 17.8 |
| | 2015 | 0.1 | 17.8 | 17.1 |
| | 2014 | 2.2 | 2.9 | 16.7 |
| | 2013 | 2.0 | 3.0 | 13.6 |
| | 2012 | 2.5 | 2.6 | 21.5 |
| FCMB | 2018 | 1.1 | 5.9 | 15.8 |
| | 2017 | 0.9 | 4.9 | 16.9 |
| | 2016 | 1.4 | 3.7 | 16.5 |
| | 2015 | 0.5 | 4.2 | 16.9 |
| | 2014 | 1.9 | 3.3 | 18.3 |
| | 2013 | 1.7 | 3.9 | 16.1 |
| | 2012 | 1.7 | 2.5 | 20.4 |

### *4.3.1. Data Analysis and Interpretation*

Before econometric testing of the model presented, there is a need to ascertain the order of integration and stationarity of the series. Westerlund & Breitung (2009) posited that the local power of Levin, Lin, and Chu test is greater than that of Im, Pesaran, and Shin test. The decision on the stationarity of variables of interest depends on the Levin, Lin, and Chu test estimate in the perfect hierarchy to other tests. The entire analysis emanates from the outputs of GRETL (2020 version) and is presented thus.

**Table 3**
Table showing the evidence of stationarity vis-à-vis order of integration

| Variables | Coefficient | T-ratio | p-value | Order of integration |
|---|---|---|---|---|
| ROAA | -1.0733 | -6.587 | 0.0012* | I(0) |
| CAR | -0.83317 | -7.129 | 0.0332* | I(0) |
| NPLR | -1.1552 | -6.198 | 0.0000* | I(1) |

* Denotes significance at 5% level.

Source: Levin, Lin & Chu (2002) test.



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After establishing stationarity, the researcher conducts a pooled OLS test and its adjoining diagnostics to ascertain poolability of panel data in this study as shown below.

**Table 4**
GRETL Pooled OLS Test for NPL, ROAA and CAR

Model 1: Pooled OLS, using 35 observations

Included 5 cross-sectional units

Time-series length = 7

Dependent variable: ROAA

| | Coefficient | Std. Error | t-ratio | p-value |
|---|---|---|---|---|
| const | −1.02641 | 1.17775 | −0.8715 | 0.3900 |
| NPLR | −0.0742955 | 0.0339146 | −2.191 | 0.0359** |
| CAR | 0.199468 | 0.0541743 | 3.682 | 0.0008*** |

| | | | |
|---|---|---|---|
| Mean dependent var | 2.608571 | S.D. dependent var | 1.554381 |
| Sum squared resid | 48.60608 | S.E. of regression | 1.232453 |
| R-squared | 0.408307 | Adjusted R-squared | 0.371326 |
| F(2, 32) | 11.04104 | P-value(F) | 0.000226 |
| Log-likelihood | −55.40986 | Akaike criterion | 116.8197 |
| Schwarz criterion | 121.4858 | Hannan-Quinn | 118.4304 |
| rho | 0.794356 | Durbin-Watson | 0.309256 |

Having run the pooled OLS regression, we can then run the tests to determine which method is best to use. Using the "Panel Diagnostics Test command" on GRETL, the test results are as follows:

Joint significance of differing group means:
F(4, 28) = 64.8169 with p-value 9.52514e-014
(A low p-value counts against the null hypothesis that the pooled OLS model is adequate, in favour of the fixed effects alternative)

Variance estimators:
between = 2.65565
within = 0.169201
theta used for quasi-demeaning = 0.905027

Breusch-Pagan test statistic:
LM = 72.7237 with p-value = prob. (chi-square (1) > 72.7237) = 1.49131e-017
(A low p-value counts against the null hypothesis that the pooled OLS model is adequate, in favour of the random effects alternative).

Hausman test statistic:
H = 0.674825 with p-value = prob. (chi-square (2) > 0.674825) = 0.713614
(A low p-value counts against the null hypothesis that the random effects model is consistent, in favour of the fixed effects model).


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After a thorough observation of the panel diagnostics, inherent interpretations and decisions goes thus;

The computed F-statistic F (4, 28) = 64.81 with a corresponding p-value (9.52514e-014) suggests that the fixed effects alternative is adequate compared to the pooled OLS regression evidenced by a p-value of less than 5%. Hence we select the fixed effect model over the option of pooled OLS model. Furthermore, the Breusch-Pagan test statistic LM = 72.7237 with an associated p-value (1.49131e-017), obviously less than 5%, prompts the decision to reject the null hypothesis and posit that the random-effects is the econometrically suitable alternative.

The reported Hausman test statistic H = 0.674825 with a p-value (0.713614) informs the researcher's decision to adopt the random-effects model over the fixed-effects model GRETL generated p-value below 5% level of significance. Furthermore, evidence gathered from the GRETL diagnostics output prompts the researcher to accept the null hypothesis stating that the random-effects model is consistent.

The overriding decision is to adopt the random-effects model as the best estimator over other options, so we resort to using the random-effects model.

**Table 5**
GRETL Output for the Random Effects Model

Model 1: Random-effects (GLS), using 35 observations

Included 5 cross-sectional units

Time-series length = 7

Dependent variable: ROAA

| Variables | Coefficient | Std. Error | T-ratio | p-value |
|---|---|---|---|---|
| const | 0.843113 | 0.877626 | 0.9607 | 0.3367 |
| NPLR | −0.07587 | 0.01463 | −5.186 | 2.15e-07*** |
| CAR | 0.10833 | 0.02522 | 4.294 | 1.75e-05*** |

| | | | |
|---|---|---|---|
| Mean dependent var | 2.608571 | S.D. dependent var | 1.554381 |
| Sum squared resid | 53.01405 | S.E. of regression | 1.267472 |
| Log-likelihood | −56.92900 | Akaike criterion | 119.8580 |
| Schwarz criterion | 124.5241 | Hannan-Quinn | 121.4687 |
| rho | −0.246491 | Durbin-Watson | 2.240978 |



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| | |
|---|---|
| 'Between' variance = 2.65565<br>'Within' variance = 0.169201 | Pesaran CD test for cross-sectional dependence – |
| theta used for quasi-demeaning = 0.905027 | Null hypothesis: No cross-sectional dependence |
| corr(y,yhat)^2 = 0.382487 | Asymptotic test statistic: z = 1.319932 with p-value = 0.187. |
| Joint test on named regressors – | Test for normality of residual – |
| Asymptotic test statistic: Chi-square(2) = 39.1096 with p-value = 3.21708e-009 | Null hypothesis: error is normally distributed |
| Breusch-Pagan test –<br>Null hypothesis: Variance of the unit-specific error = 0 | Test statistic: Chi-square(2) = 16.036 with p-value = 0.0003 |
| Asymptotic test statistic: Chi-square(1) = 72.7237 with p-value = 1.49131e-017 | |

Robust regression is a dire alternative in the presence of outliers and influential observations. Our case arises from the NPLR variable evidenced further by FBN non-performing loans spike from 2015–2018. Also, the need to use the robust standard error option emanates from the advice posed by Bickel (1978) and Koenker (1981) that the Breusch-Pagan test is not accurate for data that is not normally distributed. The estimated random-effects model above is suffering from the problem of heteroskedasticity. Hence, prompting the use of robust standard errors (HAC). Also, there is no cross-sectional dependence evidenced by a p-value above 5%.

Using the robust standard error option did not alleviate the model from heteroskedasticity at a 5% level of significance. Evidenced by a BPGT asymptotic test statistic: Chi-square (1) = 72.7237 with p-value = 1.49131e-017 and the null hypothesis of normal distribution was rejected evidenced by Chi-square (2) = 16.036 with p-value 0.0003. The researcher resorted to heteroskedasticity-corrected options on GRETL and problems of heteroskedasticity was corrected efficiently and presented below;

**Table 6**
Heteroskedasticity-corrected GRETL output

Model 2: Heteroskedasticity-corrected, using 35 observations
Dependent variable: ROAA

| | Coefficient | Std. Error | t-ratio | p-value |
|---|---|---|---|---|
| Const. | −0.453565 | 1.11404 | −0.4071 | 0.6866 |
| NPLR | −0.0659960 | 0.0173426 | −3.805 | 0.0006*** |
| CAR | 0.166068 | 0.0544604 | 3.049 | 0.0046*** |

Statistics based on the weighted data:

| | | | |
|---|---|---|---|
| Sum squared resid | 99.17062 | S.E. of regression | 1.760421 |
| R-squared | 0.516112 | Adjusted R-squared | 0.485869 |
| F (2, 32) | 17.06551 | P-value(F) | 9.03e-06 |
| Log-likelihood | −67.88899 | Akaike criterion | 141.7780 |
| Schwarz criterion | 146.4440 | Hannan-Quinn | 143.3887 |


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| Statistics based on the original data: | | | |
|---|---|---|---|
| Mean dependent var | 2.608571 | S.D. dependent var | 1.554381 |
| Sum squared resid | 49.51194 | S.E. of regression | 1.243884 |

Test for normality of residual –

Null hypothesis: error is normally distributed

Test statistic: Chi-square (2) = 19.5945 with p-value = 5.56054e-005

Variance Inflation Factors

Minimum possible value = 1.0

Values > 10.0 may indicate a collinearity problem

NPLR 1.035

CAR 1.035

### 4.4. Interpretation of Results

We will base our interpretations in the build-up to hypothesis testing on the transformed model estimates extracted from GRETL.

The adjusted R-squared of 49% approximately reinforces the degree of variations in the dependent variable explained by the independent variables. The F-test statistic (F = 17.065510, p-value = 9.03e-06) suggests that the chosen independent variables are jointly significant in explaining variations in the dependent variable and approves the fit of the chosen model. As established earlier, NPLR is expected to possess a negative sign, and CAR is expected to possess a positive sign as established by theoretical and empirical evidence.

In the above output, NPLR is negatively signed and significant in its effect on Return on Average Asset in that a 1% increase in NPLR of commercial banks in Nigeria will result in a 0.065 unit decrease in the Return on Average Asset conforming to a-prior expectations. CAR is positively signed and has a significant effect on ROAA, evidenced by a p-value of less than a 5% level of significance conforming to set a-priori expectations. A 1% increase in Capital Adequacy Ratio of commercial banks in Nigeria will result in a 0.17 increase in Return on Average Assets. If all variables are kept constant, ROAA will decrease by 0.45 units.

#### *4.4.1. Hypothesis Testing*

*$H_o$: Credit Risk Management has no significant impact on the profitability of commercial banks in Nigeria.*

It is succinct to conclude that CAR and NPLR are significant in explaining variations in ROAA from 2012–2018 with a sample of 5 Nigerian commercial banks. In light of the available econometric evidence, we forge ahead to state the null hypothesis and reach a decision. In this case, we reject the null hypothesis as all variables were significant at 5% level. Therefore, we accept the alternate hypothesis stating that Credit Risk Management has a significant impact on commercial banks' profitability in Nigeria.



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Comparing these results to the study findings in Perera & Morawakage (2016), the model used in their Sri Lankan study was modified and applied thus. However, it differed in the sample and distinct regulations across multi-banking jurisdictions. However, Perera & Morawakage (2016) posited that NPLR had the greatest effect on ROAA compared to CAR and LDR from 2009–2015 using Sri-Lankan banks. Tweaking the model in Perera & Morawakage (2016) to eliminate the measure of liquidity risk proxied by loan to deposit ratio. Nigerian bank-based evidence emanating from this research suggests that Capital Adequacy Ratio remains the principal factor engendering bank development and its continued existence. Therefore, more exposure to risk should cause an increase in its capital position. Furthermore, the constant intervention and monitoring of bank capital by regulators in different banking jurisdictions reinforces its importance in covering credit risk and other recognised variety of risks under the purview of banks. Following the GRETL output – an increase in bank capital affords an increase in loans to its clientele and acts as a buffer for unexpected losses. On the other hand, an increase in non-performing loans will result in lower incomes and a lower return on average assets.

## 5. SUMMARY OF FINDINGS, CONCLUSION AND RECOMMENDATIONS

When data is carefully queried, it yields its underlying information. As Ronald Coase would say, "If you torture the data long enough, it will confess to anything" (Coase, 2009). Having carried out rigorous mining and digging of the primary and secondary data, we have – at this point – come to some conclusions as found below:

### 5.1. Summary of Findings

In the attainment of this research objective, seventy-eight (78) questionnaires were distributed to selected financial institutions with a view of collecting relevant data for the study, but fifty-five (55) were collected and collated. Moreover, research questions were developed to facilitate the attainment of the broad objective of the study. After careful analysis and interpretation of the data collected, the following findings were made:

Percentages were conducted on received responses to questions posed by the researcher and deductions made are discussed thus;

Personal opinions of bank staff in the selected commercial banks under review answered questions from the research questionnaire administered. The first question in table 1 shows that bank staff, to a great extent, believe that most Nigerian banks failed due to inadequate credit risk management evidenced by a SA – 32.73% and A – 34.54% while others possessed contrary views. The second question in table 1 vis-a-vis the views of selected bank staff reinforces the claim that poor credit risk management remains the principal factor causing the spike in non-performing loans evidenced by SA – 34.55% and A – 36.36%. However, 9.09% of bank staff's responses remained neutral, while 20% of responses by bank staff strongly disagreed that poor credit risk management increases the rate of non-performing loans. The third question in table 1 centred on a thorough risk analysis before credit approval. 89.09% of responses by bank staff depicts a flawless acceptance that banks in utmost carefulness should conduct a thorough risk analysis before approval. The fourth question in table 1 borders on the degree of risk exposures and 67.27% of responses by bank staff continuation instead of the full stop. It concurred that banks indeed increases its risk exposure beyond its capital threshold; on the other hand, 21.82% of responses bank staff remained neutral i.e., neither agree nor disagree. The fifth question in table 1 portrayed the importance of the regulators amidst this loan menace affecting banks' health in Nigeria. Bank staff flawlessly agreed that without the regulators' presence and instant wading into the loan menace, NPLs would have grown much worse than it is now. 85.46% of responses


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by bank staff were in perfect agreement while 9.09% of responses by bank staff remained neutral, and a paltry 5.45% of responses by bank staff strongly disagreed.

After estimating the random-effects model, findings show that CAR and NPLR have a significant effect on the dependent variable; Return on Average Asset, a proxy for bank profitability in this study, is valid at a 5% level of significance. The estimated coefficients of the independent variables are in perfect consonance with the stated a-priori expectations. This study's findings are in perfect alignment with the study of Serwadda (2018) and Perera & Morawakage (2016) but differ greatly from the findings of Tekalagn, Lu & Md. Shafiqul (2015), where an increase in capital adequacy ratio causes a decrease in return on assets. The observed phenomenon may arise from strict regulatory capital requirements, the scope of operations, and banks' risk appetite.

### 5.2. Conclusion

This research aims to investigate the impact of credit risk management on bank profitability in Nigeria. The paucity of studies of local inclination on credit risk management vis-a-vis the dangerous effect on credit risk on bank capital spurred the researcher to embark on an immediate investigation to seek empirical answers. This research reinforces the role of adequate regulatory and economic capital in ensuring the long-term sustainability of Nigeria's top banks. The influx of new banks in the industry may necessitate tight regulatory beam-light to ensure their risk exposure is moderate in favour of creditors, shareholders, and depositors. There is a commendable success on the IFRS adoption in the banking industry, with a corresponding decrease in non-performing loans across the top banks in Nigeria. However, there are notable worries on the in-built flexibility possessed by banks' top management to build a bank-specific ECL system in deciding the percentage set aside for loan loss provisions and reporting procedures when there is an excess or a shortage. The overall call is for increased scrutiny by the regulators on banks' balance sheet and off-balance sheet activities to obtain the true health of banks in the banking system.

### 5.3. Recommendations

Based on our research findings on the impact of credit risk management on bank profitability in Nigeria, the following suggestions are proffered:

- Matching of bank capital to total risk exposure of commercial banks in Nigeria and if there is a deficit, new capital requirements are necessary.
- Insider-related interests in loan disbursement should be monitored closely by regulators to ensure favourable performance of the loan facility.
- AMCON's mandate should be reviewed to make them take a more active role in activating recovery procedures against insider-related loans without fear or favour.
- There should be profiling of loan defaulters whether businesses or individuals to decrease their creditworthiness.

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